Junos® OS

Ethernet Switching and Layer 2 Transparent Mode Feature Guide for Security Devices

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Junos® OS Ethernet Switching and Layer 2 Transparent Mode Feature Guide for Security Devices

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

YEAR 2000 NOTICE

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

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Documentation and Release Notes

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

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Supported Platforms

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

- SRX Series
- vSRX

Using the Examples in This Manual

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

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

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

Documentation Conventions

Table 1 on page xix 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 xix defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

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

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

<table>
<tr><th>Convention</th><th>Description</th><th>Examples</th></tr>
<tr><td><code>Fixed-width text like this</code></td><td>Represents output that appears on the terminal screen.</td><td><code>user@host></code> show chassis alarms

<code>No alarms currently active</code></td></tr>
<tr><td>Italic text like this</td><td>• Introduces or emphasizes important new terms.
• Identifies guide names.
• Identifies RFC and Internet draft titles.</td><td>• A policy term is a named structure that defines match conditions and actions.
• Junos OS CLI User Guide
• RFC 1997, BGP Communities Attribute</td></tr>
<tr><td>Italic text like this</td><td>Represents variables (options for which you substitute a value) in commands or configuration statements.</td><td>Configure the machine’s domain name:

[edit]
root@# set system domain-name
domain-name</td></tr>
<tr><td>Text like this</td><td>Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.</td><td>• To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level.
• The console port is labeled CONSOLE.</td></tr>
<tr><td>< > (angle brackets)</td><td>Encloses optional keywords or variables.</td><td>stub <default-metric <i>metric</i>>;</td></tr>
<tr><td>| (pipe symbol)</td><td>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.</td><td>broadcast | multicast

(string1 | string2 | string3)</td></tr>
<tr><td># (pound sign)</td><td>Indicates a comment specified on the same line as the configuration statement to which it applies.</td><td>rsvp { # Required for dynamic MPLS only</td></tr>
<tr><td>[ ] (square brackets)</td><td>Encloses a variable for which you can substitute one or more values.</td><td>community name members [community-ids]</td></tr>
<tr><td>Indention and braces ({ })</td><td>Identifies a level in the configuration hierarchy.</td><td rowspan="2">[edit]
routing-options {
  static {
    route default {
      nexthop address;
      retain;
    }
  }
}</td></tr>
<tr><td>; (semicolon)</td><td>Identifies a leaf statement at a configuration hierarchy level.</td></tr>
<tr><td colspan="3">GUI Conventions</td></tr>
<tr><td>Bold text like this</td><td>Represents graphical user interface (GUI) items you click or select.</td><td>• In the Logical Interfaces box, select All Interfaces.
• To cancel the configuration, click Cancel.</td></tr>
</table>

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

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

Documentation Feedback

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

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- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

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

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

Self-Help Online Tools and Resources

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

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

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

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

Opening a Case with JTAC

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

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

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

PART 1

Overview

CHAPTER 1

Introduction to Switching and Layer 2 Transparent Mode

Ethernet Switching and Layer 2 Transparent Mode Overview

Supported Platforms SRX Series, vSRX

Layer 2 transparent mode provides the ability to deploy the firewall without making changes to the existing routing infrastructure. The firewall is deployed as a Layer 2 switch with multiple VLAN segments and provides security services within VLAN segments. Secure-wire is a special version of Layer 2 transparent mode that allows bump-in-wire deployment.

Ethernet switching forwards the Ethernet frames within or across the LAN segment (or VLAN) using the Ethernet MAC address information. Ethernet switching on the SRX1500 device is performed in the hardware using ASICs.

Starting in Junos OS Release 15.1X49-D40, use the **set protocols l2-learning global-mode(transparent-bridge | switching)** command to switch between the Layer 2 transparent bridge mode and Ethernet switching mode. After switching the mode, you must reboot the device for the configuration to take effect.

NOTE: The default mode for Layer 2 is transparent mode.

The Layer 2 protocol supported in switching mode is Link Aggregation Control Protocol (LACP).

You can configure Layer 2 transparent mode on a redundant Ethernet interface. Use the following commands to define a redundant Ethernet interface:

- **set interfaces *interface-name* ether-options redundant-parent *reth-interface-name***
- **set interfaces *reth-interface-name* redundant-ether-options redundancy-group *number***

Release History Table

Release	Description
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, use the **set protocols l2-learning global-mode(transparent-bridge | switching)** command to switch between the Layer 2 transparent bridge mode and Ethernet switching mode.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- **global-mode (Protocols) on page 294**
- **l2-learning (Protocols) on page 302**

CHAPTER 2

Configuring Interfaces

Understanding Layer 2 Interfaces

Supported Platforms SRX Series, vSRX

Layer 2 logical interfaces are created by defining one or more logical units on a physical interface with the family address type **ethernet-switching**. If a physical interface has a **ethernet-switching** family logical interface, it cannot have any other family type in its logical interfaces. A logical interface can be configured in one of the following modes:

- Access mode—Interface accepts untagged packets, assigns the specified VLAN identifier to the packet, and forwards the packet within the VLAN that is configured with the matching VLAN identifier.
- Trunk mode—Interface accepts any packet tagged with a VLAN identifier that matches a specified list of VLAN identifiers. Trunk mode interfaces are generally used to interconnect switches. To configure a VLAN identifier for untagged packets received on the physical interface, use the **native-vlan-id** option. If the **native-vlan-id** option is not configured, untagged packets are dropped.

NOTE: Multiple trunk mode logical interfaces can be defined, as long as the VLAN identifiers of a trunk interface do not overlap with those of another trunk interface. The native-vlan-id must belong to a VLAN identifier list configured for a trunk interface.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Example: Configuring Layer 2 Logical Interfaces on page 6

• Understanding Transparent Mode Conditions on page 25

Example: Configuring Layer 2 Logical Interfaces

Supported Platforms SRX Series, vSRX

This example shows how to configure a Layer 2 logical interface as a trunk port so that the incoming packets can be selectively redirected to a firewall or other security device.

Requirements

Before you begin, configure the VLANs. See “Example: Configuring VLANs” on page 29.

Overview

In this example, you configure logical interface ge-3/0/0.0 as a trunk port that carries traffic for packets tagged with VLAN identifiers 1 through 10; this interface is implicitly assigned to the previously configured VLANs vlan-a and vlan-b. Then you assign a VLAN ID of 10 to any untagged packets received on physical interface ge-3/0/0.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set unit 0 family ethernet-switching interface-mode trunk vlan members 1–10
set vlan-tagging native-vlan-id 10
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure a Layer 2 logical interface as a trunk port:

1. Configure the logical interface.

```
[edit interfaces ge-3/0/0]
user@host# set unit 0 family ethernet-switching interface-mode trunk vlan members
  1–10
```

2. Specify a VLAN ID for untagged packets.

```
[edit interfaces ge-3/0/0]
user@host# set vlan-tagging native-vlan-id 10
```

3. If you are done configuring the device, commit the configuration.


```
[edit]
user@host# commit
```

Verification

To verify the configuration is working properly, enter the **show interfaces ge-3/0/0** and **show interfaces ge-3/0/0.0** commands.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Understanding Layer 2 Interfaces on page 5
- Understanding Transparent Mode Conditions on page 25
- Example: Configuring Layer 2 Security Zones on page 36

Understanding Integrated Routing and Bridging Interfaces

Supported Platforms SRX Series, vSRX

For VLANs configured with a single VLAN identifier, you can optionally configure an integrated routing and bridging (IRB) interface for management traffic in the VLAN. An IRB interface acts as a Layer 3 routing interface for a VLAN.

NOTE: If you specify a VLAN identifier list in the VLAN configuration, you cannot configure an IRB interface for the VLAN.

Packets arriving on a Layer 2 interface that are destined for the device's MAC address are classified as Layer 3 traffic while packets that are not destined for the device's MAC address are classified as Layer 2 traffic. Packets destined for the device's MAC address are sent to the IRB interface. Packets from the device's routing engine are sent out the IRB interface.

You create an IRB logical interface in a similar manner as a Layer 3 interface, but the IRB interface does not support traffic forwarding or routing. The IRB interface cannot be assigned to a security zone; however, you can configure certain services on a per-zone basis to allow host-inbound traffic for management of the device. This allows you to control the type of traffic that can reach the device from interfaces bound to a specific zone.

NOTE:

- On SRX1400, SRX1500, SRX3400, SRX3600, SRX5600, and SRX5800 devices, we support an IRB interface that allows you to terminate management connections in transparent mode. However, you cannot route traffic on that interface or terminate IPsec VPNs. (Platform support depends on the Junos OS release in your installation.)
- You can configure only one IRB logical interface for each VLAN.

NOTE: On SRX300, SRX320, SRX340, SRX345 devices, and SRX550M on the IRB interface, the following features are not supported:

- IS-IS (family ISO)
- Encapsulations (Ether CCC, VLAN CCC, VPLS, PPPoE, and so on) on VLAN interfaces
- CLNS
- DVMRP
- VLAN interface MAC change
- G-ARP
- Change VLAN-Id for VLAN interface

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Example: Configuring an IRB Interface on page 8
- Understanding VLANs on page 27
- Example: Configuring VLANs on page 29

Example: Configuring an IRB Interface

Supported Platforms SRX Series, vSRX

This example shows how to configure an IRB interface so it can act as a Layer 3 routing interface for a VLAN.

- Requirements on page 8
- Overview on page 8
- Configuration on page 9
- Verification on page 10

Requirements

Before you begin, configure a VLAN with a single VLAN identifier. See “Example: Configuring VLANs” on page 29.

Overview

In this example, you configure the IRB logical interface unit 0 with the family type inet and IP address 10.1.1.1/24, and then reference the IRB interface irb.10 in the vlan10 configuration. Then you enable Web authentication on the IRB interface and activate the webserver on the device.

NOTE: To complete the Web authentication configuration, you must perform the following tasks:

- Define the access profile and password for a Web authentication client.
- Define the security policy that enables Web authentication for the client.

Either a local database or an external authentication server can be used as the Web authentication server.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-1/0/0 unit 0 family ethernet-switching interface-mode trunk
set interfaces ge-1/0/0 unit 0 family ethernet-switching vlan members 10
set interface irb unit 0 family inet address 10.1.1.1/24 web-authentication http
set vlans vlan10 vlan-id 10
set vlans vlan10 l3-interface irb.10
set system services web-management http
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure an IRB interface:

1. Create a Layer 2 trunk interface.

   ```
   [edit]
   user@host# set interfaces ge-1/0/0 unit 0 family ethernet-switching interface-mode
     trunk
   user@host# set interfaces ge-1/0/0 unit 0 family ethernet-switching vlan members
     10
   ```

2. Create an IRB logical interface.

   ```
   [edit]
   user@host# set interface irb unit 0 family inet address 10.1.1.1/24 web-authentication
     http
   ```

3. Create a Layer 2 VLAN.

   ```
   [edit]
   user@host# set vlans vlan10 vlan-id 10
   ```

4. Associate the IRB interface with the VLAN.

   ```
   [edit]
   user@host# set vlans vlan10 l3-interface irb.10
   ```

5. Activate the webserver.

[edit]
user@host# **set system services web-management http**

6. If you are done configuring the device, commit the configuration.

[edit]
user@host# **commit**

Verification

To verify the configuration is working properly, enter the **show interface irb** , and **show vlans** commands.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Understanding Integrated Routing and Bridging Interfaces on page 7
- Example: Configuring Layer 2 Security Zones on page 36
- Understanding VLANs on page 27

Understanding Mixed Mode (Layer 2 and Layer 3)

Supported Platforms SRX Series, vSRX

Mixed mode supports both Layer 2 and Layer 3 interfaces; it is the default mode. You can configure both Layer 2 and Layer 3 interfaces simultaneously using separate security zones.

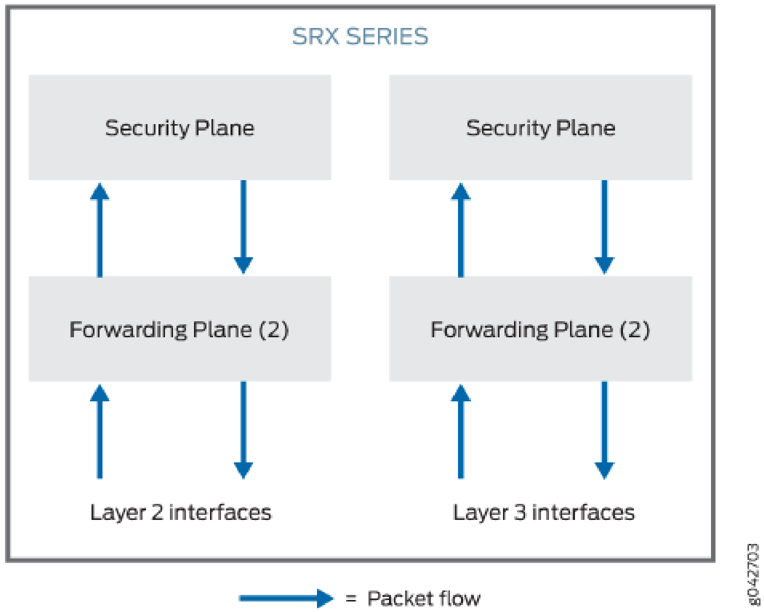
NOTE: **For the mixed mode configuration, you must reboot the device after you commit the changes. However, for SRX5000 line devices, reboot is not required.**

In mixed mode (Layer 2 and Layer 3):

- There is no routing among IRB interfaces and between IRB interfaces and Layer 3 interfaces.
- The user logical system is not supported for Layer 2 traffic. However, you can configure Layer 2 traffic using the root logical system.
- You can configure Layer 3 interfaces using both the user logical system and the root logical system.

The device in Figure 1 on page 11 looks like two separate devices. One device runs in Layer 2 mode and the other device runs in Layer 3 mode. But both devices run independently. Packets cannot be transferred between the Layer 2 and Layer 3 interfaces, because there is no routing among IRB interfaces and between IRB interfaces and Layer 3 interfaces.

Figure 1: Architecture of Mixed Layer 2 and Layer 3 Mode



In mixed mode, the Ethernet physical interface can be either a Layer 2 interface or a Layer 3 interface, but the Ethernet physical interface cannot be both simultaneously. However, Layer 2 and Layer 3 families can exist on separate physical interfaces on the same device.

Table 3 on page 11 lists the Ethernet physical interface types and supported family types.

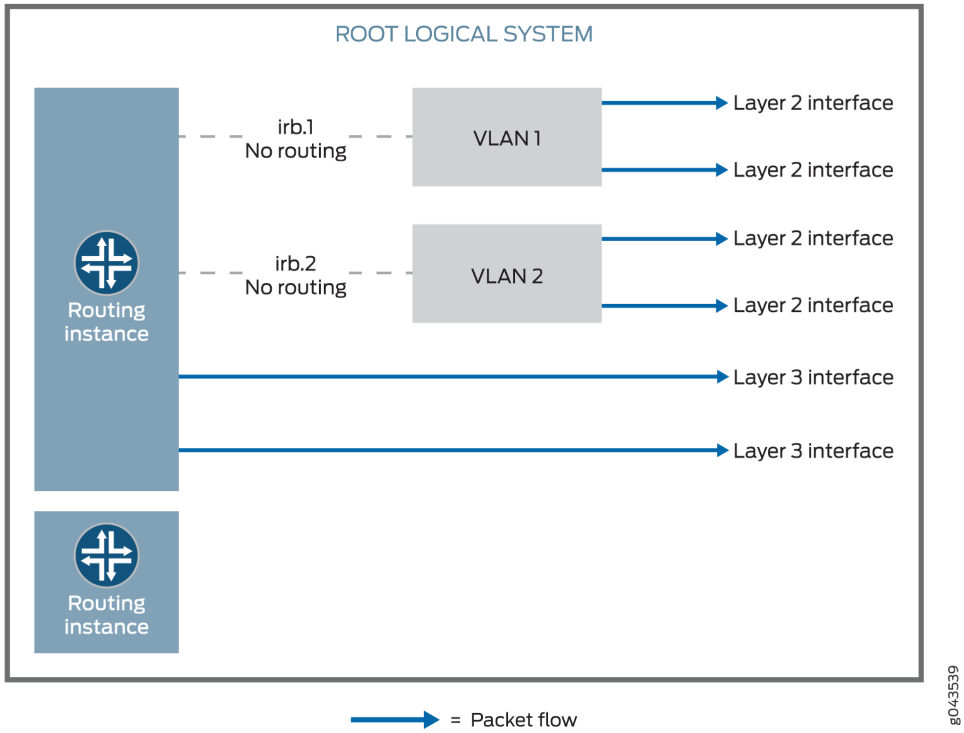
Table 3: Ethernet Physical Interface and Supported Family Types

Ethernet Physical Interface Type	Supported Family Type
Layer 2 Interface	**ethernet-switching**
Layer 3 Interface	**inet** and **inet6**

NOTE: Multiple routing instances are supported.

You can configure both the pseudointerface **irb.x** and the Layer 3 interface under the same default routing instance using either a default routing instance or a user-defined routing instance. See Figure 2 on page 12.

Figure 2: Mixed Layer 2 and Layer 3 Mode



Packets from the Layer 2 interface are switched within the same VLAN, or they connect to the host through the IRB interface. Packets cannot be routed to another IRB interface or a Layer 3 interface through their own IRB interface.

Packets from the Layer 3 interface are routed to another Layer 3 interface. Packets cannot be routed to a Layer 2 interface through an IRB interface.

Table 4 on page 12 lists the security features that are supported in mixed mode and the features that are not supported in transparent mode for Layer 2 switching.

Table 4: Security Features Supported in Mixed Mode (Layer 2 and Layer 3)

Mode Type	Supported	Not Supported
Mixed mode	• Application Layer Gateways (ALGs) • Firewall User Authentication (FWAUTH) • Intrusion Detection and Prevention (IDP) • Screen • AppSecure	• Unified Threat Management (UTM)

Table 4: Security Features Supported in Mixed Mode (Layer 2 and Layer 3) *(continued)*

Mode Type	Supported	Not Supported
Layer 3 interface of mixed mode	• Network Address Translation (NAT) • VPN	—
Layer 2 mode (transparent mode)		• Network Address Translation (NAT) • VPN • Unified Threat Management (UTM)

Starting in Junos OS Release 12.3X48-D10, some conditions apply to mixed-mode operations. Note the conditions here:

- On SRX300, SRX320, SRX340, SRX345, and SRX550M devices, you cannot configure Ethernet switching and virtual private LAN service (VPLS) using mixed mode (Layer 2 and Layer 3).
- On SRX5400, SRX5600, and SRX5800 devices, you do not have to reboot the device when you configure VLAN.

Release History Table

Release	Description
12.3X48-D10	Starting in Junos OS Release 12.3X48-D10, some conditions apply to mixed-mode operations.

Related Documentation

- Example: Improving Security Services by Configuring an SRX Series Device Using Mixed Mode (Layer 2 and Layer 3) on page 13
- Understanding Secure Wire on page 71

Example: Improving Security Services by Configuring an SRX Series Device Using Mixed Mode (Layer 2 and Layer 3)

Supported Platforms SRX Series, vSRX

You can configure an SRX Series device using both Layer 2 and Layer 3 interfaces simultaneously to simplify deployments and to improve security services.

This example shows how to pass the Layer 2 traffic from interface ge-0/0/1.0 to interface ge-0/0/0.0 and Layer 3 traffic from interface ge-0/0/2.0 to interface ge-0/0/3.0.

- Requirements on page 14
- Overview on page 14

Requirements

This example uses the following hardware and software components:

- An SRX Series device
- Four PCs

Before you begin:

- Create a separate security zone for Layer 2 and Layer 3 interfaces. See "Understanding Layer 2 Security Zones" on page 35.

Overview

In enterprises where different business groups have either Layer 2 or Layer 3 based security solutions, using a single mixed mode configuration simplifies their deployments. In a mixed mode configuration, you can also provide security services with integrated switching and routing.

In addition, you can configure an SRX Series device in both standalone and chassis cluster mode using mixed mode.

In mixed mode (default mode), you can configure both Layer 2 and Layer 3 interfaces simultaneously using separate security zones.

NOTE: **For the mixed mode configuration, you must reboot the device after you commit the changes. However, for SRX5000 line devices, reboot is not required.**

In this example, first you configure a Layer 2 family type called Ethernet switching to identify Layer 2 interfaces. You set the IP address 10.10.10.1/24 to IRB interface. Then you create zone L2 and add Layer 2 interfaces ge-0/0/1.0 and ge-0/0/0.0 to it.

Next you configure a Layer 3 family type inet to identify Layer 3 interfaces. You set the IP address 192.0.2.1/24 to interface ge-0/0/2.0 and the IP address 192.0.2.3/24 to interface ge-0/0/3. Then you create zone L3 and add Layer 3 interfaces ge-0/0/2.0 and ge-0/0/3.0 to it.

Topology

Figure 3 on page 15 shows a mixed mode topology.

Figure 3: Mixed Mode Topology

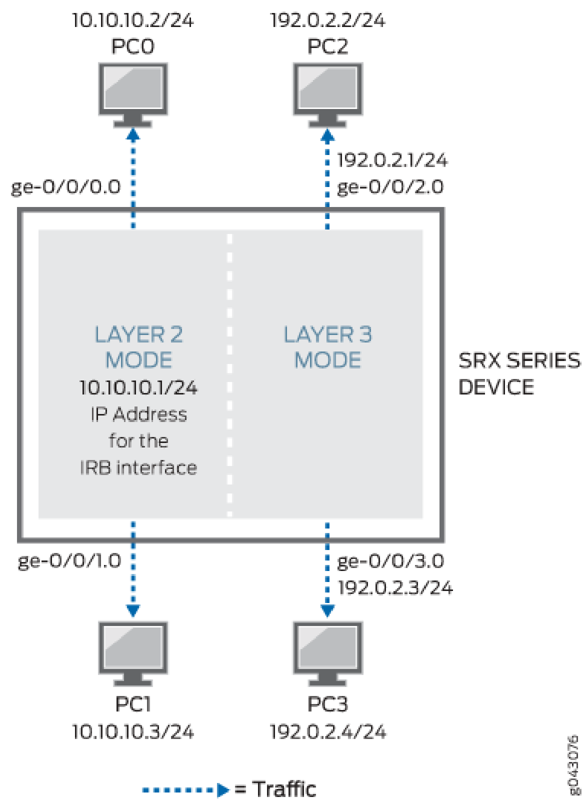


Table 5 on page 15 shows the parameters configured in this example.

Table 5: Layer 2 and Layer 3 Parameters

Parameter	Description
L2	Layer 2 zone.
ge-0/0/1.0 and ge-0/0/0.0	Layer 2 interfaces added to the Layer 2 zone.
L3	Layer 3 zone.
ge-0/0/2.0 and ge-0/0/3.0	Layer 3 interfaces added to the Layer 3 zone.
10.10.10.1/24	IP address for the IRB interface.
192.0.2.1/24 and 192.0.2.3/24	IP addresses for the Layer 3 interface.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/0 unit 0 family ethernet-switching interface-mode access
set interfaces ge-0/0/0 unit 0 family ethernet-switching vlan members 10
set interfaces ge-0/0/1 unit 0 family ethernet-switching interface-mode access
set interfaces ge-0/0/1 unit 0 family ethernet-switching vlan members 10
set interfaces irb unit 10 family inet address 10.10.10.1/24
set security zones security-zone L2 interfaces ge-0/0/1.0
set security zones security-zone L2 interfaces ge-0/0/0.0
set vlans vlan-10 vlan-id 10
set vlans vlan-10 l3-interface irb.10
set interfaces ge-0/0/2 unit 0 family inet address 192.0.2.1/24
set interfaces ge-0/0/3 unit 0 family inet address 192.0.2.3/24
set security policies default-policy permit-all
set security zones security-zone L2 host-inbound-traffic system-services any-service
set security zones security-zone L2 host-inbound-traffic protocols all
set security zones security-zone L3 host-inbound-traffic system-services any-service
set security zones security-zone L3 host-inbound-traffic protocols all
set security zones security-zone L3 interfaces ge-0/0/2.0
set security zones security-zone L3 interfaces ge-0/0/3.0
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure Layer 2 and Layer 3 interfaces:

1. Create a Layer 2 family type to configure Layer 2 interfaces.

   ```
   [edit interfaces]
   user@host#set ge-0/0/0 unit 0 family ethernet-switching interface-mode access
   user@host#set ge-0/0/0 unit 0 family ethernet-switching vlan members 10
   user@host#set ge-0/0/1 unit 0 family ethernet-switching interface-mode access
   user@host#set ge-0/0/1 unit 0 family ethernet-switching vlan members 10
   ```

2. Configure an IP address for the IRB interface.

   ```
   [edit interfaces]
   user@host# set irb unit 10 family inet address 10.10.10.1/24
   ```

3. Configure Layer 2 interfaces.

   ```
   [edit security zones security-zone L2 interfaces]
   user@host# set ge-0/0/1.0
   user@host# set ge-0/0/0.0
   ```

4. Configure VLAN.

   ```
   [edit vlans vlan-10]
   user@host# set vlan-id 10
   user@host# set l3-interface irb.10
   ```

5. Configure IP addresses for Layer 3 interfaces.

```
[edit interfaces]
user@host# set ge-0/0/2.0 unit 0 family inet address 192.0.2.1/24
user@host# set ge-0/0/3.0 unit 0 family inet address 192.0.2.3/24
```

6. Configure the policy to permit the traffic.

```
[edit security policies]
user@host#set default-policy permit-all
```

7. Configure Layer 3 interfaces.

```
[edit security zones security-zone]
user@host# set L2 host-inbound-traffic system-services any-service
user@host# set L2 host-inbound-traffic protocols all
user@host# set L3 host-inbound-traffic system-services any-service
user@host# set L3 host-inbound-traffic protocols all
user@host# set L3 interfaces ge-0/0/2.0
user@host# set L3 interfaces ge-0/0/3.0
```

Results From configuration mode, confirm your configuration by entering the **show interfaces**, **show security policies**, **show vlans**, and **show security zones** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show interfaces
  ge-0/0/0 {
    unit 0 {
      family ethernet-switching {
        interface-mode access;
        vlan-id 10;
      }
    }
  }
  ge-0/0/1 {
    unit 0 {
      family ethernet-switching {
        interface-mode access;
        vlan-id 10;
      }
    }
  }
  ge-0/0/2 {
    unit 0 {
      family inet {
        address 192.0.2.1/24;
      }
    }
  }
  ge-0/0/3 {
    unit 0 {
      family inet {
        address 192.0.2.2/24;
      }
    }
  }
```

```
  irb {
    unit 10 {
      family inet {
        address 10.10.10.1/24;
      }
    }
  }
[edit]
user@host#  show security policies
default-policy {
  permit-all;
}
[edit]
user@host# show vlans
  vlan-10 {
    vlan-id 10;
    l3-interface irb.10;
  }
[edit]
user@host#  show security zones
  security-zone L2 {
    host-inbound-traffic {
      system-services {
        any-service;
      }
      protocols {
        all;
      }
    }
    interfaces {
      ge-0/0/1.0;
      ge-0/0/0.0;
    }
  }
  security-zone L3 {
    host-inbound-traffic {
      system-services {
        any-service;
      }
      protocols {
        all;
      }
    }
    interfaces {
      ge-0/0/2.0;
      ge-0/0/3.0;
    }
  }
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- Verifying the Layer 2 and Layer 3 Interfaces and Zones on page 19
- Verifying the Layer 2 and Layer 3 Session on page 20

Verifying the Layer 2 and Layer 3 Interfaces and Zones

Purpose Verify that the Layer 2 and Layer 3 interfaces and Layer 2 and Layer 3 zones are created.

Action From operational mode, enter the **show security zones** command.

```
user@host>show security zones
 Security zone: HOST
  Send reset for non-SYN session TCP packets: Off
  Policy configurable: Yes
  Interfaces bound: 0
  Interfaces:

Security zone: L2
  Send reset for non-SYN session TCP packets: Off
  Policy configurable: Yes
  Interfaces bound: 2
  Interfaces:
    ge-0/0/0.0
    ge-0/0/1.0

Security zone: L3
  Send reset for non-SYN session TCP packets: Off
  Policy configurable: Yes
  Interfaces bound: 2
  Interfaces:
    ge-0/0/2.0
    ge-0/0/3.0

Security zone: junos-host
  Send reset for non-SYN session TCP packets: Off
  Policy configurable: Yes
  Interfaces bound: 0
  Interfaces:
```

Meaning The output shows the Layer 2 (L2) and Layer 3 (L3) zone names and the number and names of Layer 2 and Layer 3 interfaces bound to the L2 and L3 zones.

Verifying the Layer 2 and Layer 3 Session

Purpose Verify that the Layer 2 and Layer 3 sessions are established on the device.

Action From operational mode, enter the **show security flow session** command.

```
user@host>show security flow session
Session ID: 130000050, Policy name: default-policy-00/2, Timeout: 2, Valid
  In: 10.10.10.2/22 --> 10.10.10.3/28;icmp, If: ge-0/0/0.0, Pkts: 1, Bytes: 98
  Out: 10.10.10.3/245 --> 10.10.10.2/248;icmp, If: ge-0/0/1.0, Pkts: 1, Bytes:
98

Session ID: 130000051, Policy name: default-policy-02/2, Timeout: 4, Valid
  In: 192.0.2.1/17 --> 192.0.2.2/19;icmp, If: ge-0/0/2.0, Pkts: 1, Bytes: 84
Out: 192.0.2.2/212 --> 192.0.2.1/218;icmp, If: ge-0/0/3.0, Pkts: 1, Bytes: 84
```

Meaning The output shows active sessions on the device and each session's associated security policy.

- **Session ID 130000050**—Number that identifies the Layer 2 session. Use this ID to get more information about the Layer 2 session such as policy name or number of packets in and out.
- **default-policy-00/2**—Default policy name that permitted the Layer 2 traffic.
- **In**—Incoming flow (source and destination Layer 2 IP addresses with their respective source and destination port numbers, session is ICMP, and the source interface for this session is ge-0/0/0.0).
- **Out**—Reverse flow (source and destination Layer 2 IP addresses with their respective source and destination port numbers, session is ICMP, and destination interface for this session is ge-0/0/1.0).
- **Session ID 130000051**—Number that identifies the Layer 3 session. Use this ID to get more information about the Layer 3 session such as policy name or number of packets in and out.
- **default-policy-02/2**—Default policy name that permitted the Layer 3 traffic.
- **In**—Incoming flow (source and destination Layer 3 IP addresses with their respective source and destination port numbers, session is ICMP, and the source interface for this session is ge-0/0/2.0).
- **Out**—Reverse flow (source and destination Layer 3 IP addresses with their respective source and destination port numbers, session is ICMP, and destination interface for this session is ge-0/0/3.0).

Related Documentation

- Understanding Mixed Mode (Layer 2 and Layer 3) on page 10
- Understanding Secure Wire on page 71

PART 2

Configuring Layer 2 Transparent Mode

CHAPTER 3

Configuring Transparent Mode

Layer 2 Transparent Mode Overview

Supported Platforms SRX Series, vSRX

For SRX Series devices, transparent mode provides full security services for Layer 2 switching capabilities. On these SRX Series devices, you can configure one or more VLANs to perform Layer 2 switching. A VLAN is a set of logical interfaces that share the same flooding or broadcast characteristics. Like a virtual LAN (VLAN), a VLAN spans one or more ports of multiple devices. Thus, the SRX Series device can function as a Layer 2 switch with multiple VLANs that participate in the same Layer 2 network.

In transparent mode, the SRX Series device filters packets that traverse the device without modifying any of the source or destination information in the IP packet headers. Transparent mode is useful for protecting servers that mainly receive traffic from untrusted sources because there is no need to reconfigure the IP settings of routers or protected servers.

In transparent mode, all physical ports on the device are assigned to Layer 2 interfaces. Do not route Layer 3 traffic through the device. Layer 2 zones can be configured to host Layer 2 interfaces, and security policies can be defined between Layer 2 zones. When packets travel between Layer 2 zones, security policies can be enforced on these packets.

Table 6 on page 24 lists the security features that are supported and are not supported in transparent mode for Layer 2 switching.

Table 6: Security Features Supported in Transparent Mode

Mode Type	Supported	Not Supported
Transparent mode	• Application Layer Gateways (ALGs) • Firewall User Authentication (FWAUTH) • Intrusion Detection and Prevention (IDP) • Screen • AppSecure	• Network Address Translation (NAT) • VPN • Unified Threat Management (UTM)

NOTE:

- **On all SRX Series devices, transparent mode is not supported on mPIMs.**
- **On SRX300, SRX320, SRX340, SRX345, and SRX550M devices, the DHCP server propagation is not supported in Layer 2 transparent mode.**

Layer 2 Switching Exceptions on SRX Series Devices

The switching functions on the SRX Series devices are similar to the switching features on Juniper Networks MX Series routers. However, the following Layer 2 networking features on MX Series routers are not supported on SRX Series devices:

- Layer 2 control protocols—These protocols are used on MX Series routers for Rapid Spanning Tree Protocol (RSTP) or Multiple Spanning Tree Protocol (MSTP) in customer edge interfaces of a VPLS routing instance.
- Virtual switch routing instance—The virtual switching routing instance is used on MX Series routers to group one or more VLANs.
- Virtual private LAN services (VPLS) routing instance—The VPLS routing instance is used on MX Series routers for point-to-multipoint LAN implementations between a set of sites in a VPN.

In addition, the SRX Series devices do not support the following Layer 2 features:

- Spanning Tree Protocol (STP), RSTP, or MSTP—It is the user’s responsibility to ensure that no flooding loops exist in the network topology.
- Internet Group Management Protocol (IGMP) snooping—Host-to-router signaling protocol for IPv4 used to report their multicast group memberships to neighboring routers and determine whether group members are present during IP multicasting.
- Double-tagged VLANs or IEEE 802.1Q VLAN identifiers encapsulated within 802.1Q packets (also called “Q in Q” VLAN tagging)—Only untagged or single-tagged VLAN identifiers are supported on SRX Series devices.
- Nonqualified VLAN learning, where only the MAC address is used for learning within the VLAN—VLAN learning on SRX Series devices is qualified; that is, both the VLAN identifier and MAC address are used.

Also, on SRX100, SRX110, SRX210, SRX220, SRX240, SRX300, SRX320, SRX340, SRX345, SRX550, or SRX650 devices, some features are not supported. (Platform support depends on the Junos OS release in your installation.) The following features are not supported for Layer 2 transparent mode on the mentioned devices:

- G-ARP on the Layer 2 interface
- IP address monitoring on any interface
- Transit traffic through IRB
- IRB interface in a routing instance
- IRB interface handling of Layer 3 traffic

NOTE: **The IRB interface is a pseudointerface and does not belong to the reth interface and redundancy group.**

Layer 2 Transparent Mode on the SRX5000 Line Module Port Concentrator

The SRX5000 line Module Port Concentrator (SRX5K-MPC) supports Layer 2 transparent mode and processes the traffic when the SRX Series device is configured in Layer 2 transparent mode.

When the SRX5K-MPC is operating in Layer 2 mode, you can configure all interfaces on the SRX5K-MPC as Layer 2 switching ports to support Layer 2 traffic.

The security processing unit (SPU) supports all security services for Layer 2 switching functions, and the MPC delivers the ingress packets to the SPU and forwards the egress packets that are encapsulated by the SPU to the outgoing interfaces.

When the SRX Series device is configured in Layer 2 transparent mode, you can enable the interfaces on the MPC to work in Layer 2 mode by defining one or more logical units on a physical interface with the family address type as **Ethernet switching**. Later you can proceed with configuring Layer 2 security zones and configuring security policies in transparent mode. Once this is done, next-hop topologies are set up to process ingress and egress packets.

Related Documentation

- Understanding VLANs on page 27
- Understanding Transparent Mode Conditions on page 25
- Understanding Layer 2 Interfaces on page 5
- Understanding Layer 2 Security Zones on page 35
- Understanding Security Policies in Transparent Mode on page 37

Understanding Transparent Mode Conditions

Supported Platforms SRX Series, vSRX

There is no command to define or enable transparent mode on the device. The device operates in transparent mode when there are interfaces defined as Layer 2 interfaces. The device operates in route mode (the default mode) if there are no physical interfaces configured as Layer 2 interfaces.

NOTE: Starting in Junos OS Release 12.3X48-D10, mixed mode is the default mode, abd you can configure an SRX Series device using both transparent mode (Layer 2) and route mode (Layer 3) simultaneously, with no reboot required.

You can configure the **fxp0** out-of-band management interface on the SRX Series device as a Layer 3 interface, even if Layer 2 interfaces are defined on the device. With the exception of the **fxp0** interface, you can define Layer 2 and Layer 3 interfaces on the device's network ports.

NOTE: There is no fxp0 out-of-band management interface on the SRX300, SRX320, SRX340, and SRX345 devices. (Platform support depends on the Junos OS release in your installation.)

Release History Table

Release	Description
12.3X48-D10	Starting in Junos OS Release 12.3X48-D10, mixed mode is the default mode, abd you can configure an SRX Series device using both transparent mode (Layer 2) and route mode (Layer 3) simultaneously, with no reboot required.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Example: Configuring Layer 2 Logical Interfaces on page 6
- Understanding Layer 2 Interfaces on page 5
- Understanding Mixed Mode (Layer 2 and Layer 3) on page 10

CHAPTER 4

Configuring VLANs in Transparent Mode

Understanding VLANs

Supported Platforms SRX Series, vSRX

The packets that are forwarded within a VLAN are determined by the VLAN ID of the packets and the VLAN ID of the VLAN. Only the packets with VLAN IDs that match the VLAN ID configured for a VLAN are forwarded within the VLAN.

When configuring VLANs, you can specify either a single VLAN ID or a list of specific VLAN IDs. If you specify a list of VLAN IDs, a VLAN is created for each VLAN ID in the list. Certain VLAN properties, such as the integrated routing and bridging interface (IRB), are not configurable if VLANs are created in this manner.

Each Layer 2 logical interface configured on the device is implicitly assigned to a VLAN based on the VLAN ID of the packets accepted by the interface. You do not need to explicitly define the logical interfaces when configuring a VLAN.

You can configure one or more static MAC addresses for a logical interface in a VLAN; this is only applicable if you specified a single VLAN ID when creating the VLAN.

NOTE: **If a static MAC address you configure for a logical interface appears on a different logical interface, packets sent to that interface are dropped.**

You can configure the following properties that apply to all VLANs on the SRX Series device:

- Layer 2 address learning—Layer 2 address learning is enabled by default. A VLAN learns unicast media access control (MAC) addresses to avoid flooding packets to all interfaces in the VLAN. Each VLAN creates a source MAC entry in its forwarding tables for each source MAC address learned from packets received on interfaces that belong to the VLAN. When you disable MAC learning, source MAC addresses are not dynamically learned, and any packets sent to these source addresses are flooded into a VLAN.

- Maximum number of MAC addresses learned from all logical interfaces on the SRX Series device—After the MAC address limit is reached, the default is for any incoming packets with a new source MAC address to be forwarded. You can specify that the packets be dropped instead. The default limits of MAC addresses for the SRX Series devices are shown in Table 7 on page 28 and Table 8 on page 28. (Platform support depends on the Junos OS release in your installation.)

Table 7: MAC Addresses Default Limits for Junos OS Release 15.1X49-D30 and Earlier

SRX Series Devices	Default Limit for MAC Addresses
SRX100 SRX210	1024
SRX220	2048
SRX240	4096
SRX650	16,384
SRX3400 SRX3600 SRX5600 SRX5800	131,071

Starting in Junos OS Release 15.1X49-D40, default limits for MAC addresses are more uniform.

Table 8: MAC Addresses Default Limits for Junos OS Release Starting in Junos OS 15.1X49-D40

SRX Series Devices	Default Limit for MAC Addresses
SRX300 SRX320 SRX340 SRX345	16,383
SRX1500	24,575
SRX5600 SRX5800	131,071

- Timeout interval for MAC table entries. By default, the timeout interval for MAC table entries is 300 seconds. The minimum you can configure is 10 seconds and the maximum is 64,000 seconds. The timeout interval applies only to dynamically learned MAC addresses. This value does not apply to configured static MAC addresses, which never time out.

Release History Table

Release	Description
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, default limits for MAC addresses are more uniform.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Example: Configuring VLANs on page 29
- Understanding Integrated Routing and Bridging Interfaces on page 7
- Understanding Layer 2 Interfaces on page 5
- Understanding Layer 2 Forwarding Tables on page 43

Example: Configuring VLANs

Supported Platforms SRX Series, vSRX

This example shows how to configure VLANs.

NOTE: Starting in Junos OS Release 15.1X49-D10, new terminology and CLI keywords are used for switching functions. If your installation uses a Junos OS release preceding 15.1X49-D10, consult "Enhanced Layer 2 CLI Configuration Statement and Command Changes" on page 32 to determine how you must modify configuration tasks for implementation in earlier Junos OS environments.

- Requirements on page 29
- Overview on page 29
- Configuration on page 30
- Verification on page 30

Requirements

Before you begin, determine the properties you want to configure for the VLAN. See "Understanding VLANs" on page 27.

Overview

In this example, you configure VLAN vlan-a for VLANs 1 and 10, and VLAN vlan-b for VLAN 2. You then limit the number of MAC addresses learned on all logical interfaces on the device to 64,000. When this limit is reached, incoming packets with a new source MAC address will be dropped.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set vlans vlan-a vlan members 1-10
set vlans vlan-b vlan-id 2
set protocols l2-learning global-mac-limit 64000 packet-action drop
```

Step-by-Step Procedure

To configure VLANs:

1. Configure the domain type and VLANs.

```
[edit]
user@host# set vlans vlan-a vlan members 1-10
user@host# set vlans vlan-b vlan-id 2
```

2. Limit the number of MAC addresses.

```
[edit]
user@host# set protocols l2-learning global-mac-limit 64000 packet-action drop
```

3. If you are done configuring the device, commit the configuration.

```
[edit]
user@host# commit
```

Verification

To verify the configuration is working properly, enter the **show vlans** and **show protocols l2-learning** commands.

Release History Table

Release	Description
15.1X49-D10	Starting in Junos OS Release 15.1X49-D10, new terminology and CLI keywords are used for switching functions.

Related Documentation

- Understanding Integrated Routing and Bridging Interfaces on page 7
- Understanding Layer 2 Interfaces on page 5
- Understanding Layer 2 Forwarding Tables on page 43
- Understanding VLANs on page 27

Example: Configuring VLAN Retagging for Layer 2 Transparent Mode

Supported Platforms SRX Series, vSRX

This example shows how to configure VLAN retagging on a Layer 2 trunk interface to selectively screen incoming packets and redirect them to a security device without affecting other VLAN traffic.

Requirements

Before you begin, determine the mapping you want to include for the VLAN retagging. See "Understanding VLAN Retagging" on page 114.

NOTE: **Starting in Junos OS Release 15.1X49-D40 VLAN retagging is no longer supported.**

Overview

In this example, you create a Layer 2 trunk interface called ge-3/0/0 and configure it to receive packets with VLAN identifiers 1 through 10. Packets that arrive on the interface with VLAN identifier 11 are retagged with VLAN identifier 2. Before exiting the trunk interface, VLAN identifier 2 in the retagged packets is replaced with VLAN identifier 11. All VLAN identifiers in the retagged packets change back when you exit the trunk interface.

Configuration

Step-by-Step Procedure

To configure VLAN retagging on a Layer 2 trunk interface:

1. Create a Layer 2 trunk interface.

   ```
   [edit]
   user@host# set interfaces ge-3/0/0 unit 0 family ethernet-switching interface-mode trunk vlan members 1–10
   ```

2. Configure VLAN retagging.

   ```
   [edit]
   user@host# set interfaces ge-3/0/0 unit 0 family ethernet-switching vlan-rewrite translate 11 2
   ```

3. If you are done configuring the device, commit the configuration.

   ```
   [edit]
   user@host# commit
   ```

Verification

To verify the configuration is working properly, enter the **show interfaces ge-3/0/0** command.

Release History Table

Release	Description
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40 VLAN retagging is no longer supported.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Example: Configuring Layer 2 Logical Interfaces on page 6

Enhanced Layer 2 CLI Configuration Statement and Command Changes

Supported Platforms SRX Series

Starting in Junos OS Release 15.1X49-D10 some Layer 2 CLI configuration statements are enhanced, and some commands are changed. Table 9 on page 32 and Table 10 on page 33 provide lists of existing commands that have been moved to new hierarchies or changed on SRX Series devices as part of this CLI enhancement effort. The tables are provided as a high-level reference only. For detailed information about these commands, see CLI Explorer.

Table 9: Enhanced Layer 2 Configuration Statement Changes

Original Hierarchy	Changed Hierarchy	Hierarchy Level	Change Description

bridge-domains
  bridge-domain--name **{**
  ...
  }
}
	vlans ***vlans-name*** **{**
	  ...
	  }
	}
		[edit]	Hierarchy renamed.

bridge-domains
  bridge-domain--name {
  vlan-id-list [*vlan-id*] ;
}
	vlans *vlans-name* {
	  vlan members [*vlan-id*] ;
	}
		[edit vlans *vlans-name*]	Statement renamed.

bridge-options {
  interface *interface-name* {
    encapsulation-type;
    ignore-encapsulation-mismatch;
    pseudowire-status-tlv;
    static-mac *mac-address* {
      vlan-id *vlan-id*;
    }
  }
  mac-table-aging-time
    seconds;
  mac-table-size {
    number;
    packet-action drop;
  }
}
	switch-options {
	  interface *interface-name* {
	    encapsulation-type;
	    ignore-encapsulation-mismatch;
	    pseudowire-status-tlv;
	    static-mac *mac-address* {
	      vlan-id *vlan-id*;
	    }
	  }
	  mac-table-aging-time
	    seconds;
	  mac-table-size {
	    number;
	    packet-action drop;
	  }
	}
		[edit vlans *vlans-name*]	Statement renamed.

Table 9: Enhanced Layer 2 Configuration Statement Changes *(continued)*

Original Hierarchy	Changed Hierarchy	Hierarchy Level	Change Description

bridge {
block-non-ip-all;
bpdu-vlan-flooding;
bypass-non-ip-unicast;
no-packet-flooding {
no-trace-route;
}
}
	ethernet-switching {
	block-non-ip-all;
	bpdu-vlan-flooding;
	bypass-non-ip-unicast;
	no-packet-flooding {
	no-trace-route;
	}
	}
		[edit security flow]	Statement renamed.

family {
bridge {
bridge-domain-type (svlan|
bvlan);
...
	family {
	ethernet-switching {
	...
		[edit interfaces *interface-name*] unit *unit-number*	Hierarchy renamed.

... **routing-interface** irb.0; ...	... **l3-interface** irb.0; ...	[edit vlans *vlans-name*]	Statement renamed.

Table 10: Enhanced Layer 2 Operational Command Changes

Original Operational Command	Modified Operational Command
clear bridge mac-table	clear ethernet-switching table
clear bridge mac-table persistent-learning	clear ethernet-switching table persistent-learning
show bridge domain	show vlans
show bridge mac-table	show ethernet-switching table
show l2-learning interface	show ethernet-switching interface

NOTE: There is no fxp0 out-of-band management interface on the SRX300, SRX320, and SRX500HM devices. (Platform support depends on the Junos OS release in your installation.)

Release History Table

Release	Description
15.1X49-D10	Starting in Junos OS Release 15.1X49-D10 some Layer 2 CLI configuration statements are enhanced, and some commands are changed.

CHAPTER 5

Configuring Security Zones and Security Policies

Understanding Layer 2 Security Zones

Supported Platforms SRX Series, vSRX

A Layer 2 security zone is a zone that hosts Layer 2 interfaces. A security zone can be either a Layer 2 or Layer 3 zone; it can host either all Layer 2 interfaces or all Layer 3 interfaces, but it cannot contain a mix of Layer 2 and Layer 3 interfaces.

The security zone type—Layer 2 or Layer 3—is implicitly set from the first interface configured for the security zone. Subsequent interfaces configured for the same security zone must be the same type as the first interface.

NOTE: **You cannot configure a device with both Layer 2 and Layer 3 security zones.**

You can configure the following properties for Layer 2 security zones:

- Interfaces—List of interfaces in the zone.
- Policies—Active security policies that enforce rules for the transit traffic, in terms of what traffic can pass through the firewall, and the actions that need to take place on the traffic as it passes through the firewall.
- Screens—A Juniper Networks stateful firewall secures a network by inspecting, and then allowing or denying, all connection attempts that require passage from one security zone to another. For every security zone, and the MGT zone, you can enable a set of predefined screen options that detect and block various kinds of traffic that the device determines as potentially harmful.

NOTE: You can configure the same screen options for a Layer 2 security zone as for a Layer 3 security zone.

- Address books—IP addresses and address sets that make up an address book to identify its members so that you can apply policies to them.
- TCP-RST—When this feature is enabled, the system sends a TCP segment with the reset flag set when traffic arrives that does not match an existing session and does not have the synchronize flag set.

In addition, you can configure a Layer 2 zone for host-inbound traffic. This allows you to specify the kinds of traffic that can reach the device from systems that are directly connected to the interfaces in the zone. You must specify all expected host-inbound traffic because inbound traffic from devices directly connected to the device's interfaces is dropped by default.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Understanding Layer 2 Interfaces on page 5
- Understanding Transparent Mode Conditions on page 25
- Example: Configuring Layer 2 Security Zones on page 36
- Example: Configuring Layer 2 Logical Interfaces on page 6

Example: Configuring Layer 2 Security Zones

Supported Platforms SRX Series, vSRX

This example shows how to configure Layer 2 security zones.

Requirements

Before you begin, determine the properties you want to configure for the Layer 2 security zone. See “Understanding Layer 2 Security Zones” on page 35.

Overview

In this example, you configure security zone l2-zone1 to include a Layer 2 logical interface called ge-3/0/0.0 and security zone l2-zone2 to include a Layer 2 logical interface called ge-3/0/1.0. Then you configure l2-zone2 to allow all supported application services (such as SSH, Telnet, and SNMP) as host-inbound traffic.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security-zone l2-zone1 interfaces ge-3/0/0.0
set security-zone l2-zone2 interfaces ge-3/0/1.0
set security-zone l2–zone2 host-inbound-traffic system-services all
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure Layer 2 security zones:

1. Create a Layer 2 security zone and assign interfaces to it.

   ```
   [edit security zones]
   user@host# set security-zone l2-zone1 interfaces ge-3/0/0.0
   user@host# set security-zone l2-zone2 interfaces ge-3/0/1.0
   ```

2. Configure one of the Layer 2 security zones.

   ```
   [edit security zones]
   user@host# set security-zone l2–zone2 host-inbound-traffic system-services all
   ```

3. If you are done configuring the device, commit the configuration.

   ```
   [edit]
   user@host# commit
   ```

Verification

To verify the configuration is working properly, enter the **show security zones** command.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Example: Configuring Security Policies in Transparent Mode on page 38
- Example: Configuring Layer 2 Logical Interfaces on page 6

Understanding Security Policies in Transparent Mode

Supported Platforms SRX Series, vSRX

In transparent mode, security policies can be configured only between Layer 2 zones. When packets are forwarded through the VLAN, the security policies are applied between security zones. A security policy for transparent mode is similar to a policy configured for Layer 3 zones, with the following exceptions:

- NAT is not supported.

- IPsec VPN is not supported.
- Application ANY is used.

Layer 2 forwarding does not permit any interzone traffic unless there is a policy explicitly configured on the device. By default, Layer 2 forwarding performs the following actions:

- Allows or denies traffic specified by the configured policy.
- Allows Address Resolution Protocol (ARP) and Layer 2 non-IP multicast and broadcast traffic.
- Continues to block all non-IP and non-ARP unicast traffic.

This default behavior can be changed for Ethernet switching packet flow by using either J-Web or the CLI configuration editor:

- Configure the **block-non-ip-all** option to block all Layer 2 non-IP and non-ARP traffic, including multicast and broadcast traffic.
- Configure the **bypass-non-ip-unicast** option to allow all Layer 2 non-IP traffic to pass through the device.

NOTE: You cannot configure both options at the same time.

In mixed mode (default mode), you can create a separate security zone for Layer 2 and Layer 3 interfaces. However, there is no routing among IRB interfaces and between IRB interfaces and Layer 3 interfaces. Hence, you cannot configure security policies between Layer 2 and Layer 3 zones. You can only configure security policies between the Layer 2 zones or between Layer 3 zones.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Understanding Transparent Mode Conditions on page 25
- Example: Configuring Security Policies in Transparent Mode on page 38
- Example: Configuring Layer 2 Security Zones on page 36
- Understanding Mixed Mode (Layer 2 and Layer 3) on page 10

Example: Configuring Security Policies in Transparent Mode

Supported Platforms SRX Series, vSRX

This example shows how to configure security policies in transparent mode between Layer 2 zones.

Requirements

Before you begin, determine the policy behavior you want to include in the Layer 2 security zone. See "Understanding Security Policies in Transparent Mode" on page 37.

Overview

In this example, you configure a security policy to allow HTTP traffic from the 192.0.2.0/24 subnetwork in the l2–zone1 security zone to the server at 192.0.2.1/24 in the l2–zone2 security zone.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security policies from-zone l2-zone1 to-zone l2-zone2 policy p1 match source-address
  192.0.2.0/24
set security policies from-zone l2-zone1 to-zone l2-zone2 policy p1 match
  destination-address 192.0.2.1/24
set security policies from-zone l2-zone1 to-zone l2-zone2 policy p1 match application http
set security policies from-zone l2-zone1 to-zone l2-zone2 policy p1 then permit
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure security policies in transparent mode:

1. Create policies and assign addresses to the interfaces for the zones.

```
[edit security policies]
user@host# set from-zone l2-zone1 to-zone l2-zone2 policy p1 match source-address
  192.0.2.0/24
user@host# set from-zone l2-zone1 to-zone l2-zone2 policy p1 match
  destination-address 192.0.2.1/24
```

2. Set policies for the application.

```
[edit security policies]
user@host# set from-zone l2-zone1 to-zone l2-zone2 policy p1 match application
  http
user@host# set from-zone l2-zone1 to-zone l2-zone2 policy p1 then permit
```

Results

From configuration mode, confirm your configuration by entering the **show security policies** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
  user@host> show security policies
  from-zone l2-zone1 to-zone l2-zone2
{
  policy p1 {
```

```
      match {
        source-address 192.0.2.0/24;
        destination-address 192.0.2.1/24;
        application junos-http;
      }
      then {
        permit;
      }
    }
  }
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform these tasks:

Verifying Layer 2 Security Policies

Purpose Verify that the Layer 2 security policies are configured properly.

Action From configuration mode, enter the **show security policies** command.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Understanding Transparent Mode Conditions on page 25
- Example: Configuring Layer 2 Security Zones on page 36

Understanding Firewall User Authentication in Transparent Mode

Supported Platforms SRX Series

A firewall user is a network user who must provide a username and password for authentication when initiating a connection across the firewall. Firewall user authentication enables administrators to restrict and permit users accessing protected resources behind a firewall based on their source IP address and other credentials. Junos OS supports the following types of firewall user authentication for transparent mode on the SRX Series device:

- Pass-through authentication—A host or a user from one zone tries to access resources on another zone. You must use an FTP, Telnet, or HTTP client to access the IP address of the protected resource and be authenticated by the firewall. The device uses FTP, Telnet, or HTTP to collect username and password information, and subsequent traffic from the user or host is allowed or denied based on the result of this authentication.
- Web authentication—Users try to connect, by using HTTP, to an IP address on the IRB interface that is enabled for Web authentication. You are prompted for the username and password that are verified by the device. Subsequent traffic from the user or host to the protected resource is allowed or denied based on the result of this authentication.

Related Documentation

- *Authentication and Integrated User Firewalls Feature Guide for Security Devices*
- Layer 2 Transparent Mode Overview on page 23
- Understanding Integrated Routing and Bridging Interfaces on page 7
- Example: Configuring an IRB Interface on page 8

CHAPTER 6

Configuring Layer 2 Forwarding Tables

Understanding Layer 2 Forwarding Tables

Supported Platforms SRX Series, vSRX

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 subnetwork 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 subnetwork 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 subnetwork 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 Transparent Mode Overview on page 23
- Understanding Integrated Routing and Bridging Interfaces on page 7

- Example: Configuring an IRB Interface on page 8
- Example: Configuring the Default Learning for Unknown MAC Addresses on page 45

Example: Configuring the Default Learning for Unknown MAC Addresses

Supported Platforms SRX Series

This example shows how to configure the device to use only ARP requests to learn the outgoing interfaces for unknown destination MAC addresses.

Requirements

Before you begin, determine the MAC addresses and associated interfaces of the forwarding table. See "Understanding Layer 2 Forwarding Tables" on page 43.

Overview

In this example, you configure the device to use only ARP queries without traceroute requests.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set security flow ethernet-switching no-packet-flooding no-trace-route
```

Step-by-Step Procedure

To configure the device to use only ARP requests to learn unknown destination MAC addresses:

1. Enable the device.

   ```
   [edit]
   user@host# set security flow ethernet-switching no-packet-flooding no-trace-route
   ```

2. If you are done configuring the device, commit the configuration.

   ```
   [edit]
   user@host# commit
   ```

Verification

To verify the configuration is working properly, enter the **show security flow** command.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Understanding Integrated Routing and Bridging Interfaces on page 7
- Example: Configuring an IRB Interface on page 8

CHAPTER 7

Configuring Layer 2 Transparent Mode Chassis Clusters

Understanding Layer 2 Transparent Mode Chassis Clusters

Supported Platforms SRX Series, vSRX

A pair of SRX Series devices in Layer 2 transparent mode can be connected in a chassis cluster to provide network node redundancy. When configured in a chassis cluster, one node acts as the primary device and the other as the secondary device, ensuring stateful failover of processes and services in the event of system or hardware failure. If the primary device fails, the secondary device takes over processing of traffic.

NOTE: If the primary device fails in a Layer 2 transparent mode chassis cluster, the physical ports in the failed device become inactive (go down) for a few seconds before they become active (come up) again.

To form a chassis cluster, a pair of the same kind of supported SRX Series devices combines to act as a single system that enforces the same overall security.

Devices in Layer 2 transparent mode can be deployed in active/backup and active/active chassis cluster configurations.

The following chassis cluster features are not supported for devices in Layer 2 transparent mode:

- Gratuitous ARP—The newly elected master in a redundancy group cannot send gratuitous ARP requests to notify network devices of a change in mastership on the redundant Ethernet interface links.
- IP address monitoring—Failure of an upstream device cannot be detected.

A redundancy group is a construct that includes a collection of objects on both nodes. A redundancy group is primary on one node and backup on the other. When a redundancy group is primary on a node, its objects on that node are active. When a redundancy group fails over, all its objects fail over together.

You can create one or more redundancy groups numbered 1 through 128 for an active/active chassis cluster configuration. Each redundancy group contains one or more redundant Ethernet interfaces. A redundant Ethernet interface is a pseudointerface that contains physical interfaces from each node of the cluster. The physical interfaces in a redundant Ethernet interface must be the same kind—either Fast Ethernet or Gigabit Ethernet. If a redundancy group is active on node 0, then the child links of all associated redundant Ethernet interfaces on node 0 are active. If the redundancy group fails over to the node 1, then the child links of all redundant Ethernet interfaces on node 1 become active.

NOTE: **In the active/active chassis cluster configuration, the maximum number of redundancy groups is equal to the number of redundant Ethernet interfaces that you configure. In the active/backup chassis cluster configuration, the maximum number of redundancy groups supported is two.**

Configuring redundant Ethernet interfaces on a device in Layer 2 transparent mode is similar to configuring redundant Ethernet interfaces on a device in Layer 3 route mode, with the following difference: the redundant Ethernet interface on a device in Layer 2 transparent mode is configured as a Layer 2 logical interface.

The redundant Ethernet interface may be configured as either an access interface (with a single VLAN ID assigned to untagged packets received on the interface) or as a trunk interface (with a list of VLAN IDs accepted on the interface and, optionally, a native-vlan-id for untagged packets received on the interface). Physical interfaces (one from each node in the chassis cluster) are bound as child interfaces to the parent redundant Ethernet interface.

In Layer 2 transparent mode, MAC learning is based on the redundant Ethernet interface. The MAC table is synchronized across redundant Ethernet interfaces and Services Processing Units (SPUs) between the pair of chassis cluster devices.

The IRB interface is used only for management traffic, and it cannot be assigned to any redundant Ethernet interface or redundancy group.

All Junos OS screen options that are available for a single, nonclustered device are available for devices in Layer 2 transparent mode chassis clusters.

NOTE: **Spanning Tree Protocols (STPs) are not supported for Layer 2 transparent mode. You should ensure that there are no loop connections in the deployment topology.**

Related Documentation

- *Chassis Cluster Feature Guide for SRX Series Devices*
- Layer 2 Transparent Mode Overview on page 23

- Understanding Layer 2 Interfaces on page 5
- Example: Configuring Layer 2 Logical Interfaces on page 6
- Understanding Transparent Mode Conditions on page 25
- Example: Configuring Redundant Ethernet Interfaces for Layer 2 Transparent Mode Chassis Clusters on page 49
- Understanding Layer 2 Forwarding Tables on page 43

Example: Configuring Redundant Ethernet Interfaces for Layer 2 Transparent Mode Chassis Clusters

Supported Platforms SRX Series, vSRX

This example shows how to configure a redundant Ethernet interface on a device as a Layer 2 logical interface for a Layer 2 transparent mode chassis cluster.

- Requirements on page 49
- Overview on page 49
- Configuration on page 49
- Verification on page 50

Requirements

Before you begin, determine the devices you want to connect in a chassis cluster. See "Understanding Layer 2 Transparent Mode Chassis Clusters" on page 47.

Overview

This example shows you how to configure the redundant Ethernet interface as a Layer 2 logical interface and how to bind the physical interfaces (one from each node in the chassis cluster) to the redundant Ethernet interface. In this example, you create redundant Ethernet interface reth0 for redundancy group 1 and configure reth0 as an access interface with the VLAN identifier 1. Then you assign physical interface ge-2/0/2 on a chassis cluster node to the redundant Ethernet interface reth0.

Configuration

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set reth0 redundant-ether-options redundancy-group 1
set reth0 unit 0 family ethernet-switching interface-mode access vlan-id 1
set ge-2/0/2 gigether-options redundant-parent reth0
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure a redundant Ethernet interface as a Layer 2 logical interface:

1. Configure the interfaces and redundancy group.

   ```
   [edit interfaces]
   user@host# set reth0 redundant-ether-options redundancy-group 1
   user@host# set reth0 unit 0 family ethernet-switching interface-mode access
     vlan-id 1
   ```

2. Assign a physical interface on a chassis cluster node.

   ```
   [edit interfaces]
   user@host# set ge-2/0/2 gigether-options redundant-parent reth0
   ```

3. If you are done configuring the device, commit the configuration.

   ```
   [edit]
   user@host# commit
   ```

Verification

To verify the configuration is working properly, enter the **show interfaces reth0** and **show interfaces ge-2/0/2** commands.

Related Documentation

- *Chassis Cluster Feature Guide for SRX Series Devices*
- Layer 2 Transparent Mode Overview on page 23
- Understanding Transparent Mode Conditions on page 25
- Understanding Layer 2 Transparent Mode Chassis Clusters on page 47
- Understanding Layer 2 Forwarding Tables on page 43

CHAPTER 8

Configuring IP Spoofing in Layer 2 Transparent Mode

Understanding IP Spoofing in Layer 2 Transparent Mode

Supported Platforms SRX Series, vSRX

In an IP spoofing attack, the attacker gains access to a restricted area of the network and inserts a false source address in the packet header to make the packet appear to come from a trusted source. IP spoofing is most frequently used in denial-of-service (DoS) attacks. When SRX Series devices are operating in transparent mode, the IP spoof-checking mechanism makes use of address book entries. Address books only exist on the Routing Engine. IP spoofing in Layer 2 transparent mode is performed on the Packet Forwarding Engine. Address book information cannot be obtained from the Routing Engine each time a packet is received by the Packet Forwarding Engine. Therefore, address books attached to the Layer 2 zones must be pushed to the Packet Forwarding Engine.

NOTE: **IP spoofing in Layer 2 transparent mode does not support DNS and wildcard addresses.**

When a packet is received by the Packet Forwarding Engine, the packet's source IP address is checked to determine if it is in the incoming zone's address-book. If the packet's source IP address is in the incoming zone's address book, then this IP address is allowed on the interface, and traffic is passed.

If the source IP address is not present in the incoming zone's address-book, but exists in other zones', then the IP address is considered a spoofed IP. Accordingly, actions such as drop and logging can be taken depending on the screen configuration (alarm-without-drop).

NOTE: **If the alarm-without-drop option is configured, the Layer 2 spoofing packet only triggers an alarm message, but the packet is not dropped.**

If a packet's source IP address is not present in the incoming zone's address book or other zones', then you cannot determine if the IP is spoofed or not. In such instances, the packet is passed.

Junos OS takes into account the following match conditions while it searches for source IP addresses in the address book:

- **Host-match**—The IP address match found in the address-book is an address without a prefix.
- **Prefix-match**—The IP address match found in the address-book is an address with a prefix.
- **Any-match**—The IP address match found in the address-book is "any", "any-IPv4", or "any-IPv6".
- **No-match**—No IP address match is found.

Related Documentation

- Configuring IP Spoofing in Layer 2 Transparent Mode on page 52

Configuring IP Spoofing in Layer 2 Transparent Mode

Supported Platforms SRX Series, vSRX

You can configure the IP spoof-checking mechanism to determine whether or not an IP is being spoofed.

To configure IP spoofing in Layer 2 transparent mode:

1. Set the interface in Layer 2 transparent mode.

   [edit]
   user@host# **set interfaces ge-0/0/1 unit 0 family ethernet-switching**

2. (Optional) Set the zone in Layer 2 transparent mode.

   [edit]
   user@host# **set security zones security-zone untrust interfaces ge-0/0/1.0**

3. Configure the address book.

   [edit]
   user@host# **set security address-book my-book address myadd1 10.1.1.0/24**
   user@host# **set security address-book my-book address myadd2 10.1.2.0/24**

4. Apply the address book to the zone.

   [edit]
   user@host# **set security address-book my-book attach zone untrust**

5. Configure screen IP spoofing.

   [edit]
   user@host# **set security screen ids-option my-screen ip spoofing**

6. Apply the screen to the zone.

   [edit]

```
user@host# set security zones security-zone untrust screen my-screen
```

7. (Optional) Configure the **alarm-without-drop** option.

```
[edit]
user@host# set security screen ids-option my-screen alarm-without-drop
```

NOTE: If the **alarm-without-drop** option is configured, the Layer 2 spoofing packet only triggers an alarm message, but the packet is not dropped.

Related Documentation

- Understanding IP Spoofing in Layer 2 Transparent Mode on page 51

CHAPTER 9

Configuring Class of Service in Transparent Mode

Class of Service Functions in Transparent Mode Overview

Supported Platforms SRX Series, vSRX

Devices operating in Layer 2 transparent mode support the following class-of-service (CoS) functions:

- IEEE 802.1p behavior aggregate (BA) classifiers to determine the forwarding treatment for packets entering the device

NOTE: **Only IEEE 802.1p BA classifier types are supported on devices operating in transparent mode.**

- Rewrite rules to redefine IEEE 802.1 CoS values in outgoing packets

NOTE: **Rewrite rules that redefine IP precedence CoS values and Differentiated Services Code Point (DSCP) CoS values are not supported on devices operating in transparent mode.**

- Shapers to apply rate limiting to an interface
- Schedulers that define the properties of an output queue

You configure BA classifiers and rewrite rules on transparent mode devices in the same way as on devices operating in Layer 3 mode. For transparent mode devices, however, you apply BA classifiers and rewrite rules only to logical interfaces configured with the **family ethernet-switching** configuration statement.

Related Documentation

- *Class of Service Feature Guide for Security Devices*
- Layer 2 Transparent Mode Overview on page 23
- Understanding Transparent Mode Conditions on page 25
- Understanding BA Traffic Classification on Transparent Mode Devices on page 56
- Example: Configuring BA Classifiers on Transparent Mode Devices on page 56

Understanding BA Traffic Classification on Transparent Mode Devices

Supported Platforms SRX Series, vSRX

A BA classifier checks the header information of an ingress packet. The resulting traffic classification consists of a forwarding class (FC) and packet loss priority (PLP). The FC and PLP associated with a packet specify the CoS behavior of a hop within the system. For example, a hop can place a packet into a priority queue according to its FC, and manage queues by checking the packet's PLP. Junos OS supports up to eight FCs and four PLPs.

NOTE: MPLS EXP bit-based traffic classification is not supported.

BA classification can be applied within one DiffServ domain. BA classification can also be applied between two domains, where each domain honors the CoS results generated by the other domain. Junos OS performs BA classification for a packet by examining its Layer 2 and Layer 3 CoS-related parameters. Those parameters include the following:

- Layer 2—IEEE 802.1p: User Priority
- Layer 3—IPv4 Precedence, IPv4 DSCP, IPv6 DSCP

On SRX Series devices in transparent mode, a BA classifier evaluates only Layer 2 parameters. On SRX Series devices in Layer 3 mode, a BA classifier can evaluate Layer 2 and Layer 3 parameters; in that case, classification resulting from Layer 3 parameters overrides that of Layer 2 parameters.

On SRX Series devices in transparent mode, you specify one of four PLP levels—high, medium-high, medium-low, or low—when configuring a BA classifier.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Understanding Transparent Mode Conditions on page 25
- Class of Service Functions in Transparent Mode Overview on page 55
- Example: Configuring BA Classifiers on Transparent Mode Devices on page 56

Example: Configuring BA Classifiers on Transparent Mode Devices

Supported Platforms SRX Series

This example shows how to configure BA classifiers on transparent mode devices to determine the forwarding treatment of packets entering the devices.

Requirements

Before you begin, configure a Layer 2 logical interface. See "Example: Configuring Layer 2 Logical Interfaces" on page 6.

Overview

In this example, you configure logical interface ge-0/0/4.0 as a trunk port that carries traffic for packets tagged with VLAN identifiers 200 through 390. You then configure forwarding classes and create BA classifier c1 for IEEE 802.1 traffic where incoming packets with IEEE 802.1p priority bits 110 are assigned to the forwarding class fc1 with a low loss priority. Finally, you apply the BA classifier c1 to interface ge-0/0/4.0.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/4 vlan-tagging unit 0 family ethernet-switching interface-mode
  trunk vlan members 200-390
set class-of-service forwarding-classes queue 0 fc1
set class-of-service forwarding-classes queue 1 fc2
set class-of-service forwarding-classes queue 3 fc4
set class-of-service forwarding-classes queue 4 fc5
set class-of-service forwarding-classes queue 5 fc6
set class-of-service forwarding-classes queue 6 fc7
set class-of-service forwarding-classes queue 7 fc8
set class-of-service forwarding-classes queue 2 fc3
set class-of-service classifiers ieee-802.1 c1 forwarding-class fc1 loss-priority low
  code-point 110
set class-of-service interfaces ge-0/0/4 unit 0 classifiers ieee-802.1 c1
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure BA classifiers on transparent mode devices:

1. Configure the logical interface as a Layer 2 trunk port.

   ```
   [edit]
   user@host# set interfaces ge-0/0/4 vlan-tagging unit 0 family ethernet-switching
     interface-mode trunk vlan members 200-390
   ```

2. Configure the class of service.

```
[edit]
user@host# edit class-of-service
```

3. Configure the forwarding classes.

```
[edit class-of-service]
user@host# set forwarding-classes queue 0 fc1
user@host# set forwarding-classes queue 1 fc2
user@host# set forwarding-classes queue 3 fc4
user@host# set forwarding-classes queue 4 fc5
user@host# set forwarding-classes queue 5 fc6
user@host# set forwarding-classes queue 6 fc7
user@host# set forwarding-classes queue 7 fc8
user@host# set forwarding-classes queue 2 fc3
```

4. Configure a BA classifier.

```
[edit class-of-service]
user@host# set classifiers ieee-802.1 c1 forwarding-class fc1 loss-priority low
   code-points 110
```

5. Apply the BA classifier to the interface.

```
[edit class-of-service]
user@host# set interfaces ge-0/0/4 unit 0 classifiers ieee-802.1 c1
```

Results From configuration mode, confirm your configuration by entering the **show interfaces ge-0/0/4** and **show class-of-service** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
  user@host> show interfaces ge-0/0/4
  vlan-tagging;
  unit 0 {
    family ethernet-switching {
    interface-mode trunk;
    vlan members 200-390;
  }
}
[edit]
  user@host> show class-of-service
  classifiers {
  ieee-802.1 c1 {
    forwarding-class fc1 {
    loss-priority low code-points 110;
    }
  }
  }
  forwarding-classes {
    queue 0 fc1;
    queue 1 fc2;
    queue 3 fc4;
    queue 4 fc5;
    queue 5 fc6;
```



```
        queue 6 fc7;
        queue 7 fc8;
        queue 2 fc3;
        }
        interfaces {
          ge-0/0/4 {
        unit 0 {
        classifiers {
          ieee-802.1 c1;
        }
        }
      }
    }
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform this task:

Verifying BA Classifiers on Transparent Mode Devices

Purpose Verify that the BA classifier was configured on the transparent mode devices properly.

Action From configuration mode, enter the **show interfaces ge-0/0/4** and **show class-of-service** commands.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Understanding Transparent Mode Conditions on page 25
- Class of Service Functions in Transparent Mode Overview on page 55
- Understanding BA Traffic Classification on Transparent Mode Devices on page 56

Understanding Rewrite of Packet Headers on Transparent Mode Devices

Supported Platforms SRX Series, vSRX

Before a packet is transmitted from an interface, the CoS fields in the packet's header can be rewritten for the forwarding class (FC) and packet loss priority (PLP) of the packet. The rewriting function converts a packet's FC and PLP into corresponding CoS fields in the packet header. In Layer 2 transparent mode, the CoS fields are the IEEE 802.1p priority bits.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Understanding Transparent Mode Conditions on page 25
- Example: Configuring Rewrite Rules on Transparent Mode Devices on page 60

Example: Configuring Rewrite Rules on Transparent Mode Devices

Supported Platforms SRX Series, vSRX

This example shows how to configure rewrite rules on transparent mode devices to redefine IEEE 802.1 CoS values in outgoing packets.

Requirements

Before you begin, configure a Layer 2 logical interface. See “Example: Configuring Layer 2 Logical Interfaces” on page 6.

Overview

In this example, you configure logical interface ge-1/0/3.0 as a trunk port that carries traffic for packets tagged with VLAN identifiers 200 through 390. You then configure the forwarding classes and create rewrite rule rw1 for IEEE 802.1 traffic. For outgoing packets in the forwarding class fc1 with low loss priority, the IEEE 802.1p priority bits are rewritten as 011. Finally, you apply the rewrite rule rw1 to interface ge-1/0/3.0.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-1/0/3 vlan-tagging unit 0 family ethernet-switching interface-mode
  trunk vlan members 200-390
set class-of-service forwarding-classes queue 0 fc1
set class-of-service forwarding-classes queue 1 fc2
set class-of-service forwarding-classes queue 3 fc4
set class-of-service forwarding-classes queue 4 fc5
set class-of-service forwarding-classes queue 5 fc6
set class-of-service forwarding-classes queue 6 fc7
set class-of-service forwarding-classes queue 7 fc8
set class-of-service forwarding-classes queue 2 fc3
set class-of-service rewrite-rules ieee-802.1 rw1 forwarding-class fc1 loss-priority low
  code-point 011
set class-of-service interfaces ge-1/0/3 unit 0 rewrite-rules ieee-802.1 rw1
```


Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure rewrite rules on transparent mode devices:

1. Configure the logical interface as a Layer 2 trunk port.

   ```
   [edit]
   user@host# set interfaces ge-1/0/3 vlan-tagging unit 0 family ethernet-switching
     interface-mode trunk vlan members 200-390
   ```

2. Configure the class of service.

   ```
   [edit]
   user@host# edit class-of-service
   ```

3. Configure the forwarding classes.

   ```
   [edit class-of-service]
   user@host# set forwarding-classes queue 0 fc1
   user@host# set forwarding-classes queue 1 fc2
   user@host# set forwarding-classes queue 3 fc4
   user@host# set forwarding-classes queue 4 fc5
   user@host# set forwarding-classes queue 5 fc6
   user@host# set forwarding-classes queue 6 fc7
   user@host# set forwarding-classes queue 7 fc8
   user@host# set forwarding-classes queue 2 fc3
   ```

4. Configure a rewrite rule.

   ```
   [edit class-of-service]
   user@host# set rewrite-rules ieee-802.1 rw1 forwarding-class fc1 loss-priority low
     code-point 011
   ```

5. Apply the rewrite rule to the interface.

   ```
   [edit class-of-service]
   user@host# set interfaces ge-1/0/3 unit 0 rewrite-rules ieee-802.1 rw1
   ```

Results

From configuration mode, confirm your configuration by entering the **show interfaces ge-1/0/3** and **show class-of-service** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
  user@host> show interfaces ge-1/0/3
  vlan-tagging;
  unit 0 {
    family ethernet-switching {
    interface-mode trunk;
    vlan members 200-390;
  }
}
[edit]
  user@host> show class-of-service
  forwarding-classes {
  queue 0 fc1;
    queue 1 fc2;
```

```
      queue 3 fc4;
      queue 4 fc5;
      queue 5 fc6;
      queue 6 fc7;
      queue 7 fc8;
    queue 2 fc3;
    }
    interfaces {
      ge-1/0/3 {
      unit 0 {
      rewrite-rules {
        ieee-802.1 rw1;
        }
      }
    }
    }
    rewrite-rules {
      ieee-802.1 rw1 {
      forwarding-class fc1 {
      loss-priority low code-point 011;
      }
    }
  }
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

To confirm that the configuration is working properly, perform this task:

Verifying Rewrite Rules on Transparent Mode Devices

Purpose Verify that the rewrite rule was configured on the transparent mode devices properly.

Action From configuration mode, enter the **show interfaces ge-1/0/3** and **show class-of-service** commands.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Understanding Transparent Mode Conditions on page 25
- Understanding Rewrite of Packet Headers on Transparent Mode Devices on page 59

CHAPTER 10

Configuring IPv6 Flows

Understanding IPv6 Flows in Transparent Mode

Supported Platforms SRX Series

In transparent mode, the SRX Series device filters packets that traverse the device without modifying any of the source or destination information in the packet MAC headers. Transparent mode is useful for protecting servers that mainly receive traffic from untrusted sources because there is no need to reconfigure the IP settings of routers or protected servers.

A device operates in transparent mode when all physical interfaces on the device are configured as Layer 2 interfaces. A physical interface is a Layer 2 interface if its logical interface is configured with the **ethernet-switching** option at the [**edit interfaces *interface-name* unit *unit-number* family**] hierarchy level. There is no command to define or enable transparent mode on the device. The device operates in transparent mode when there are interfaces defined as Layer 2 interfaces. The device operates in route mode (the default mode) if all physical interfaces are configured as Layer 3 interfaces.

By default, IPv6 flows are dropped on security devices. To enable processing by security features such as zones, screens, and firewall policies, you must enable flow-based forwarding for IPv6 traffic with the **mode flow-based** configuration option at the [**edit security forwarding-options family inet6**] hierarchy level. You must reboot the device when you change the mode.

In transparent mode, you can configure Layer 2 zones to host Layer 2 interfaces, and you can define security policies between Layer 2 zones. When packets travel between Layer 2 zones, security policies can be enforced on these packets. The following security features are supported for IPv6 traffic in transparent mode:

- Layer 2 security zones and security policies. See "Understanding Layer 2 Security Zones" on page 35 and "Understanding Security Policies in Transparent Mode" on page 37.
- Firewall user authentication. See "Understanding Firewall User Authentication in Transparent Mode" on page 40.

- Layer 2 transparent mode chassis clusters. See "Understanding Layer 2 Transparent Mode Chassis Clusters" on page 47.
- Class of service functions. See "Class of Service Functions in Transparent Mode Overview" on page 55.

The following security features are *not* supported for IPv6 flows in transparent mode:

- Logical systems
- IPv6 GTPv2
- J-Web interface
- NAT
- IPsec VPN
- With the exception of DNS, FTP, and TFTP ALGs, all other ALGs are not supported.

Configuring VLANs and Layer 2 logical interfaces for IPv6 flows is the same as configuring VLANs and Layer 2 logical interfaces for IPv4 flows. You can optionally configure an integrated routing and bridging (IRB) interface for management traffic in a VLAN. The IRB interface is the only Layer 3 interface allowed in transparent mode. The IRB interface on the SRX Series device does not support traffic forwarding or routing. The IRB interface can be configured with both IPv4 and IPv6 addresses. You can assign an IPv6 address for the IRB interface with the **address** configuration statement at the [**edit interfaces irb unit *number* family inet6**] hierarchy level. You can assign an IPv4 address for the IRB interface with the **address** configuration statement at the [**edit interfaces irb unit *number* family inet**] hierarchy level.

The Ethernet Switching functions on SRX Series devices are similar to the switching features on Juniper Networks MX Series routers. However, not all Layer 2 networking features supported on MX Series routers are supported on SRX Series devices. See "Layer 2 Transparent Mode Overview" on page 23.

The SRX Series device maintains forwarding tables that contain MAC addresses and associated interfaces for each Layer 2 VLAN. The IPv6 flow processing is similar to IPv4 flows. See "Understanding Layer 2 Forwarding Tables" on page 43.

Related Documentation

- Flow-Based Processing for IPv6 Traffic on page 64
- Example: Configuring Transparent Mode for IPv6 Flows on page 66

Flow-Based Processing for IPv6 Traffic

Supported Platforms SRX Series, vSRX

Flow-based processing mode is required for security features such as zones, screens, and firewall policies to function. Starting with Junos OS Release 15.1X49-D70, the SRX Series device is enabled by default for flow-based forwarding for IPv6 traffic on all devices except the SRX300 Series device.

For the following devices, you do not need to reboot the device when you are switching modes between flow mode, packet mode, and drop mode.

- SRX1500
- SRX4100, SRX4200
- SRX5600, SRX5800
- vSRX

SRX300 Series Devices

When IPv6 is configured on SRX300 Series devices, drop mode remains the default behavior because of memory constraints. In this case, you must reboot the device after changing the processing mode from the drop mode default to flow mode and between modes on SRX300 Series devices.

To enable flow-based forwarding for IPv6 traffic on SRX300 Series devices, modify the mode at the [**edit security forwarding-options family inet6**] hierarchy level:

```
security {
  forwarding-options {
    family {
      inet6 {
        mode flow-based;
      }
    }
  }
}
```

To configure forwarding for IPv6 traffic on SRX300 Series devices:

1. Change the forwarding option mode for IPv6 to flow-based.

   ```
   [edit]
   user@host# security forwarding-options family inet6 mode flow-based
   ```

2. Review your configuration.

   ```
   [edit]
   user@host# show security forwarding-options
     family {
       inet6 {
         mode flow-based;
       }
     }
   ```

3. Check your changes to the configuration before committing.

   ```
   [edit]
   user@host# commit check
   ```

   ```
   warning: You have enabled/disabled inet6 flow.
   You must reboot the system for your change to take effect.
   If you have deployed a cluster, be sure to reboot all nodes.
   configuration check succeeds
   ```

4. Commit the configuration.


```
[edit]
user@host# commit
```

```
warning: You have enabled/disabled inet6 flow.
You must reboot the system for your change to take effect.
If you have deployed a cluster, be sure to reboot all nodes.
commit complete
```

5. Reboot the device.

NOTE: For SRX300 Series, the device discards IPv6 type 0 Routing Header (RH0) packets.

To process IPv6 traffic on SRX300 Series devices, you need to configure IPv6 addresses for the transit interfaces that receive and forward the traffic. For information on the inet6 protocol family and procedures for configuring IPv6 addresses for interfaces, see the *Interfaces Feature Guide for Security Devices*. To process IPv6 traffic, you also need to configure IPv6 addresses for the transit interfaces that receive and forward the traffic. For information on the inet6 protocol family and procedures for configuring IPv6 addresses for interfaces, see the Interfaces Feature Guide for Security Devices.

Release History Table

Release	Description
15.1X49-D70	Starting with Junos OS Release 15.1X49-D70, the SRX Series device is enabled by default for flow-based forwarding for IPv6 traffic on all devices except the SRX300 Series device.

Related Documentation

- *Understanding IPv6 Address Space, Addressing, Address Format, and Address Types*
- *Using Filters to Display IPv6 Session and Flow Information for SRX Series Services Gateways*

Example: Configuring Transparent Mode for IPv6 Flows

Supported Platforms SRX Series

This example shows how to configure VLANs, a Layer 2 interface, and an IRB interface that supports both IPv4 and IPv6 addresses. This example also shows how to configure the device to use only ARP requests to learn the outgoing interfaces for unknown destination MAC addresses.

Requirements

The device must be enabled for IPv6 flow processing. See “Flow-Based Processing for IPv6 Traffic” on page 64.

Overview

This example creates the configuration described in Table 11 on page 67.

Table 11: IPv6 Transparent Mode Configuration for IPv6 Flows

Feature	Name	Configuration Parameters
VLANs	vlan-a	VLAN 2
	vlan-b	VLAN 10
Logical interface	ge-0/0/0.0	Trunk port for packets tagged with VLAN IDs 1 through 10
Physical interface	ge-0/0/0	VLAN ID 30 assigned to untagged packets
IRB interface	irb.0	Addresses: • IPv4 address 10.1.1.1/24 • IPv6 address 2001:0db8:2::1/64 Referenced in vlan-b VLAN
Learn the outgoing interfaces for unknown destination MAC addresses		Use only ARP queries without traceroute requests

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set vlans vlan-a vlan-id 2
set vlans vlan-b vlan members 1-10
set interfaces ge-0/0/0 vlan-tagging native-vlan-id 30
set interfaces ge-0/0/0 unit 0 family ethernet-switching interface-mode trunk vlan
  members 1-10
set interfaces irb unit 0 family inet address 10.1.1.1/24
set interfaces irb unit 0 family inet6 address 2001:0db8::1/64
set vlans vlan-b l3-interface irb.0
set security flow ethernet-switching no-packet-flooding no-trace-route
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure transparent mode for IPv6 flows:

1. Configure VLANs.

   ```
   [edit vlans]
   user@host# set vlan-a vlan-id 2
   user@host# set vlan-b vlan members 1-10
   ```

2. Configure the Layer 2 interface.

   ```
   [edit interfaces ge-0/0/0]
   user@host# set vlan-tagging native-vlan-id 30
   user@host# set unit 0 family ethernet-switching interface-mode trunk vlan members
     1-10
   ```

3. Configure the IRB interface.

   ```
   [edit interfaces irb unit 0]
   user@host# set family inet address 10.1.1.1/24
   user@host# set family inet6 address 2001:0db8::1/64
   ```

4. Configure the IRB interface for the VLAN.

   ```
   [edit vlans]
   user@host# set vlan-b l3-interface irb.0
   ```

5. Configure learning for unknown destination MAC addresses.

   ```
   [edit security flow ethernet-switching]
   user@host# set no-packet-flooding no-trace-route
   ```

Results

From configuration mode, confirm your configuration by entering the **show vlans**, **show interfaces**, and **show security flow ethernet-switching** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@host# show vlans
vlan-a {
  vlan-id 2;
}
  vlan-b {
    vlan members 1-10;
    l3-interface irb.0;
  }
user@host# show interfaces
ge-0/0/0 {
  vlan-tagging;
  native-vlan-id 30;
  unit 0 {
    family ethernet-switching {
      interface-mode trunk;
      vlan members 1-10;
```

```
        }
      }
    }
    user@host# show security flow ethernet-switching
    no-packet-flooding {
      no-trace-route;
    }
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

Verifying IPv6 Sessions

Purpose Verify IPv6 sessions on the device.

Action From operational mode, enter the **show security flow session family inet6** command.

Verifying IPv6 Gates

Purpose Verify IPv6 gates on the device.

Action From operational mode, enter the **show security flow gate family inet6** command.

Verifying IPv6 IP-action Settings

Purpose Verify IPv6 IP-action settings on the device.

Action From operational mode, enter the **show security flow ip-action family inet6** command.

Related Documentation

- *Understanding IPv6 Address Space, Addressing, Address Format, and Address Types*
- Understanding IPv6 Flows in Transparent Mode on page 63

CHAPTER 11

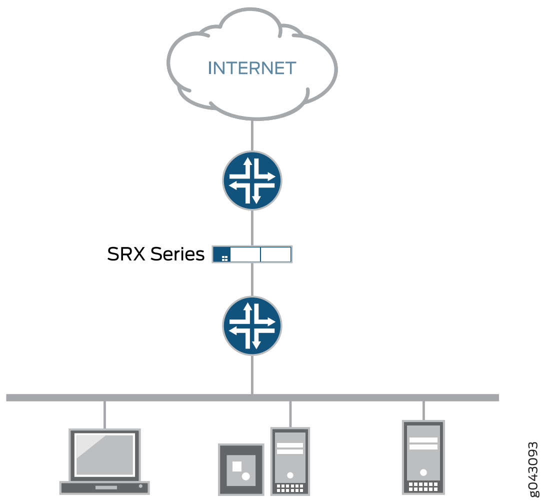
Configuring Secure Wire

Understanding Secure Wire

Supported Platforms SRX Series

Traffic that arrives on a specific interface can be forwarded unchanged through another interface. This mapping of interfaces, called secure wire, allows an SRX Series to be deployed in the path of network traffic without requiring a change to routing tables or a reconfiguration of neighboring devices. Figure 4 on page 72 shows a typical in-path deployment of an SRX Series with secure wire.

Figure 4: SRX Series In-Path Deployment with Secure Wire



Secure wire maps two peer interfaces. It differs from transparent and route modes in that there is no switching or routing lookup to forward traffic. As long as the traffic is permitted by a security policy, a packet arriving on one peer interface is immediately forwarded unchanged out of the other peer interface. There is no routing or switching decision made on the packet. Return traffic is also forwarded unchanged.

Secure wire mapping is configured with the **secure-wire** statement at the [**edit security forwarding-options**] hierarchy level; two Ethernet logical interfaces must be specified. The Ethernet logical interfaces must be configured with **family ethernet-switching** and each pair of interfaces must belong to the VLAN(s). The interfaces must be bound to security zones and a security policy configured to permit traffic between the zones.

This feature is available on Ethernet logical interfaces only; both IPv4 and IPv6 traffic are supported. You can configure interfaces for access or trunk mode. Secure wire supports chassis cluster redundant Ethernet interfaces. This feature does not support security features not supported in transparent mode, including NAT and IPsec VPN. Layer 7 features, including AppSecure, IPS, and UTM, are supported.

Secure wire is a special case of Layer 2 transparent mode on SRX Series devices that provide point-to-point connections. This means that the two interfaces of a secure wire should ideally be directly connected to Layer 3 entities, such as routers or hosts. Secure wire interfaces can be connected to switches. However, note that a secure wire interface forwards all arriving traffic to the peer interface only if the traffic is permitted by a security policy.

Secure wire can coexist with Layer 3 mode. While you can configure Layer 2 and Layer 3 interfaces at the same time, traffic forwarding occurs independently on Layer 2 and Layer 3 interfaces.

Secure wire can coexist with Layer 2 transparent mode. If both features exist on the same SRX Series device, you need to configure them in different VLANs.

NOTE: Integrated routing and bridging (IRB) interfaces are not supported with secure wire.

Related Documentation

- Example: Simplifying SRX Series Device Deployment with Secure Wire over Access Mode Interfaces on page 73
- Example: Simplifying SRX Series Device Deployment with Secure Wire over Trunk Mode Interfaces on page 76
- Example: Simplifying SRX Series Device Deployment with Secure Wire over Aggregated Interface Member Links on page 80
- Example: Simplifying Chassis Cluster Deployment with Secure Wire over Redundant Ethernet Interfaces on page 84
- Example: Simplifying Chassis Cluster Deployment with Secure Wire over Aggregated Redundant Ethernet Interfaces on page 88
- Understanding Mixed Mode (Layer 2 and Layer 3) on page 10

Example: Simplifying SRX Series Device Deployment with Secure Wire over Access Mode Interfaces

Supported Platforms SRX Series

If you are connecting an SRX Series device to other network devices, you can use secure wire to simplify the device deployment in the network. No changes to routing or forwarding tables on the SRX Series device and no reconfiguration of neighboring devices is needed. Secure wire allows traffic to be forwarded unchanged between specified access mode interfaces on an SRX Series device as long as it is permitted by security policies or other security features. Follow this example if you are connecting an SRX Series device to other network devices through access mode interfaces.

This example shows how to configure a secure wire mapping for two access mode interfaces. This configuration applies to scenarios where user traffic is not VLAN tagged.

Requirements

No special configuration beyond device initialization is required before configuring this feature.

Overview

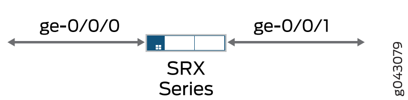
This example configures the secure wire access-sw that maps interface ge-0/0/0.0 to interface ge-0/0/1.0. The two peer interfaces are configured for access mode. The VLAN ID 10 is configured for the vlan-10 and the access mode interfaces.

NOTE: A specific VLAN ID must be configured for a VLAN.

Topology

Figure 5 on page 74 shows the access mode interfaces that are mapped in secure wire access-sw.

Figure 5: Secure Wire Access Mode Interfaces



Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set vlans vlan-10 vlan-id 10
set interfaces ge-0/0/0 unit 0 family ethernet-switching interface-mode access vlan-id
  10
set interfaces ge-0/0/1 unit 0 family ethernet-switching interface-mode access vlan-id
  10
set security forwarding-options secure-wire access-sw interface [ge-0/0/0.0 ge-0/0/1.0]
set security zones security-zone trust interfaces ge-0/0/0.0
set security zones security-zone untrust interfaces ge-0/0/1.0
set security policies default-policy permit-all
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure a secure wire mapping for access mode interfaces:

1. Configure the VLAN.

   ```
   [edit vlans vlan-10]
   user@host# set vlan-id 10
   ```

2. Configure the access mode interfaces.

   ```
   [edit interfaces ]
   ```


user@host# **set ge-0/0/0 unit 0 family ethernet-switching interface-mode access vlan-id 10**
user@host# **set ge-0/0/1 unit 0 family ethernet-switching interface-mode access vlan-id 10**

3. Configure the secure wire mapping.

   [edit security forwarding-options]
   user@host# **set secure-wire access-sw interface [ge-0/0/0.0 ge-0/0/1.0]**

4. Configure security zones.

   [edit security zones]
   user@host# **set security-zone trust interfaces ge-0/0/0.0**
   user@host# **set security-zone untrust interfaces ge-0/0/1.0**

5. Configure a security policy to permit traffic.

   [edit security policies]
   user@host# **set default-policy permit-all**

Results From configuration mode, confirm your configuration by entering the **show vlans**, **show interfaces**, **show security forwarding-options**, and **show security zones** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@host# show vlans
  vlan-10 {
    vlan-id 10;
    interface ge-0/0/0.0;
    interface ge-0/0/1.0;
  }
  user@host# show interfaces
  ge-0/0/0 {
    unit 0 {
      family ethernet-switching {
        interface-mode access;
        vlan {
          members vlan-10;
        }
      }
    }
  }
  ge-0/0/1 {
    unit 0 {
      family ethernet-switching {
        interface-mode access;
        vlan {
          members vlan-10;
        }
      }
    }
  }
  user@host# show security forwarding-options
  secure-wire {
    access-sw {
      interface [ ge-0/0/0.0 ge-0/0/1.0 ];
```

```
        }
    }
user@host# show security zones
    security-zone trust {
        interfaces {
            ge-0/0/0.0;
        }
    }
    security-zone untrust {
        interfaces {
            ge-0/0/1.0;
        }
    }
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- Verifying Secure Wire Mapping on page 76
- Verifying the VLAN on page 76

Verifying Secure Wire Mapping

Purpose Verify the secure wire mapping.

Action From operational mode, enter the **show security forwarding-options secure-wire** command.

```
user@host> show security forward-options secure-wire
Secure wire                    Interface      Link   Interface      Link

access-sw                      ge-0/0/0.0     up     ge-0/0/1.0     up
Total secure wires: 1
```

Verifying the VLAN

Purpose Verify the VLAN.

Action From operational mode, enter the **show vlans vlan-10** command.

```
user@host> show vlans vlan-10
Routing instance       VLAN name          Tag     Interfaces
default-switch         vlan-10             10         ge-0/0/0.0
                                                      ge-0/0/1.0
```

Related Documentation

- Understanding Secure Wire on page 71

Example: Simplifying SRX Series Device Deployment with Secure Wire over Trunk Mode Interfaces

Supported Platforms SRX Series

If you are connecting an SRX Series device to other network devices, you can use secure wire to simplify the device deployment in the network. No changes to routing or forwarding tables on the SRX Series device and no reconfiguration of neighboring devices is needed. Secure wire allows traffic to be forwarded unchanged between specified trunk mode interfaces on an SRX Series device as long as it is permitted by security policies or other security features. Follow this example if you are connecting an SRX Series device to other network devices through trunk mode interfaces.

Requirements

No special configuration beyond device initialization is required before configuring this feature.

Overview

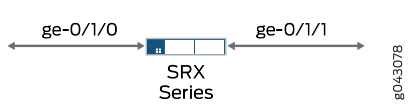
This example configures the secure wire trunk-sw that maps interface ge-0/1/0.0 to interface ge-0/1/1.0. The two peer interfaces are configured for trunk mode and carry user traffic tagged with VLAN IDs from 100 to 102. The VLAN ID list 100-102 is configured for the VLAN vlan-100 and the trunk mode interfaces.

NOTE: A specific VLAN ID must be configured for a VLAN.

Topology

Figure 6 on page 77 shows the trunk mode interfaces that are mapped in secure wire trunk-sw.

Figure 6: Secure Wire Trunk Mode Interfaces



Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set vlans vlan-100 vlan members 100-102
set interfaces ge-0/1/0 unit 0 family ethernet-switching interface-mode trunk vlan
  members 100-102
```



```
set interfaces ge-0/1/1 unit 0 family ethernet-switching interface-mode trunk vlan
   members 100-102
set security forwarding-options secure-wire trunk-sw interface [ge-0/1/0.0 ge-0/1/1.0]
set security zones security-zone trust interfaces ge-0/1/0.0
set security zones security-zone untrust interfaces ge-0/1/1.0
set security policies default-policy permit-all
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure a secure wire mapping for trunk mode interfaces:

1. Configure the VLAN.

   ```
   [edit vlans vlan-100]
   user@host# set vlan members 100-102
   ```

2. Configure the trunk mode interfaces.

   ```
   [edit interfaces]
   user@host# set ge-0/1/0 unit 0 family ethernet-switching interface-mode trunk
      vlan members 100-102
   user@host# set ge-0/1/1 unit 0 family ethernet-switching interface-mode trunk
      vlan members 100-102
   ```

3. Configure the secure wire mapping.

   ```
   [edit security forwarding-options]
   user@host# set secure-wire trunk-sw interface [ge-0/1/0.0 ge-0/1/1.0]
   ```

4. Configure security zones.

   ```
   [edit security zones]
   user@host# set security-zone trust interfaces ge-0/1/0.0
   user@host# set security-zone untrust interfaces ge-0/1/1.0
   ```

5. Configure a security policy to permit traffic.

   ```
   [edit security policies]
   user@host# set default-policy permit-all
   ```

Results

From configuration mode, confirm your configuration by entering the **show vlans**, **show interfaces**, **show security forwarding-options**, and **show security zones** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@host# show vlans
   vlan-100 {
      vlan members 100-102;
   }
   user@host# show interfaces
   ge-0/1/0 {
      unit 0 {
         family ethernet-switching {
            interface-mode trunk;
            vlan members 100-102;
         }
```

```
    }
  }
  ge-0/1/1 {
    unit 0 {
      family ethernet-switching {
        interface-mode trunk;
        vlan members 100-102;
      }
    }
  }
  user@host# show security forwarding-options
  secure-wire trunk-sw {
    interfaces [ge-0/1/0.0 ge-0/1/1.0];
  }
user@host# show security zones
  security-zone trust {
    interfaces {
      ge-0/1/0.0;
    }
  }
  security-zone untrust {
    interfaces {
      ge-0/1/1.0;
    }
  }
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- Verifying Secure Wire Mapping on page 79
- Verifying the VLAN on page 79

Verifying Secure Wire Mapping

Purpose Verify the secure wire mapping.

Action From operational mode, enter the **show security forwarding-options secure-wire** command.

```
user@host> show security forward-options secure-wire
Secure wire                        Interface       Link    Interface       Link

trunk-sw                           ge-0/1/0.0      up      ge-0/1/1.0      up
Total secure wires: 1
```

Verifying the VLAN

Purpose Verify the VLAN.

Action From operational mode, enter the **show vlans** command.

```
user@host> show vlans
```



```
Routing instance        VLAN name          VLAN ID    Interfaces
default-switch          vlan-100-vlan-0100     100        ge-0/1/0.0
                                                       ge-0/1/1.0
default-switch          vlan-100-vlan-0101     101        ge-0/1/0.0
                                                       ge-0/1/1.0
default-switch          vlan-100-vlan-0102     102        ge-0/1/0.0
                                                       ge-0/1/1.0
```

NOTE: VLANs are automatically expanded, with one VLAN for each VLAN ID in the VLAN ID list.

Related Documentation

- Understanding Secure Wire on page 71

Example: Simplifying SRX Series Device Deployment with Secure Wire over Aggregated Interface Member Links

Supported Platforms SRX Series

If you are connecting an SRX Series device to other network devices, you can use secure wire to simplify the device deployment in the network. No changes to routing or forwarding tables on the SRX Series device and no reconfiguration of neighboring devices is needed. Secure wire allows traffic to be forwarded unchanged between specified aggregated interface member links on an SRX Series device as long as it is permitted by security policies or other security features. Follow this example if you are connecting an SRX Series device to other network devices through aggregated interface member links.

NOTE: LACP is not supported. Secure wire mappings can be configured for member links of link bundles instead of directly mapping aggregated Ethernet interfaces.

Requirements

No special configuration beyond device initialization is required before configuring this feature.

Overview

This example configures secure wires for two aggregated Ethernet interface link bundles with two links each. Two separate secure wires ae-link1 and ae-link2 are configured using one link from each aggregated Ethernet link bundle. This static mapping requires that the two link bundles have the same number of links.

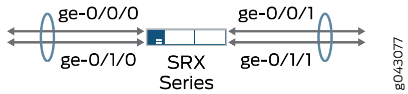
For link bundles, all logical interfaces of the secure wire mappings must belong to the same VLAN. VLAN ID 10 is configured for the VLAN vlan-10 and the logical interfaces. All logical interfaces of a link bundle must belong to the same security zone.

NOTE: A specific VLAN ID or VLAN ID list must be configured for a VLAN.

Topology

Figure 7 on page 81 shows the aggregated interfaces that are mapped in secure wire configurations.

Figure 7: Secure Wire Aggregated Interfaces



Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set vlans vlan-10 vlan-id 10
set interfaces ge-0/0/0 unit 0 family ethernet-switching interface-mode access vlan-id
  10
set interfaces ge-0/0/1 unit 0 family ethernet-switching interface-mode access vlan-id
  10
set interfaces ge-0/1/0 unit 0 family ethernet-switching interface-mode access vlan-id
  10
set interfaces ge-0/1/1 unit 0 family ethernet-switching interface-mode access vlan-id
  10
set security forwarding-options secure-wire ae-link1-sw interface [ge-0/1/0.0 ge-0/1/1.0]
set security forwarding-options secure-wire ae-link2-sw interface [ge-0/0/0.0 ge-0/0/1.0]
set security zones security-zone trust interfaces ge-0/0/0.0
set security zones security-zone trust interfaces ge-0/1/0.0
set security zones security-zone untrust interfaces ge-0/0/1.0
set security zones security-zone untrust interfaces ge-0/1/1.0
set security policies default-policy permit-all
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure a secure wire mapping for aggregated interface member links:

1. Configure the VLAN.

   ```
   [edit vlans vlan-10]
   user@host# set vlan-id10
   ```

2. Configure the interfaces.

   ```
   [edit interfaces ]
   ```

```
user@host# set ge-0/0/0 unit 0 family ethernet-switching interface-mode access
  vlan-id 10
user@host# set ge-0/0/1 unit 0 family ethernet-switching interface-mode access
  vlan-id 10
user@host# set ge-0/1/0 unit 0 family ethernet-switching interface-mode access
  vlan-id 10
user@host# set ge-0/1/1 unit 0 family ethernet-switching interface-mode access
  vlan-id 10
```

3. Configure the secure wire mappings.

```
[edit security forwarding-options]
user@host# set secure-wire ae-link1-sw interface [ ge-0/1/0.0 ge-0/1/1.0 ]
user@host# set secure-wire ae-link2-sw interface [ ge-0/0/0.0 ge-0/0/1.0 ]
```

4. Configure security zones.

```
[edit security zones]
user@host# set security-zone trust interfaces ge-0/0/0.0
user@host# set security-zone trust interfaces ge-0/1/0.0
user@host# set security-zone untrust interfaces ge-0/0/1.0
user@host# set security-zone untrust interfaces ge-0/1/1.0
```

5. Configure a security policy to permit traffic.

```
[edit security policies]
user@host# set default-policy permit-all
```

Results From configuration mode, confirm your configuration by entering the **show vlans**, **show interfaces**, **show security forwarding-options**, and **show security zones** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@host# show vlans
  vlan-10 {
    vlan-id 10;
  }
  user@host# show interfaces
  ge-0/0/0 {
    unit 0 {
      family ethernet-switching {
        interface-mode access;
        vlan-id 10;
      }
    }
  }
  ge-0/0/1 {
    unit 0 {
      family ethernet-switching {
        interface-mode access;
        vlan-id 10;
      }
    }
  }
  ge-0/1/0 {
    unit 0 {
      family ethernet-switching {
```



```
                interface-mode access;
                vlan-id 10;
            }
        }
    }
    ge-0/1/1{
        unit 0 {
            family ethernet-switching {
                interface-mode access;
                vlan-id 10;
            }
        }
    }
    user@host# show security forwarding-options
    secure-wire ae-link1-sw {
        interfaces [ge-0/1/0.0 ge-0/1/1.0];
    }
    secure-wire ae-link2-sw {
        interfaces [ge-0/0/0.0 ge-0/0/1.0];
    }
  user@host# show security zones
    security-zone trust {
        interfaces {
            ge-0/0/0.0;
            ge-0/1/0.0;
        }
    }
    security-zone untrust {
        interfaces {
            ge-0/0/1.0;
            ge-0/1/1.0;
        }
    }
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- Verifying Secure Wire Mapping on page 83
- Verifying the VLAN on page 84

Verifying Secure Wire Mapping

Purpose Verify the secure wire mapping.

Action From operational mode, enter the **show security forwarding-options secure-wire** command.

```
user@host> show security forward-options secure-wire
Secure wire                    Interface      Link   Interface      Link

ae-link1-sw                    ge-0/1/0.0     up     ge-0/1/1.0     up
ae-link2-sw                    ge-0/0/0.0     up     ge-0/0/1.0     up
Total secure wires: 2
```

Verifying the VLAN

Purpose

Verify the VLAN.

Action

From operational mode, enter the **show vlans vlan-10** command.

```
user@host> show vlans vlan-10
Routing instance        VLAN name          VLAN ID     Interfaces
default-switch          vlan-10                 10           ge-0/0/0.0
                                                          ge-0/0/1.0
                                                          ge-0/1/0.0
                                                          ge-0/1/1.0
```

Related Documentation

- Understanding Secure Wire on page 71

Example: Simplifying Chassis Cluster Deployment with Secure Wire over Redundant Ethernet Interfaces

Supported Platforms SRX Series

If you are connecting an SRX Series chassis cluster to other network devices, you can use secure wire to simplify the cluster deployment in the network. No changes to routing or forwarding tables on the cluster and no reconfiguration of neighboring devices is needed. Secure wire allows traffic to be forwarded unchanged between specified redundant Ethernet interfaces on the SRX Series chassis cluster as long as it is permitted by security policies or other security features. Follow this example if you are connecting an SRX Series chassis cluster to other network devices through redundant Ethernet interfaces.

Requirements

Before you begin:

- Connect a pair of the same SRX Series devices in a chassis cluster.
- Configure the chassis cluster node ID and cluster ID.
- Set the number of redundant Ethernet interfaces in the chassis cluster.
- Configure the chassis cluster fabric.
- Configure chassis cluster redundancy group (in this example redundancy group 1 is used).

For more information, see the *Chassis Cluster Feature Guide for SRX Series Devices*.

Overview

Secure wire is supported over redundant Ethernet interfaces in a chassis cluster. The two redundant Ethernet interfaces must be configured in the same redundancy group. If failover occurs, both redundant Ethernet interfaces should fail over together.

NOTE: Secure wire mapping of redundant Ethernet link aggregation groups (LAGs) are not supported. LACP is not supported.

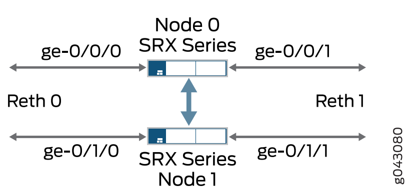
This example configures the secure wire reth-sw that maps ingress interface reth0.0 to egress interface reth1.0. Each redundant Ethernet interface consists of two child interfaces, one on each node of the chassis cluster. The two redundant Ethernet interfaces are configured for access mode. VLAN ID 10 is configured for the VLAN vlan-10 and the redundant Ethernet interfaces.

NOTE: A specific VLAN ID or VLAN ID list must be configured for a VLAN.

Topology

Figure 8 on page 85 shows the redundant Ethernet interfaces that are mapped in secure wire reth-sw.

Figure 8: Secure Wire Redundant Ethernet Interfaces



Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set vlans vlan-10 vlan-id 10
set interfaces ge-0/0/0 gigether-options redundant-parent reth0
set interfaces ge-0/0/1 gigether-options redundant-parent reth1
set interfaces ge-0/1/0 gigether-options redundant-parent reth0
set interfaces ge-0/1/1 gigether-options redundant-parent reth1
set interfaces reth0 unit 0 family ethernet-switching interface-mode access vlan-id 10
set interfaces reth1 unit 0 family ethernet-switching interface-mode access vlan-id 10
set interfaces reth0 redundant-ether-options redundancy-group 1
set interfaces reth1 redundant-ether-options redundancy-group 1
set security forwarding-options secure-wire reth-sw interface [reth0.0 reth1.0]
```



```
set security zones security-zone trust interfaces reth0.0
set security zones security-zone untrust interfaces reth1.0
set security policies default-policy permit-all
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure a secure wire mapping for chassis cluster redundant Ethernet interfaces:

1. Configure the VLAN.

   ```
   [edit vlans vlan-10]
   user@host# set vlan-id 10
   ```

2. Configure the redundant Ethernet interfaces.

   ```
   [edit interfaces ]
   user@host# set ge-0/0/0 gigether-options redundant-parent reth0
   user@host# set ge-0/0/1 gigether-options redundant-parent reth1
   user@host# set ge-0/1/0 gigether-options redundant-parent reth0
   user@host# set ge-0/1/1 gigether-options redundant-parent reth1

   user@host#set reth0 unit 0 family ethernet-switching interface-mode access vlan-id
     10
   user@host#set reth1 unit 0 family ethernet-switching interface-mode access vlan-id
     10

   user@host# set reth0 redundant-ether-options redundancy-group 1
   user@host# set reth1 redundant-ether-options redundancy-group 1
   ```

3. Configure the secure wire mapping.

   ```
   [edit security forwarding-options]
   user@host# set secure-wire reth-sw interface [reth0.0 reth1.0]
   ```

4. Configure security zones.

   ```
   [edit security zones]
   user@host# set security-zone trust interfaces reth0.0
   user@host# set security-zone untrust interfaces reth1.0
   ```

5. Configure a security policy to permit traffic.

   ```
   [edit security policies]
   user@host# set default-policy permit-all
   ```

Results

From configuration mode, confirm your configuration by entering the **show vlans**, **show interfaces**, **show security forwarding-options**, and **show security zones** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@host# show vlans
  vlan-10 {
    vlan-id 10;
  }
  user@host# show interfaces
```

```
  ge-0/0/0 {
    gigether-options {
      redundant-parent reth0;
    }
  }
  ge-0/0/1 {
    gigether-options {
      redundant-parent reth1;
    }
  }
  ge-0/1/0 {
    gigether-options {
      redundant-parent reth0;
    }
  }
  ge-0/1/1 {
    gigether-options {
      redundant-parent reth1;
    }
  }
  reth0 {
    redundant-ether-options {
      redundancy-group 1;
    }
    unit 0 {
      family ethernet-switching {
        interface-mode access;
        vlan-id 10;
      }
    }
  }
  reth1 {
    redundant-ether-options {
      redundancy-group 1;
    }
    unit 0 {
      family ethernet-switching {
        interface-mode access;
        vlan-id 10;
      }
    }
  }
  user@host# show security forwarding-options
  secure-wire reth-sw {
    interfaces [reth0.0 reth1.0];
  }
user@host# show security zones
  security-zone trust {
    interfaces {
      reth0.0;
    }
  }
  security-zone untrust {
    interfaces {
      reth1.0;
    }
```

```
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- Verifying Secure Wire Mapping on page 88
- Verifying the VLAN on page 88

Verifying Secure Wire Mapping

Purpose Verify the secure wire mapping.

Action From operational mode, enter the **show security forwarding-options secure-wire** command.

```
user@host> show security forward-options secure-wire
node0:
--------------------------------------------------------------------------
Secure wire                        Interface       Link    Interface       Link

reth-sw                            reth0.0         up      reth1.0         up

Total secure wires: 1

node1:
--------------------------------------------------------------------------
Secure wire                        Interface       Link    Interface       Link

reth-sw                            reth0.0         up      reth1.0         up

Total secure wires: 1
```

Verifying the VLAN

Purpose Verify the VLAN.

Action From operational mode, enter the **show vlan vlan-10** command.

```
user@host> show vlan vlan-10
Routing instance        VLAN Name            VLAN ID     Interfaces
default-switch          vlan-10                      10          reth0.0
                                                             reth1.0
```

Related Documentation

- Understanding Secure Wire on page 71
- Example: Simplifying Chassis Cluster Deployment with Secure Wire over Aggregated Redundant Ethernet Interfaces on page 88

Example: Simplifying Chassis Cluster Deployment with Secure Wire over Aggregated Redundant Ethernet Interfaces

Supported Platforms SRX Series

If you are connecting an SRX Series chassis cluster to other network devices, you can use secure wire to simplify the cluster deployment in the network. No changes to routing or forwarding tables on the cluster and no reconfiguration of neighboring devices is needed. Secure wire allows traffic to be forwarded unchanged between specified redundant Ethernet interfaces on the SRX Series chassis cluster as long as it is permitted by security policies or other security features. Follow this example if you are connecting an SRX Series chassis cluster to other network devices through aggregated redundant Ethernet interfaces.

NOTE: Secure wires cannot be configured for redundant Ethernet interface link aggregation groups (LAGs). For the secure wire mapping shown in this example, there is no LAG configuration on the SRX Series chassis cluster. Each redundant Ethernet interface consists of two child interfaces, one on each node of the chassis cluster. Users on upstream or downstream devices connected to the SRX Series cluster can configure the redundant Ethernet interface child links in LAGs.

- Requirements on page 89
- Overview on page 89
- Configuration on page 90
- Verification on page 94

Requirements

Before you begin:

- Connect a pair of the same SRX Series devices in a chassis cluster.
- Configure the chassis cluster node ID and cluster ID.
- Set the number of redundant Ethernet interfaces in the chassis cluster.
- Configure the chassis cluster fabric.
- Configure the chassis cluster redundancy group (in this example, redundancy group 1 is used).

For more information, see the *Chassis Cluster Feature Guide for SRX Series Devices*.

Overview

This example configures secure wires for four redundant Ethernet interfaces: reth0, reth1, reth2, and reth3. Each redundant Ethernet interface consists of two child interfaces, one on each node of the chassis cluster. All four redundant Ethernet interfaces must be in the same VLAN—in this example, the VLAN is vlan-0. Two of the redundant Ethernet interfaces, reth0.0 and reth2.0, are assigned to the trust zone, while the other two interfaces, reth1.0 and reth3.0, are assigned to the untrust zone.

This example configures the following secure wires:

- reth-sw1 maps interface reth0.0 to interface reth1.0

- reth-sw2 maps interface reth2.0 to reth3.0

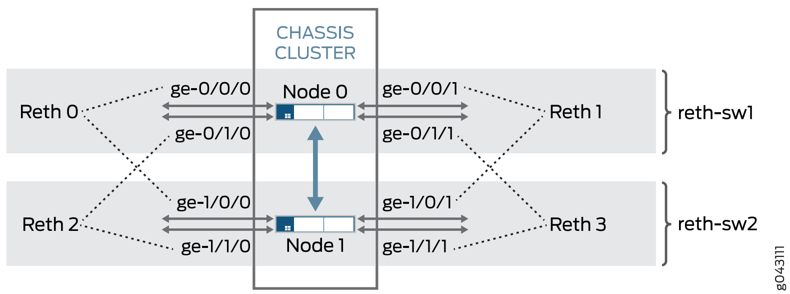
All redundant Ethernet interfaces are configured for access mode. VLAN ID 10 is configured for the VLAN vlan-0 and the redundant Ethernet interfaces.

NOTE: A specific VLAN ID or VLAN ID list must be configured for a VLAN.

Topology

Figure 9 on page 90 shows the redundant Ethernet interface child links that are mapped in secure wire configurations reth-sw1 and reth-sw2. Each redundant Ethernet interface consists of two child interfaces, one on each node of the chassis cluster.

Figure 9: Secure Wire Redundant Ethernet Interface Child Links



Users on upstream or downstream devices connected to the SRX Series cluster can configure redundant Ethernet interface child links in a LAG as long as the LAG does not span chassis cluster nodes. For example, ge-0/0/0 and ge-0/1/0 and ge-0/0/1 and ge-0/1/1 on node 0 can be configured as LAGs on connected devices. In the same way, ge-1/0/0 and ge-1/1/0 and ge-1/0/1 and ge-1/1/1 on node 1 can be configured as LAGs on connected devices.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set vlans vlan-0 vlan-id 10
set interfaces ge-0/0/0 gigether-options redundant-parent reth0
set interfaces ge-0/0/1 gigether-options redundant-parent reth1
set interfaces ge-0/1/0 gigether-options redundant-parent reth2
set interfaces ge-0/1/1 gigether-options redundant-parent reth3
set interfaces ge-1/0/0 gigether-options redundant-parent reth0
set interfaces ge-1/0/1 gigether-options redundant-parent reth1
set interfaces ge-1/1/0 gigether-options redundant-parent reth2
set interfaces ge-1/1/1 gigether-options redundant-parent reth3
set interfaces reth0 unit 0 family ethernet-switching interface-mode access vlan-id 10
set interfaces reth1 unit 0 family ethernet-switching interface-mode access vlan-id 10
```

```
set interfaces reth2 unit 0 family ethernet-switching interface-mode access vlan-id 10
set interfaces reth3 unit 0 family ethernet-switching interface-mode access vlan-id 10
set interfaces reth0 redundant-ether-options redundancy-group 1
set interfaces reth1 redundant-ether-options redundancy-group 1
set interfaces reth2 redundant-ether-options redundancy-group 1
set interfaces reth3 redundant-ether-options redundancy-group 1
set security forwarding-options secure-wire reth-sw1 interface [reth0.0 reth1.0]
set security forwarding-options secure-wire reth-sw2 interface [reth2.0 reth3.0]
set security zones security-zone trust interfaces reth0.0
set security zones security-zone trust interfaces reth2.0
set security zones security-zone untrust interfaces reth1.0
set security zones security-zone untrust interfaces reth3.0
set security policies default-policy permit-all
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure a secure wire mapping for aggregated interface member links:

1. Configure the VLAN.

```
[edit vlans vlan-0]
user@host# set vlan-id 10
```

2. Configure the redundant Ethernet interfaces.

```
[edit interfaces ]
user@host# set ge-0/0/0 gigether-options redundant-parent reth0
user@host# set ge-0/0/1 gigether-options redundant-parent reth1
user@host# set ge-0/1/0 gigether-options redundant-parent reth2
user@host# set ge-0/1/1 gigether-options redundant-parent reth3
user@host# set ge-1/0/0 gigether-options redundant-parent reth0
user@host# set ge-1/0/1 gigether-options redundant-parent reth1
user@host# set ge-1/1/0 gigether-options redundant-parent reth2
user@host# set ge-1/1/1 gigether-options redundant-parent reth3

user@host# set reth0 unit 0 family ethernet-switching interface-mode access
  vlan-id 10
user@host# set reth1 unit 0 family ethernet-switching interface-mode access vlan-id
  10
user@host# set reth2 unit 0 family ethernet-switching interface-mode access vlan-id
  10
user@host# set reth3 unit 0 family ethernet-switching interface-mode access vlan-id
  10

user@host# set reth0 redundant-ether-options redundancy-group 1
user@host# set reth1 redundant-ether-options redundancy-group 1
user@host# set reth2 redundant-ether-options redundancy-group 1
user@host# set reth3 redundant-ether-options redundancy-group 1
```

3. Configure the secure wire mappings.

```
[edit security forwarding-options]
user@host# set secure-wire reth-sw1 interface [reth0.0 reth1.0]
user@host# set secure-wire reth-sw2 interface [reth2.0 reth3.0]
```

4. Configure security zones.

```
[edit security zones]
user@host# set security-zone trust interfaces reth0.0
user@host# set security-zone trust interfaces reth2.0

user@host# set security-zone untrust interfaces reth1.0
user@host# set security-zone untrust interfaces reth3.0
```

5. Configure a security policy to permit traffic.

```
[edit security policies]
user@host# set default-policy permit-all
```

Results From configuration mode, confirm your configuration by entering the **show vlans**, **show interfaces**, **show security forwarding-options**, and **show security zones** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@host# show vlans
  vlan-0 {
    vlan-id 10;
  }
  user@host# show interfaces
  ge-0/0/0 {
    gigether-options {
      redundant-parent reth0;
    }
  }
  ge-0/0/1 {
    gigether-options {
      redundant-parent reth1;
    }
  }
  ge-0/1/0 {
    gigether-options {
      redundant-parent reth2;
    }
  }
  ge-0/1/1 {
    gigether-options {
      redundant-parent reth3;
    }
  }
  ge-1/0/0 {
    gigether-options {
      redundant-parent reth0;
    }
  }
  ge-1/0/1 {
    gigether-options {
      redundant-parent reth1;
    }
  }
  ge-1/1/0 {
```



```
    gigether-options {
        redundant-parent reth2;
    }
}
ge-1/1/1 {
    gigether-options {
        redundant-parent reth3;
    }
}
reth0 {
    redundant-ether-options {
        redundancy-group 1;
    }
    unit 0 {
        family ethernet-switching {
            interface-mode access;
            vlan-id 10;
        }
    }
}
reth1 {
    redundant-ether-options {
        redundancy-group 1;
    }
    unit 0 {
        family ethernet-switching {
            interface-mode access;
            vlan-id 10;
        }
    }
}
reth2 {
    redundant-ether-options {
        redundancy-group 1;
    }
    unit 0 {
        family ethernet-switching {
            interface-mode access;
            vlan-id 10;
        }
    }
}
reth3 {
    redundant-ether-options {
        redundancy-group 1;
    }
    unit 0 {
        family ethernet-switching {
            interface-mode access;
            vlan-id 10;
        }
    }
}
user@host# show security forwarding-options
secure-wire reth-sw1 {
    interfaces [reth0.0 reth1.0];
```

```
    }
    secure-wire reth-sw2 {
      interfaces [reth2.0 reth3.0];
    }
  user@host# show security zones
    security-zone trust {
      interfaces {
        reth0.0;
        reth2.0;
      }
    }
    security-zone untrust {
      interfaces {
        reth1.0;
        reth3.0;
      }
    }
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- Verifying Secure Wire Mapping on page 94
- Verifying VLAN on page 94

Verifying Secure Wire Mapping

Purpose Verify the secure wire mapping.

Action From operational mode, enter the **show security forwarding-options secure-wire** command.

```
user@host> show security forward-options secure-wire
node0:
---------------------------------------------------------------------------
Secure wire                        Interface       Link   Interface       Link

reth-sw1                           reth0.0         up     reth1.0         up
reth-sw2                           reth2.0         up     reth3.0         up

Total secure wires: 2

node1:
---------------------------------------------------------------------------
Secure wire                        Interface       Link   Interface       Link

reth-sw1                           reth0.0         up     reth1.0         up
reth-sw2                           reth2.0         up     reth3.0         up

Total secure wires: 2
```

Verifying VLAN

Purpose Verify the VLAN.

Action From operational mode, enter the **show vlans vlan-0** command.

```
user@host> show vlans vlan-0
Routing instance        VLAN name            VLAN ID     Interfaces
default-switch          vlan-0                     10
                                                               reth0.0
                                                               reth1.0
                                                               reth2.0
                                                               reth3.0
```

Related Documentation

- Understanding Secure Wire on page 71
- Example: Simplifying Chassis Cluster Deployment with Secure Wire over Redundant Ethernet Interfaces on page 84

PART 3

Configuring Ethernet Ports for Switching

CHAPTER 12

Configuring Switching Modes

Understanding Switching Modes

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345

There are two types of switching modes:

- Switching Mode–The uPIM appears in the list of interfaces as a single interface, which is the first interface on the uPIM. For example, ge-2/0/0. You can optionally configure each uPIM port only for autonegotiation, speed, and duplex mode. A uPIM in switching mode can perform the following functions:
  - Layer 3 forwarding—Routes traffic destined for WAN interfaces and other PIMs present on the chassis.
  - Layer 2 forwarding—Switches intra-LAN traffic from one host on the LAN to another LAN host (one port of uPIM to another port of same uPIM).
- Enhanced Switching Mode–Each port can be configured for switching or routing mode. This usage differs from the routing and switching modes, in which all ports must be in either switching or routing mode. The uPIM in enhanced switching mode provides the following features:
  - Supports configuration of different types of VLANs and inter-VLAN routing.
  - Supports Layer 2 control plane protocol such as Link Aggregation Control Protocol (LACP).
  - Supports port-based Network Access Control (PNAC) by means of authentication servers.

NOTE: The SRX300 and SRX320 devices support enhanced switching mode only. When you set a multiport uPIM to enhanced switching mode, all the Layer 2 switching features are supported on the uPIM. (Platform support depends on the Junos OS release in your installation.)

You can set a multiport Gigabit Ethernet uPIM on a device to either switching or enhanced switching mode.

When you set a multiport uPIM to switching mode, the uPIM appears as a single entity for monitoring purposes. The only physical port settings that you can configure are autonegotiation, speed, and duplex mode on each uPIM port, and these settings are optional.

Related Documentation

- Example: Configuring Switching Modes on page 106
- Ethernet Ports Switching Overview on page 100

Ethernet Ports Switching Overview

Supported Platforms SRX Series

Certain ports on Juniper Networks devices can function as Ethernet access switches that switch traffic at Layer 2 and route traffic at Layer 3.

You can deploy supported devices in branch offices as an access or desktop switch with integrated routing capability, thus eliminating intermediate access switch devices from your network topology. The Ethernet ports provide switching while the Routing Engine provides routing functionality, enabling you to use a single device to provide routing, access switching, and WAN interfaces.

This topic contains the following sections:

Supported Devices and Ports

Juniper Networks supports switching features on a variety of Ethernet ports and devices (see Table 12 on page 100). Platform support depends on the Junos OS release in your installation. The following ports and devices are included:

- Onboard Ethernet ports (Gigabit and Fast Ethernet built-in ports) on the SRX300, SRX320, SRX320 PoE, SRX340, SRX345, SRX550M and SRX1500 devices.
- Multiport Gigabit Ethernet XPIM on the SRX650 device.

Table 12: Supported Devices and Ports for Switching Features

Device	Ports
SRX100 devices	Onboard Fast Ethernet ports (**fe-0/0/0** and **fe-0/0/7**)

Table 12: Supported Devices and Ports for Switching Features *(continued)*

Device	Ports
SRX210 devices	Onboard Gigabit Ethernet ports (**ge-0/0/0** and **ge-0/0/1**) and 1-Port Gigabit Ethernet SFP Mini-PIM port. Onboard Fast Ethernet ports (**fe-0/0/2** and **fe-0/0/7**)
SRX220 devices	Onboard Gigabit Ethernet ports (**ge-0/0/0** through **ge-0/0/7**) and 1-Port Gigabit Ethernet SFP Mini-PIM port.
SRX240 devices	Onboard Gigabit Ethernet ports (**ge-0/0/0** through **ge-0/0/15**) and 1-Port Gigabit Ethernet SFP Mini-PIM port.
SRX300 devices	Onboard Gigabit Ethernet ports (**ge-0/0/0** and **ge-0/0/7**)
SRX320 devices	Onboard Gigabit Ethernet ports (**ge-0/0/0** and **ge-0/0/7**)
SRX340 devices	Onboard Gigabit Ethernet ports (**ge-0/0/0** through **ge-0/0/15**)
SRX345 devices	Onboard Gigabit Ethernet ports (**ge-0/0/0** through **ge-0/0/15**)
SRX550 devices	Onboard Gigabit Ethernet ports (**ge-0/0/0** through **ge-0/0/9**, Multiport Gigabit Ethernet XPIM modules, and 1-Port Gigabit Ethernet SFP Mini-PIM port.
SRX550M devices	Onboard Gigabit Ethernet ports (**ge-0/0/0** through **ge-0/0/9** and Multiport Gigabit Ethernet XPIM modules.
SRX650 devices	Multiport Gigabit Ethernet XPIM modules NOTE: On SRX650 devices, Ethernet switching is not supported on Gigabit Ethernet interfaces (**ge-0/0/0** through **ge-0/0/3** ports).
SRX1500 devices	Onboard Gigabit Ethernet ports (**ge-0/0/0** through **ge-0/0/19**)

On the SRX300, SRX320, SRX340 and SRX345 devices, you can set the onboard Gigabit Ethernet ports to operate as either switched ports or routed ports.

Integrated Bridging and Routing

Integrated bridging and routing (IRB) provides support for simultaneous Layer 2 swiching and Layer 3 routing within the same VLAN. Packets arriving on an interface of the VLAN are switched or routed based on the destination MAC address of the packet. Packets with the router's MAC address as the destination are routed to other Layer 3 interfaces.

Link Layer Discovery Protocol and LLDP-Media Endpoint Discovery

Devices use Link Layer Discovery Protocol (LLDP) and LLDP-Media Endpoint Discovery (MED) to learn and distribute device information on network links. The information allows the device to quickly identify a variety of systems, resulting in a LAN that interoperates smoothly and efficiently.

LLDP-capable devices transmit information in Type Length Value (TLV) messages to neighbor devices. Device information can include specifics, such as chassis and port identification and system name and system capabilities. The TLVs leverage this information from parameters that have already been configured in the Junos OS.

LLDP-MED goes one step further, exchanging IP-telephony messages between the device and the IP telephone. These TLV messages provide detailed information on Power over Ethernet (PoE) policy. The PoE Management TLVs let the device ports advertise the power level and power priority needed. For example, the device can compare the power needed by an IP telephone running on a PoE interface with available resources. If the device cannot meet the resources required by the IP telephone, the device could negotiate with the telephone until a compromise on power is reached.

The following basic TLVs are supported:

- Chassis Identifier—The MAC address associated with the local system.
- Port identifier—The port identification for the specified port in the local system.
- Port Description—The user-configured port description. The port description can be a maximum of 256 characters.
- System Name—The user-configured name of the local system. The system name can be a maximum of 256 characters.
- Switching Features Overview—This information is not configurable, but taken from the software.
- System Capabilities—The primary function performed by the system. The capabilities that system supports; for example, Ethernet switching or router. This information is not configurable, but based on the model of the product.
- Management Address—The IP management address of the local system.

The following LLDP-MED TLVs are supported:

- LLDP-MED Capabilities—A TLV that advertises the primary function of the port. The values range from 0 through 15:
  - 0—Capabilities
  - 1—Network policy
  - 2—Location identification
  - 3—Extended power through medium-dependent interface power-sourcing equipment (MDI-PSE)
  - 4—Inventory
  - 5–15—Reserved
- LLDP-MED Device Class Values:

- 0—Class not defined
- 1—Class 1 device
- 2—Class 2 device
- 3—Class 3 device
- 4—Network connectivity device
- 5–255— Reserved

NOTE: **On SRX100, SRX210, SRX220, SRX240, SRX300, SRX320, SRX340, SRX345, and SRX650 devices, on VLAN-tagged routed interfaces, LLDP is not supported. (Platform support depends on the Junos OS release in your installation.)**

- Network Policy—A TLV that advertises the port VLAN configuration and associated Layer 2 and Layer 3 attributes. Attributes include the policy identifier, application types, such as voice or streaming video, 802.1Q VLAN tagging, and 802.1p priority bits and Diffserv code points.
- Endpoint Location—A TLV that advertises the physical location of the endpoint.
- Extended Power via MDI—A TLV that advertises the power type, power source, power priority, and power value of the port. It is the responsibility of the PSE device (network connectivity device) to advertise the power priority on a port.

LLDP and LLDP-MED must be explicitly configured on uPIMs (in enhanced switching mode) on base ports on SRX100, SRX210, SRX240, SRX300, SRX320, SRX340, and SRX345 devices, and Gigabit Backplane Physical Interface Modules (GPIMs) on SRX650 devices. (Platform support depends on the Junos OS release in your installation.) To configure LLDP on all interfaces or on a specific interface, use the **lldp** statement at the [**set protocols**] hierarchy. To configure LLDP-MED on all interfaces or on a specific interface, use the **lldp-med** statement at the [**set protocols**] hierarchy.

Types of Switch Ports

The ports, or interfaces, on a switch operate in either access mode or trunk mode.

An interface in access mode connects to a network device, such as a desktop computer, an IP telephone, a printer, a file server, or a security camera. The interface itself belongs to a single VLAN. The frames transmitted over an access interface are normal Ethernet frames.

Trunk interfaces 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 one another.

Q-in-Q VLAN Tagging

Q-in-Q tunneling, defined by the IEEE 802.1ad standard, allows service providers on Ethernet access networks to extend a Layer 2 Ethernet connection between two customer sites.

In Q-in-Q tunneling, as a packet travels from a customer VLAN (C-VLAN) to a service provider's VLAN, a service provider-specific 802.1Q tag is added to the packet. This additional tag is used to segregate traffic into service-provider-defined service VLANs (S-VLANs). The original customer 802.1Q tag of the packet remains and is transmitted transparently, passing through the service provider's network. As the packet leaves the S-VLAN in the downstream direction, the extra 802.1Q tag is removed.

NOTE: **When Q-in-Q tunneling is configured for a service provider's VLAN, all Routing Engine packets, including packets from the routed VLAN interface, that are transmitted from the customer-facing access port of that VLAN will always be untagged.**

There are three ways to map C-VLANs to an S-VLAN:

- All-in-one bundling—Use the **dot1q-tunneling** statement at the [**edit vlans**] hierarchy to map without specifying customer VLANs. All packets from a specific access interface are mapped to the S-VLAN.
- Many-to-one bundling—Use the **customer-vlans** statement at the [**edit vlans**] hierarchy to specify which C-VLANs are mapped to the S-VLAN.
- Mapping C-VLAN on a specific interface—Use the **mapping** statement at the [**edit vlans**] hierarchy to map a specific C-VLAN on a specified access interface to the S-VLAN.

Table 13 on page 104 lists the C-VLAN to S-VLAN mapping supported on SRX Series devices. (Platform support depends on the Junos OS release in your installation.)

Table 13: Supported Mapping Methods

Mapping	SRX210	SRX240	SRX300	SRX320	SRX340	SRX345	SRX550M	SRX650
All-in-one bundling	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Many-to-one bundling	No	No	No	No	Yes	Yes	Yes	Yes
Mapping C-VLAN on a specific interface	No	No	Yes	Yes	Yes	Yes	Yes	Yes

NOTE: **On SRX650 devices, in the dot1q-tunneling configuration options, customer VLANs range and VLAN push do not work together for the same S-VLAN, even when you commit the configuration. If both are configured, then VLAN push takes priority over customer VLANs range.**

IRB interfaces are supported on Q-in-Q VLANs for SRX210, SRX240, SRX300, SRX320, SRX340, SRX345, and SRX650 devices. Packets arriving on an IRB interface on a Q-in-Q VLAN are routed regardless of whether the packet is single or double tagged. The outgoing routed packets contain an S-VLAN tag only when exiting a trunk interface; the packets exit the interface untagged when exiting an access interface. (Platform support depends on the Junos OS release in your installation.)

In a Q-in-Q deployment, customer packets from downstream interfaces are transported without any changes to source and destination MAC addresses. You can disable MAC address learning at both the interface level and the VLAN level. Disabling MAC address learning on an interface disables learning for all the VLANs of which that interface is a member. When you disable MAC address learning on a VLAN, MAC addresses that have already been learned are flushed.

On SRX100, SRX210, SRX240, SRX300, SRX320, SRX340, SRX345, and SRX650 devices (with platform support depending on the Junos OS release in your installation), on the Layer 3 aggregated Ethernet, the following features are not supported:

- Encapsulations (such as CCC, VLAN CCC, VPLS, and PPPoE)
- J-Web
- On all SRX Series devices, the Link Layer Discovery Protocol (LLDP) is not supported on redundant Ethernet (reth) interfaces.
- On SRX550M devices the aggregate Ethernet (ae) interface with XE member interface cannot be configured with the Ethernet switching family.
- On SRX300, SRX320, SRX340, SRX345, and SRX550M devices, the Q-in-Q support on a Layer 3 interface has the following limitations:
  - Double tagging is not supported on reth and ae interfaces.
  - Multitopology routing is not supported in flow mode and in chassis clusters.
  - Dual tagged frames are not supported on encapsulations (such as CCC, TCC, VPLS, and PPPoE)
  - On Layer 3 logical interfaces, **input-vlan-map**, **output-vlan-map**, **inner-range**, and **inner-list** are not applicable
  - Only TPIDs with 0x8100 are supported, and the maximum number of tags is 2.
  - Dual tagged frames are accepted only for logical interfaces with IPV4 and IPv6 families.

- On SRX100, SRX210, SRX240, SRX300, SRX320, SRX340, SRX345, and SRX650 devices (with platform support depending on the Junos OS release in your installation), on the routed VLAN interface (RVI), the following features are not supported:
  - IS-IS (family ISO)
  - Encapsulations (Ether CCC, VLAN CCC, VPLS, PPPoE, and so on) on VLAN interfaces
  - CLNS
  - DVMRP
  - VLAN interface MAC change
  - G-ARP
  - Change VLAN-Id for VLAN interface

Related Documentation

- Understanding Switching Modes on page 99

Example: Configuring Switching Modes

Supported Platforms SRX300, SRX320, SRX340, SRX345

Requirements

Before you begin, see "Ethernet Ports Switching Overview" on page 100.

Overview

In this example, you configure **chassis** and set the l2-learning protocol to global mode switching. You then set a physical port parameter on the l2-learning protocols.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set protocols l2-learning global-mode switching
set interfaces ge-0/0/1 unit 0 family ethernet-switching interface-mode access
```

Step-by-Step Procedure

To configure switching mode:

1. Set l2-learning protocol to global mode switching.

```
[edit protocols l2-learning]
user@host# set protocols l2-learning global-mode switching
```


2. Set a physical port parameter on the l2-learning protocols.

   [edit]
   user@host# **set interfaces ge-0/0/1 unit 0 family ethernet-switching interface-mode access**

3. If you are done configuring the device, commit the configuration.

   [edit]
   user@host# **commit**

Verification

To verify the configuration is working properly, enter the **show interfaces ge-0/0/1 switch-options** and **show protocols l2-learning** commands.

Related Documentation

- Ethernet Ports Switching Overview on page 100

CHAPTER 13

Configuring VLANs in Switching Mode

Understanding VLANs

Supported Platforms SRX Series

Each VLAN is a collection of network nodes that are grouped together to form separate broadcast domains. On an Ethernet network that is a single LAN, all traffic is forwarded to all nodes on the LAN. On VLANs, frames whose origin and destination are in the same VLAN are forwarded only within the local VLAN. Frames that are not destined for the local VLAN are the only ones forwarded to other broadcast domains. VLANs thus limit the amount of traffic flowing across the entire LAN, reducing the possible number of collisions and packet retransmissions within a VLAN and on the LAN as a whole.

On an Ethernet LAN, all network nodes must be physically connected to the same network. On VLANs, the physical location of the nodes is not important, so you can group network devices in any way that makes sense for your organization, such as by department or business function, by types of network nodes, or even by physical location. Each VLAN is identified by a single IP subnetwork and by standardized IEEE 802.1Q encapsulation.

To identify which VLAN the traffic belongs to, all frames on an Ethernet VLAN are identified by a tag, as defined in the IEEE 802.1Q standard. These frames are tagged and are encapsulated with 802.1Q tags.

For a simple network that has only a single VLAN, all traffic has the same 802.1Q tag. 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 know to which VLAN a frame belongs. 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 VLAN configuration details, see Table 14 on page 110.

Table 14: VLAN Configuration Details

Field	Function	Action
General		
VLAN Name	Specifies a unique name for the VLAN.	Enter a name. NOTE: VLAN text field is disabled when vlan-tagging is not enabled.
VLAN ID/Range	Specifies the identifier or range for the VLAN.	Select one: • **VLAN ID**—Type a unique identification number from **1** through **4094**. If no value is specified, it defaults to 1. • **VLAN Range**—Type a number range to create VLANs with IDs corresponding to the range. For example, the range 2–3 will create two VLANs with the ID 2 and 3.
Description	Describes the VLAN.	Enter a brief description for the VLAN.
Input Filter	Specifies the VLAN firewall filter that is applied to incoming packets.	To apply an input firewall filter, select the firewall filter from the list.
Output Filter	Specifies the VLAN firewall filter that is applied to outgoing packets.	To apply an output firewall filter, select the firewall filter from the list.
Ports		
Ports	Specifies the ports to be associated with this VLAN for data traffic. You can also remove the port association.	Click one: • **Add**—Select the ports from the available list. • **Remove**—Select the port that you do not want associated with the VLAN.
IP Address		
Layer 3 Information	Specifies IP address options for the VLAN.	Select to enable the IP address options.
IP Address	Specifies the IP address of the VLAN.	Enter the IP address.
Subnet Mask	Specifies the range of logical addresses within the address space that is assigned to an organization.	Enter the address, for example, **203.0.113.0**. You can also specify the address prefix.
Input Filter	Specifies the VLAN interface firewall filter that is applied to incoming packets.	To apply an input firewall filter to an interface, select the firewall filter from the list.
Output Filter	Specifies the VLAN interface firewall filter that is applied to outgoing packets.	To apply an output firewall filter to an interface, select the firewall filter from the list.
ARP/MAC Details	Specifies the details for configuring the static IP address and MAC.	Click the **ARP/MAC Details** button. Enter the static IP address and MAC address in the window that is displayed.
VoIP		

Table 14: VLAN Configuration Details *(continued)*

Field	Function	Action
Ports	Specifies the ports to be associated with this VLAN for voice traffic. You can also remove the port association.	Click one: • **Add**—Select the ports from the available list. • **Remove**—Select the port that you do not want associated with the VLAN.

NOTE: On SRX100 devices, dynamic VLAN assignments and guest VLANs are not supported.

On SRX240, SRX300, SRX340, SRX345 and SRX650 devices, the VLAN range from 3967 to 4094 falls under the reserved VLAN address range, and the user is not allowed any configured VLANs from this range. Platform support depends on the Junos OS release in your installation.

Related Documentation

- Example: Configuring VLANs on page 111
- Ethernet Ports Switching Overview on page 100

Example: Configuring VLANs

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

This example shows you how to configure a VLAN.

Requirements

Before you begin:

- Determine which interfaces to use and verify that they are in switch mode. See “Understanding VLANs” on page 109.
- Determine what ports to use on the device and how to segment your network. See “Ethernet Ports Switching Overview” on page 100.

Overview

In this example, you create a new VLAN and then configure attributes.

Configuration

GUI Step-by-Step Procedure

To access the VLAN:

1. In the J-Web user interface, select **Configure>Switching>VLAN**.

   The VLAN configuration page displays a list of existing VLANs. If you select a specific VLAN, the specific VLAN details are displayed in the details section.

2. Click one:

- **Add**—Creates a VLAN.
- **Edit**—Edits an existing VLAN configuration.
- **Delete**—Deletes an existing VLAN.

NOTE: **If you delete a VLAN, the VLAN configuration for all the associated interfaces is also deleted.**

Add or edit VLAN information.

3. Click one:
   - **OK**—Saves the configuration and returns to the main configuration page, then click **Commit Options**>**Commit**.
   - **Cancel**—Cancels your entries and returns to the main configuration page.

Related Documentation

- Understanding VLANs on page 109
- Ethernet Ports Switching Overview on page 100

Example: Configuring VLANs (CLI Procedure)

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

This example shows you how to configure a VLAN.

Requirements

Before you begin:

- Determine which interfaces to use and verify that they are in switch mode. See "Understanding VLANs" on page 109.
- Determine what ports to use on the device and how to segment your network. See "Ethernet Ports Switching Overview" on page 100.

Overview

In this example, you create a new VLAN and then configure attributes. You can configure one or more VLANs to perform Layer 2 switching. The Layer 2 switching functions include integrated routing and bridging (IRB) for support for Layer 2 switching and Layer 3 IP routing on the same interface. SRX Series devices can function as Layer 2 switches, each with multiple switching, or broadcast, domains that participate in the same Layer 2 network.

Configuration

CLI Quick Configuration

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set vlans v10 vlan-id 10
set vlans v10 l3-interface irb.10
set interfaces irb unit 10 family inet address 10.1.1.10/24
set interfaces ge-0/0/1 unit 0 family ethernet-switching vlan members 10
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure a VLAN:

1. Create the VLAN by setting the unique VLAN name and configuring the VLAN ID.

   ```
   [edit vlans]
   user@host# set vlans v10 vlan-id 10
   ```

2. Bind a Layer 3 interface with the VLAN.

   ```
   [edit]
   user@host# set vlans v10 l3-interface irb.10
   ```

3. Create the subnet for the VLAN's broadcast domain.

   ```
   [edit]
   user@host# set interfaces irb unit 10 family inet address 10.1.1.10/24
   ```

4. Assign an interface to the VLAN by specifying the logical interface (with the unit statement) and specifying the VLAN name as the member.

   ```
   [edit]
   user@host# set interfaces ge-0/0/1 unit 0 family ethernet-switching vlan members
     10
   ```

Results

From configuration mode, confirm your configuration by entering the **show vlans** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show vlans
v10 {
  vlan-id 10;
  l3-interface irb.10;
}
user@host# show interfaces
ge-0/0/1 {
  unit 0 {
    family ethernet-switching {
```

```
            vlan {
                members 10;
            }
        }
    }
}
irb {
    unit 10 {
        family inet {
            address 10.1.1.10/24;
        }
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Verifying VLANs

Purpose Verify that VLANs are configured and assigned to the interfaces.

Action From operational mode, enter the **show vlans** command.

```
user@host> show vlans

Routing instance        VLAN name             Tag          Interfaces
default-switch          default               1

default-switch          v10                   10
                                                           ge-0/0/1.0
```

Meaning The output shows the VLANs are configured and assigned to the interfaces.

Related Documentation

- Understanding VLANs on page 109
- Ethernet Ports Switching Overview on page 100

Understanding VLAN Retagging

Supported Platforms SRX Series, vSRX

NOTE: Starting in Junos OS Release 15.1X49-D40 VLAN retagging is no longer supported.

NOTE: Starting in Junos OS Release 15.1X49-D70 VLAN retagging in switching mode is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.

NOTE: Starting in Junos OS Release 15.1X49-D80 VLAN retagging in switching mode is supported on SRX1500 devices.

The VLAN identifier in packets arriving on a Layer 2 trunk port can be rewritten or "retagged" with a different internal VLAN identifier. VLAN retagging is a symmetric operation; upon exiting the same trunk port, the retagged VLAN identifier is replaced with the original VLAN identifier. VLAN retagging provides a way to selectively screen incoming packets and redirect them to a firewall or other security device without affecting other VLAN traffic.

VLAN retagging can be applied only to interfaces configured as Layer 2 trunk interfaces. These interfaces can include redundant Ethernet interfaces in a Layer 2 transparent mode chassis cluster configuration.

NOTE: If a trunk port is configured for VLAN retagging, untagged packets received on the port cannot be assigned a VLAN identifier with the VLAN retagging configuration. To configure a VLAN identifier for untagged packets received on the physical interface, use the **native-vlan-id** statement.

To configure VLAN retagging for a Layer 2 trunk interface, specify a one-to-one mapping of the following:

- Incoming VLAN identifier—VLAN identifier of the incoming packet that is to be retagged. This VLAN identifier must not be the same VLAN identifier configured with the **native-vlan-id** statement for the trunk port.
- Internal VLAN identifier—VLAN identifier for the retagged packet. This VLAN identifier must be in the VLAN identifier list for the trunk port and must not be the same VLAN identifier configured with the **native-vlan-id** statement for the trunk port.

This is an enterprise style of VLAN retagging in which a single command **set interfaces ge-3/0/0 unit 0 family ethernet-switching vlan-rewrite translate 11 2** is sufficient on top of normal trunk configuration. But, in case of Q-in-Q which is is service provider style the same thing can be done using swap.

Release History Table

Release	Description
15.1X49-D80	Starting in Junos OS Release 15.1X49-D80 VLAN retagging in switching mode is supported on SRX1500 devices.
15.1X49-D70	Starting in Junos OS Release 15.1X49-D70 VLAN retagging in switching mode is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40 VLAN retagging is no longer supported.

Related Documentation

- Layer 2 Transparent Mode Overview on page 23
- Example: Configuring VLAN Retagging for Layer 2 Transparent Mode on page 30
- Example: Configuring Layer 2 Logical Interfaces on page 6

Configuring VLAN Retagging on a Layer 2 Trunk Interface

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

VLAN retagging is a feature which works on IEEE standard 802.1Q Virtual Lan (VLAN TAG). VLAN retagging for SRX1500 devices is a enterprise style of VLAN retagging, in which a single command is sufficient on top of normal trunk configuration.

1. Create a Layer 2 trunk interface.

   ```
   [edit]
   user@host#set interfaces ge-3/0/0 unit 0 family ethernet-switching interface-mode trunk vlan members 1–10
   ```
2. Configure VLAN retagging.

   ```
   [edit]
   user@host#set interfaces ge-3/0/0 unit 0 family ethernet-switching vlan-rewrite translate 11 2
   ```

Example: Configuring a Guest VLAN

Supported Platforms SRX300, SRX320, SRX340, SRX345

This example shows how to configure a guest VLAN for limited network access or for Internet-only access to avoid compromising a company's security.

NOTE: Starting in Junos OS Release 15.1X49-D40, guest VLANs are not supported.

- Requirements on page 117
- Overview on page 117

- Configuration on page 117
- Verification on page 117

Requirements

Before you begin, verify that the interfaces that will be used are in switch mode. See "Example: Configuring Switching Modes" on page 106 and "Understanding Switching Modes" on page 99.

Overview

In this example, you configure a VLAN called visitor-vlan with a VLAN ID of 300. Then you set protocols and configure visitor-vlan as the guest VLAN.

Configuration

Step-by-Step Procedure

To configure a guest VLAN:

1. Configure a VLAN.

   ```
   [edit]
   user@host# set vlans visitor-vlan vlan-id 300
   ```

2. Specify the guest VLAN.

   ```
   [edit]
   user@host# set protocols dot1x authenticator interface all guest-vlan visitor-vlan
   ```

3. If you are done configuring the device, commit the configuration.

   ```
   [edit]
   user@host# commit
   ```

Verification

To verify the configuration is working properly, enter the **show vlans** and **show protocols dot1x** commands.

Release History Table

Release	Description
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, guest VLANs are not supported.

Related Documentation

- Understanding VLANs on page 109
- Ethernet Ports Switching Overview on page 100

CHAPTER 14

Configuring Multiple VLAN Registration Protocol

Configuring Multiple VLAN Registration Protocol (MVRP) to Manage Dynamic VLAN Registration

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Multiple VLAN Registration Protocol (MVRP) is used to manage dynamic VLAN registration in a Layer 2 network. You can configure MVRP on SRX Series devices.

MVRP is disabled by default on SRX Series devices.

To enable MVRP and to set MVRP options, follow these instructions:

Enabling MVRP

MVRP can be enabled only on trunk interfaces.

To enable MVRP on a specific trunk interface (here, interface ge-0/0/1):

```
[edit protocols mvrp]
user@host# set interface ge-0/0/1
```

Changing the Registration Mode to Disable Dynamic VLANs

When the registration mode for an interface is set to **normal** (the default), dynamic VLANs are created on interfaces participating in MVRP. The dynamic VLANs created on one SRX

Series device are then propagated by means of MVRP to other SRX Series devices in the topology.

However, dynamic VLAN creation through MVRP can be disabled for all trunk interfaces or for individual trunk interfaces.

Configuring Timer Values

The timers in MVRP define the amount of time an interface waits to join or leave MVRP or to send or process the MVRP information for the router or switch after receiving an MVRP PDU:

- The join timer controls the amount of time the router or switch waits to accept a registration request.
- The leave timer controls the period of time that the router or switch waits in the Leave state before changing to the unregistered state.
- The leaveall timer controls the frequency with which the LeaveAll messages are communicated.

The default MVRP timer values are 200 ms for the join timer, 1000 ms for the leave timer, and 60 seconds for the leaveall timer.

BEST PRACTICE: **Maintain default timer settings unless there is a compelling reason to change the settings. Modifying timers to inappropriate values might cause an imbalance in the operation of MVRP.**

To set the join timer at 300 ms for a specific interface (here, interface ge-0/0/1):

```
[edit protocols mvrp]
user@host# set interface ge-0/0/1 join-timer 300
```

To set the leave timer at 400 ms for a specific interface (here, interface ge-0/0/1):

```
[edit protocols mvrp]
user@host# set interface ge-0/0/1 leave-timer 400
```

To set the leaveall timer at 20 seconds for a specific interface (here, interface ge-0/0/1):

```
[edit protocols mvrp]
user@host# set interface ge-0/0/1 leaveall-timer 20
```

Configuring the Multicast MAC Address for MVRP

MVRP uses the customer MVRP multicast MAC address when MVRP is enabled. However, you can configure MVRP to use the provider MVRP multicast MAC address instead.

To configure MVRP to use the provider MVRP multicast MAC address:

```
[edit protocols mvrp]
user@host# set bpdu-destination-mac-address provider-bridge-group;
```


Configuring an MVRP Interface as a Point-to-Point Interface

Specify that a configured interface is connected point-to-point. If specified, a point-to-point subset of the MRP state machine provides a simpler and more efficient method to accelerate convergence on the network.

To specify that an MVRP interface is point-to-point (here, interface ge-0/0/1):

```
[edit protocols mvrp]
user@host# set interface ge-0/0/1 point-to-point;
```

Configuring MVRP Tracing Options

Set MVRP protocol-level tracing options.

To specify MVRP protocol tracing (here, the file is **/var/log/mvrp-log**, size is **2m**, number of files is **28**, the option **world-readable** indicates the log can be read by user, and MVRP is flagging **events**):

```
[edit protocols mvrp]
user@host# edit traceoptions file /var/log/mvrp-log size 2m files 28 world-readable flag
  events
```

Disabling MVRP

MVRP is disabled by default. You need to perform this procedure only if MVRP is previously enabled.

To disable MVRP on all trunk interfaces, use one of the following commands:

```
[edit]
user@host# deactivate protocols mvrp
user@host# delete protocols mvrp
```


CHAPTER 15

Configuring Q-in-Q Tunneling and VLAN Translation

Understanding Q-in-Q Tunneling and VLAN Translation

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

Q-in-Q tunneling enables service providers on Ethernet access networks to extend a Layer 2 Ethernet connection between two customer sites. Using Q-in-Q tunneling, providers can also segregate or bundle customer traffic into fewer VLANs or different VLANs by adding another layer of 802.1Q tags. Q-in-Q tunneling is useful when customers have overlapping VLAN IDs because customers' VLAN (C-VLAN) tags are prepended by the service-provider VLAN (S-VLAN) tag, which allows you to preserve each customers' VLAN IDs without conflict. The Juniper Networks Junos operating system (Junos OS) implementation of Q-in-Q tunneling supports the IEEE 802.1ad standard.

This topic describes:

How Q-in-Q Tunneling Works

In Q-in-Q tunneling, as a packet travels from a C-VLAN to an S-VLAN, a service-provider-specific 802.1Q tag is added to the packet. This additional tag is used to segregate traffic into S-VLANs. The original customer 802.1Q tag of the packet is retained and is transmitted transparently, passing through the service provider's network. As the packet leaves the S-VLAN in the downstream direction, the additional 802.1Q tag is removed.

When Q-in-Q tunneling is enabled, trunk interfaces are assumed to be part of the service provider or data center network. Access interfaces are assumed to be customer-facing and accept both tagged and untagged frames. When using many-to-one bundling or mapping a specific interface, you must use the **native** option to specify an S-VLAN for untagged and priority tagged packets if you want to accept these packets. (Priority tagged packets have their VLAN ID set to 0, and their priority code point bits might be configured with a CoS value.) If you do not specify an S-VLAN for them, untagged packets are discarded. The **native** option is not available for all-in-one bundling because there is no need to specify untagged and priority tagged packets when all packets are mapped to an S-VLAN. This topic refers to trunk interfaces as S-VLAN interfaces. This type of interface is also known as a network-to-network interface (NNI). The topic refers to access interfaces as C-VLAN interfaces. This type of interface is also known as a user-network interface (UNI).

Q-in-Q tunneling does not affect any class-of-service (CoS) values that are configured on a C-VLAN. These settings are retained in the C-VLAN tag and can be used after a packet leaves an S-VLAN. CoS values are not copied from C-VLAN tags to S-VLAN tags.

Depending on your interface configuration, you might need to adjust the MTU value on your trunk or access ports to accommodate the 4 bytes used for the tag added by Q-in-Q tunneling. For example, if you use the default MTU value of 1514 bytes on your access and trunk ports, you need to make one of the following adjustments:

- Reduce the MTU on the access links by at least 4 bytes so that the frames do not exceed the MTU of the trunk link when S-VLAN tags are added.
- Increase the MTU on the trunk link so that the link can handle the larger frame size.

NOTE: You can configure Q-in-Q tunneling only on access ports (not trunk ports).

NOTE: You can configure the same interface to be an S-VLAN/NNI interface and a C-VLAN/UNI interface. This means that the same physical interface can transmit single-tagged and double-tagged frames simultaneously. This allows you maximum flexibility in your network topology and lets you maximize the use of your interfaces.

An interface can be a member of multiple S-VLANs. You can map one C-VLAN to one S-VLAN (1:1) or many C-VLANs to many S-VLANs (*N*:*N*). C-VLAN and S-VLAN tags are unique—for instance, you can have both a C-VLAN tag of 101 and an S-VLAN tag of 101. You can limit the set of accepted customer tags to a range of tags or to discrete values. Class-of-service (CoS) values of C-VLANs are unchanged in the downstream direction. You may copy ingress priority and CoS settings to the S-VLAN.

C-VLAN and S-VLAN interfaces accept priority-tagged packets without any configuration.

How VLAN Translation Works

VLAN translation replaces an incoming C-VLAN tag with an S-VLAN tag instead of adding an additional tag. The C-VLAN tag is therefore lost, so a single-tagged packet is normally untagged when it leaves the S-VLAN (at the other end of the link). If an incoming packet has had Q-in-Q tunneling applied in advance, VLAN translation replaces the outer tag and the inner tag is retained when the packet leaves the S-VLAN at the other end of the link.

To configure VLAN translation, use the **mapping swap** statement at the **[edit vlans interface]** hierarchy level.

NOTE: **You can configure VLAN translation on access ports only. You cannot configure it on trunk ports, and you cannot configure Q-in-Q tunneling on the same access port.**

Sending and Receiving Untagged Packets

To enable an interface to send and receive untagged packets, you must specify a native VLAN for a physical interface. When the interface receives an untagged packet, it adds the VLAN ID of the native VLAN to the packet and sends the newly tagged packet to the mapped interface.

To specify a native VLAN, use the **native-vlan-id** statement at the **[edit interfaces *interface-name*]** hierarchy level. The native VLAN ID must match the C-VLAN or S-VLAN ID or be included in the VLAN ID list specified on the logical interface.

For example, on a logical interface for a C-VLAN interface, you might specify a C-VLAN ID list of 100-200. Then, on the C-VLAN physical interface, you could specify a native VLAN ID of 150. This configuration would work because the native VLAN of 150 is included in the C-VLAN ID list of 100-200.

We recommend configuring a native VLAN when using any of the approaches to map C-VLANs to S-VLANs. If you do not configure a native VLAN on an interface, untagged packets received by the interface are discarded. See the Mapping C-VLANs to S-VLANs section in this topic for information about the methods of mapping C-VLANs to S-VLANs.

Disabling MAC Address Learning

In a Q-in-Q deployment, customer packets interfaces are transported without any changes to source and destination MAC addresses. You can disable MAC address learning at the global, interface, and VLAN levels:

- To disable learning globally, disable MAC address learning for the switch.
- To disable learning for an interface, disable MAC address learning for all VLANs of which the specified interface is a member.
- To disable learning for a VLAN, disable MAC address learning for a specified VLAN.

Mapping C-VLANs to S-VLANs

There are three ways to map C-VLANs to S-VLANs:

- Port-based QinQ (All-in-one bundling) on page 126
- Many-to-Many Bundling on page 126
- Mapping a Specific Interface on page 127
- VLAN-Rewrite with Q-in-Q on page 127
- Q-in-Q ethertype on page 127
- Q-in-Q CoS mapping on page 127

If you configure multiple mapping methods, the switch gives priority to mapping a specific interface, then to many-to-many bundling, and last to all-in-one bundling. However, for a particular mapping method, setting up overlapping rules for the same C-VLAN is not supported.

Port-based QinQ (All-in-one bundling)

All-in-one bundling maps all packets from all C-VLAN interfaces to an S-VLAN.

The C-VLAN interface accepts untagged and single-tagged packets. An S-VLAN 802.1Q tag is then added to these packets, and the packets are sent to the S-VLAN interface, which accepts untagged, single-tagged, and double-tagged packets.

Use the **dot1q-tunneling** statement at the [**edit vlans**] hierarchy to map without specifying customer VLANs. All packets from a specific access interface are mapped to the S-VLAN.

NOTE: The C-VLAN and S-VLAN interfaces accept untagged packets provided that the **native-vlan-id** statement is configured on these interfaces.

Many-to-Many Bundling

Many-to-many bundling is used to specify which C-VLANs are mapped to which S-VLANs.

Use many-to-many bundling when you want a subset of the C-VLANs on the access switch to be part of multiple S-VLANs. With many-to-many bundling, the C-VLAN interfaces accept untagged and single-tagged packets. An S-VLAN 802.1Q tag is then added to these packets, and the packets are sent to the S-VLAN interfaces, which accept untagged, single-tagged, and double-tagged packets.

NOTE: The C-VLAN and S-VLAN interfaces accept untagged packets provided that the **native-vlan-id** statement is configured on these interfaces.

Mapping a Specific Interface

Use specific interface mapping when you want to assign an S-VLAN to a specific C-VLAN on an interface. The configuration applies only to the specific interface, not to all access interfaces.

Specific interface mapping has two suboptions: **push** and **swap**. When traffic that is mapped to a specific interface is pushed, the packet retains its original tag as it moves from the C-VLAN to the S-VLAN and an additional S-VLAN tag is added to the packet. When traffic that is mapped to a specific interface is swapped, the incoming tag is replaced with a new VLAN tag. This is sometimes known VLAN rewriting or VLAN translation.

Typically, this method is used to keep data from different customers separate or to provide individualized treatment of the packets on a certain interface. You might also use this method map VLAN traffic from different customers to a single S-VLAN.

When using specific interface mapping, the C-VLAN interfaces accept untagged and single-tagged packets, while the S-VLAN interfaces accept untagged, single-tagged, and double-tagged packets.

NOTE: The C-VLAN and S-VLAN interfaces accept untagged packets provided that the native-vlan-id statement is configured on these interfaces.

VLAN-Rewrite with Q-in-Q

A single UNI interface will encapsulate a customer's CVLAN traffic and classify into a SVLAN, and performs the vlan-translation for other customer's CVLAN and classify into another SVLAN to provide segregation of data traffic received on UNI interface.

Q-in-Q ethertype

As per 802.1AD standard, data traffic going out of NNI interface will have SVLAN TPID as 0x88A8; however, 4 SVLAN TPIDs (0x88A8, 0x9100, 0x8100 etc.) are supported based on available ASIC support.

Q-in-Q CoS mapping

Copy CVLAN tagged packets dot1p bits to SVLAN tag dot1p bits. This is meant to treat customer vlan-tagged packets the same way in provider-network.

Constraints for Q-in-Q Tunneling and VLAN Translation

Be aware of the following constraints when configuring Q-in-Q tunneling and VLAN translation:

- Prior to Junos OS Release 15.1X49-D80 you cannot create a regular VLAN on an interface if you have created an S-VLAN or C-VLAN on that interface for Q-in-Q tunneling. This means that you cannot create an integrated routing and bridging (IRB) interface on that interface because regular VLANs are a required part of IRB configuration. With Junos OS Release 15.1X49-D80, you can create a regular VLAN on a trunk interface that has an S-VLAN, which means that you can also create an IRB interface on the trunk. In this case, the regular VLAN and S-VLAN on the same trunk interface cannot share the same VLAN ID. Junos OS Release 15.1X49-D80 does not allow you to create a regular VLAN on an access interface that has a C-VLAN.
- Most access port security features are not supported with Q-in-Q tunneling and VLAN translation.
- Configuring Q-in-Q tunneling and VLAN rewriting/VLAN translation on the same port is not supported.
- You can configure at most one VLAN rewrite/VLAN translation for a given VLAN and interface. For example, you can create no more than one translation for VLAN 100 on interface xe-0/0/0.
- The combined total of VLANs and rules for Q-in-Q tunneling and VLAN translation cannot exceed 6000. For example, you can configure and commit 4000 VLANs and 2000 rules for Q-in-Q tunneling and VLAN translation. However, you cannot configure 4000 VLANs and 2500 rules for Q-in-Q tunneling and VLAN translation. If you try to commit a configuration that exceeds the limit, you see CLI and syslog errors that inform you about the problem.
- MAC addresses are learned from S-VLANs, not C-VLANs.
- Broadcast, unknown unicast, and multicast traffic is forwarded to all members in the S-VLAN.
- The following features are not supported with Q-in-Q tunneling:
  - DHCP relay
  - Fibre Channel over Ethernet
  - IP Source Guard
- The following features are not supported with VLAN rewriting/VLAN translation:
  - Fibre Channel over Ethernet
  - Firewall filter applied to a port or VLAN in the output direction
  - Private VLANs
  - VLAN Spanning Tree Protocol
  - Reflective relay

Configuring Q-in-Q Tunneling

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

Q-in-Q tunneling and VLAN translation allow service providers to create a Layer 2 Ethernet connection between two customer sites. Providers can segregate different customers' VLAN traffic on a link (for example, if the customers use overlapping VLAN IDs) or bundle different customer VLANs into a single service VLAN. Data centers can use Q-in-Q tunneling and VLAN translation to isolate customer traffic within a single site or to enable customer traffic flows between cloud data centers in different geographic locations.

Q-in-Q tunneling adds a service VLAN tag before the customer's 802.1Q VLAN tags. The Juniper Networks Junos operating system implementation of Q-in-Q tunneling supports the IEEE 802.1ad standard.

NOTE: **This task uses a Junos OS release that supports the Enhanced Layer 2 Software (ELS) configuration style.**

With releases prior to Junos OS Release 15.1X49-D80, you cannot create a regular VLAN on an interface if you have created an S-VLAN or C-VLAN on that interface for Q-in-Q tunneling. This means that you cannot create an integrated routing and bridging (IRB) interface on that interface because regular VLANs are a required part of IRB configuration. With Junos OS Release 15.1X49-D80, you can create a regular VLAN on a trunk interface that has an S-VLAN, which means that you can also create an IRB interface on the trunk. In this case, the regular VLAN and S-VLAN on the same trunk interface cannot share the same VLAN ID. Junos OS Release 15.1X49-D80, does not allow you to create a regular VLAN on an access interface that has a C-VLAN.

Before setting up Q-in-Q tunneling, make sure you have created and configured the necessary customer VLANs on the neighboring switches. See "Example: Configuring VLANs" on page 111.

Using the Different Mapping Methods

Once you have created the required VLANs on the neighboring switches, configure Q-in-Q tunneling using one of the three methods to map customer VLANs (C-VLANs) to service-provider-defined service VLANs (S-VLANs):.

- All-in-one bundling maps all packets from all C-VLAN interfaces to an S-VLAN.
- Use many-to-many bundling when you want a subset of the C-VLANs on the access switch to be part of multiple S-VLANs.
- Use specific interface mapping when you want to assign an S-VLAN to a specific C-VLAN on an interface.

Configuring All-in-One Bundling

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

You can configure Q-in-Q tunneling using the all-in-one bundling method, which forwards all packets that ingress on a C-VLAN interface to an S-VLAN. (Packets are forwarded to the S-VLAN regardless of whether they are tagged or untagged prior to ingress.) Using this approach saves you the effort of specifying a specific mapping for each C-VLAN.

First configure the S-VLAN and its interface:

1. Assign a logical interface (unit) to be a member of the S-VLAN.

   [edit vlans *vlan-name*]
   `user@switch#` **interface *interface-name.unit-number***

   NOTE: **Do not use logical interface unit 0. You must later bind a VLAN tag ID to the unit you specify in this step, and you cannot bind a VLAN tag ID to unit 0. Also note that you do not create a VLAN ID for the S-VLAN. The ID is created automatically for the appropriate logical interface.**

2. Enable the interface to transmit packets with two 802.1Q VLAN tags:

   [edit interfaces *interface-name*]
   `user@switch#` **flexible-vlan-tagging**
3. Enable extended VLAN bridge encapsulation on the interface:

   [edit interfaces *interface-name*]
   `user@switch#` **encapsulation extended-vlan-bridge**
4. Enable the S-VLAN interface to send and receive untagged packets:

   [edit interfaces *interface-name*]
   `user@switch#` **native-vlan-id *vlan-id***
5. Bind the logical interface (unit) of the interface that you specified in step 1 to the automatically-created VLAN ID for the S-VLAN:

   [edit interfaces *interface-name* unit *logical-unit-number*]
   `user@switch#` **vlan-id *number***

For example, the following configuration enables Q-in-Q tunneling on interface xe-0/0/0, enables xe-0/0/0 to accept untagged packets, and binds the VLAN ID of S-VLAN v10 to a logical interface of xe-0/0/0.

set interfaces xe-0/0/0 flexible-vlan-tagging
set interfaces xe-0/0/0 native-vlan-id 10
set interfaces xe-0/0/0 encapsulation extended-vlan-bridge
set interfaces xe-0/0/0 unit 10 vlan-id 10

Now configure all-in-one bundling on a C-VLAN interface:

1. Assign a logical interface (unit) of the C-VLAN interface to be a member of the S-VLAN.

   [edit vlans *vlan-name*]
   `user@switch#` **interface *interface-name.unit-number***
2. Enable the interface to transmit packets with 802.1Q VLAN tags :

   [edit interfaces *interface-name*]


```
user@switch# flexible-vlan-tagging
```

3. Enable extended VLAN bridge encapsulation on the interface:

   [edit interfaces *interface-name*]
   ```
   user@switch# encapsulation extended-vlan-bridge
   ```
4. Enable the C-VLAN interface to send and receive untagged packets:

   [edit interfaces *interface-name*]
   ```
   user@switch# native-vlan-id vlan-id
   ```
5. Configure a logical interface to receive and forward any tagged packet whose VLAN ID tag matches the list of VLAN IDs you specify:

   [edit interfaces *interface-name* unit *logical-unit-number*]
   ```
   user@switch# vlan-id-list vlan-id-numbers
   ```

   WARNING: On some SRX Series devices, you can apply no more than eight VLAN identifier lists to a physical interface.

6. Configure the system to add an S-VLAN tag (outer tag) as packets travel from a C-VLAN interface to the S-VLAN:

   [edit interfaces *interface-name* unit *logical-unit-number*]
   ```
   user@switch# input-vlan-map push
   ```
7. Configure the system to remove the S-VLAN tag when packets are forwarded (internally) from the S-VLAN interface to the C-VLAN interface:

   [edit interfaces *interface-name* unit *logical-unit-number*]
   ```
   user@switch# output-vlan-map pop
   ```

For example, the following configuration makes xe-0/0/1.10 a member of S-VLAN v10, enables Q-in-Q tunneling, maps packets from C-VLANs 100 through 200 to S-VLAN 10, and enables xe-0/0/1 to accept untagged packets. If a packet originates in C-VLAN 100 and needs to be sent across the S-VLAN, a tag with VLAN ID 10 is added to the packet. When a packet is forwarded (internally) from the S-VLAN interface to interface xe-0/0/1, the tag with VLAN ID 10 is removed.

```
set vlans v10 interface xe-0/0/1.10
set interfaces xe-0/0/1 flexible-vlan-tagging
set interfaces xe-0/0/1 encapsulation extended-vlan-bridge
set interfaces xe-0/0/1 unit 10 vlan-id-list 100-200
set interfaces xe-0/0/1 native-vlan-id 150
set interfaces xe-0/0/1 unit 10 input-vlan-map push
set interfaces xe-0/0/1 unit 10 output-vlan-map pop
```

Configuring Many-to-Many Bundling

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

You can configure Q-in-Q tunneling using the many-to-many bundling method, which maps packets from multiple C-VLANs to multiple S-VLANs. This method is convenient for mapping a range of C-VLANs without having to specify each one individually. (You can also use this method to configure only one C-VLAN to be mapped to an S-VLAN.)

First configure the S-VLANs and assign them to an interface:

1. Assign a logical interface (unit) to be a member of one of the S-VLANs. Do not use logical interface unit 0.

   [edit vlans *vlan-name*]
   `user@switch#` **interface *interface-name.unit-number***

   NOTE: **Note that you do not create a VLAN ID for the S-VLAN. The ID is created automatically for the appropriate logical interface.**

2. Repeat step 1 for the other S-VLANs.
3. Enable the physical interface to transmit packets with two 802.1Q VLAN tags:

   [edit interfaces *interface-name*]
   `user@switch#` **flexible-vlan-tagging**
4. Enable extended VLAN bridge encapsulation on the interface:

   [edit interfaces *interface-name*]
   `user@switch#` **encapsulation extended-vlan-bridge**
5. Enable the S-VLAN interface to send and receive untagged packets:

   [edit interfaces *interface-name*]
   `user@switch#` **native-vlan-id *vlan-id***
6. Bind one of the logical units of the interface to the VLAN ID for one of the S-VLANs.

   [edit interfaces *interface-name* unit *logical-unit-number*]
   `user@switch#` **vlan-id *number***
7. Repeat step 6 to bind the automatically-created VLAN IDs for the other S-VLANs to the other logical units of the interface:

For example, the following configuration creates S-VLANs v10 and v30 and associates them with interface xe-0/0/0. It also enables Q-in-Q tunneling, enables xe-0/0/0 to accept untagged packets, and maps incoming C-VLAN packets to S-VLANs v10 and v30.

set interfaces xe-0/0/0 flexible-vlan-tagging
set interfaces xe-0/0/0 native-vlan-id 10
set interfaces xe-0/0/0 encapsulation extended-vlan-bridge
set interfaces xe-0/0/0 unit 10 vlan-id 10
set interfaces xe-0/0/0 unit 30 vlan-id 30

To configure the many-to-many bundling method on a C-VLAN interface, perform the following steps for each customer:

1. Assign a logical interface (unit) of one C-VLAN interface to be a member of one S-VLAN.

   [edit vlans *vlan-name*]
   `user@switch#` **interface *interface-name.unit-number***
2. Repeat step 1 to assign another C-VLAN interface (physical interface) to be a member of another S-VLAN.
3. Enable the interface to transmit packets with 802.1Q VLAN tags:

   [edit interfaces *interface-name*]
   `user@switch#` **flexible-vlan-tagging**
4. Enable extended VLAN bridge encapsulation on the interface:

```
[edit interfaces interface-name]
user@switch# encapsulation extended-vlan-bridge
```

5. Enable the C-VLAN interface to send and receive untagged packets:

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

6. For each physical interface, configure a logical interface (unit) to receive and forward any tagged packet whose VLAN ID tag matches the list of VLAN IDs you specify:

```
[edit interfaces interface-name unit logical-unit-number]
user@switch# vlan-id-list vlan-id-numbers
```

To configure only one C-VLAN to be mapped to an S-VLAN, specify only one VLAN ID after vlan-id-list.

WARNING: On some SRX Series devices you can apply no more than eight VLAN identifier list to a physical interface.

7. For each physical interface, configure the system to add an S-VLAN tag (outer tag) as packets travel from the C-VLAN interface to the S-VLAN:

```
[edit interfaces interface-name unit logical-unit-number]
user@switch# input-vlan-map push
```

8. For each physical interface, configure the system to remove the S-VLAN tag when packets are forwarded from the S-VLAN interface to the C-VLAN interface:

```
[edit interfaces interface-name unit logical-unit-number]
user@switch# output-vlan-map pop
```

For example, the following configuration makes xe-0/0/1.10 a member of S-VLAN v10, enables Q-in-Q tunneling, and maps packets from C-VLANs 10 through 20 to S-VLAN 10. The configuration for customer 2 makes xe-0/0/2.30 a member of S-VLAN v30, enables Q-in-Q tunneling, and maps packets from C-VLANs 30 through 40, 50 through 60, and 70 through 80 to S-VLAN 30. Both interfaces are configured to accept untagged packets.

If a packet originates in C-VLAN 10 and needs to be sent over the S-VLAN, a tag with a VLAN ID 10 is added to the packet. If a packet is forwarded internally from the S-VLAN interface to xe-0/0/1.10, the tag with VLAN ID 10 is removed. The same principles apply to the C-VLANs configured on interface xe-0/0/2.

NOTE: Notice that you can use the same tag value for an S-VLAN and C-VLAN. For example, the configuration for customer 1 maps C-VLAN ID 10 to S-VLAN ID 10. C-VLAN and S-VLAN tags use separate name spaces, so this configuration is allowed.

Configuration for customer 1:

```
set vlans v10 interface xe-0/0/1.10
set interfaces xe-0/0/1 flexible-vlan-tagging
set interfaces xe-0/0/1 encapsulation extended-vlan-bridge
set interfaces xe-0/0/1 unit 10 vlan-id-list 10-20
set interfaces xe-0/0/1 native-vlan-id 15
```


set interfaces xe-0/0/1 unit 10 input-vlan-map push
set interfaces xe-0/0/1 unit 10 output-vlan-map pop

Configuration for customer 2:

set vlans v30 interface xe-0/0/2.30
set interfaces xe-0/0/2 flexible-vlan-tagging
set interfaces xe-0/0/2 encapsulation extended-vlan-bridge
set interfaces xe-0/0/2 unit 30 vlan-id-list 30-40
set interfaces xe-0/0/2 unit 30 vlan-id-list 50-60
set interfaces xe-0/0/2 unit 30 vlan-id-list 70-80
set interfaces xe-0/0/2 native-vlan-id 75
set interfaces xe-0/0/2 unit 30 input-vlan-map push
set interfaces xe-0/0/2 unit 30 output-vlan-map pop

Configuring a Specific Interface Mapping with VLAN ID Translation Option

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

You can configure Q-in-Q tunneling by mapping packets from a specified C-VLAN to a specified S-VLAN. In addition, you can configure the system to replace a C-VLAN tag with an S-VLAN tag or replace an S-VLAN tag with a C-VLAN tag (instead of double tagging). This is call VLAN translation or VLAN rewriting. VLAN translation is particularly useful if a service provider's Layer 2 network that connects a customer's sites does not support double tagged packets.

When you use VLAN translation, both ends of the link normally must be able to swap the tags appropriately. That is, both ends of the link must be configured to swap the C-VLAN tag for the S-VLAN tag and swap the S-VLAN tag for the C-VLAN tag so that traffic in both directions is tagged appropriately while in transit and after arrival.

First configure the S-VLAN and its interface:

1. Assign a logical interface to be a member of the S-VLAN. Do not use unit 0.

   [edit vlans *vlan-name*]
   `user@switch#` **interface *interface-name.unit-number***

   NOTE: **Note that you do not create a VLAN ID for the S-VLAN. The ID is created automatically for the appropriate logical interface.**

2. Enable the interface to transmit packets with 802.1Q VLAN tags:

   [edit interfaces *interface-name*]
   `user@switch#` **flexible-vlan-tagging**
3. Enable the S-VLAN interface to send and receive untagged packets:

   [edit interfaces *interface-name*]
   `user@switch#` **native-vlan-id *vlan-id***
4. Enable extended VLAN bridge encapsulation on the interface:

   [edit interfaces *interface-name*]
   `user@switch#` **encapsulation extended-vlan-bridge**
5. Bind the logical interface (unit) of the interface that you specified earlier to the VLAN ID for the S-VLAN:

[edit interfaces *interface-name* unit *logical-unit-number*]
`user@switch#` **vlan-id *number***

For example, the following configuration enables Q-in-Q tunneling on interface xe-0/0/0, enables xe-0/0/0 to accept untagged packets, and binds a logical interface of xe-0/0/0 to the VLAN ID of VLAN v200.

set interfaces xe-0/0/0 flexible-vlan-tagging
set interfaces xe-0/0/0 native-vlan-id 10
set interfaces xe-0/0/0 encapsulation extended-vlan-bridge
set interfaces xe-0/0/0 unit 200 vlan-id 200

Now configure a specific interface mapping with optional VLAN ID translation on the C-VLAN interface:

1. Assign a logical interface of the C-VLAN interface to be a member of the S-VLAN.

   [edit vlans *vlan-name*]
   `user@switch#` **interface *interface-name.unit-number***
2. Enable the interface to transmit packets with 802.1Q VLAN tags:

   [edit interfaces *interface-name*]
   `user@switch#` **flexible-vlan-tagging**
3. Enable the C-VLAN interface to send and receive untagged packets:

   [edit interfaces *interface-name*]
   `user@switch#` **native-vlan-id *vlan-id***
4. Enable extended VLAN bridge encapsulation on the interface:

   [edit interfaces *interface-name*]
   `user@switch#` **encapsulation extended-vlan-bridge**
5. Configure a logical interface (unit) to receive and forward any tagged packet whose VLAN ID tag matches the VLAN IDs you specify:

   [edit interfaces *interface-name* unit *logical-unit-number*]
   `user@switch#` **vlan-id *number***
6. Configure the system to remove the existing C-VLAN tag and replace it with the S-VLAN tag when packets ingress on the C-VLAN interface and are forwarded to the S-VLAN:

   [edit interfaces *interface-name* unit *logical-unit-number*]
   `user@switch#` **input-vlan-map swap**
7. Configure the system to remove the existing S-VLAN tag and replace it with the C-VLAN tag when packets are forwarded from the S-VLAN interface to the C-VLAN interface:

   [edit interfaces *interface-name* unit *logical-unit-number*]
   `user@switch#` **output-vlan-map swap**
8. To configure an S-VLAN and associate it with the appropriate C-VLAN interface:

   [edit vlans *vlan-name*]
   `user@switch#` **interface *interface-name***

For example, the following configuration on C-VLAN interface xe-0/0/1 enables Q-in-Q tunneling, enables xe-0/0/1 to accept untagged packets, and maps incoming packets from C-VLAN 150 to logical interface 200, which is a member of S-VLAN 200. Also, when packets egress from C-VLAN interface xe-0/0/1 and travel to the S-VLAN interface, the C-VLAN tag of 150 is removed and replaced with the S-VLAN tag of 200. When packets travel from the S-VLAN interface to the C-VLAN interface, the S-VLAN tag of 200 is removed and replaced with the C-VLAN tag of 150.

set interfaces xe-0/0/1 flexible-vlan-tagging
set interfaces xe-0/0/1 native-vlan-id 10
set interfaces xe-0/0/1 encapsulation extended-vlan-bridge
set interfaces xe-0/0/1 unit 200 vlan-id 150
set interfaces xe-0/0/1 unit 200 output-vlan-map swap
set interfaces xe-0/0/1 unit 200 input-vlan-map swap

Configuring VLAN Translation

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

VLAN translation allow service providers to create a Layer 2 Ethernet connection between two customer sites. Providers can segregate different customers' VLAN traffic on a link (for example, if the customers use overlapping VLAN IDs) or bundle different customer VLANs into a single service VLAN. Data centers can use Q-in-Q tunneling to isolate customer traffic within a single site or when customer traffic flows between cloud data centers in different geographic locations.

Before you begin configuring VLAN translation, make sure you have created and configured the necessary customer VLANs on the neighboring switches. See *Configuring VLANs*.

To configure VLAN translation:

1. Enable per service provider VLAN.

   [edit vlans]
   `user@switch#` **set *vlan-name* dot1q-tunneling**
2. Configure Customer vlan tag mapping.

   [edit vlans]
   `user@switch#` **set *vlan-name* interface *intf-name* mapping *ctag* swap**
3. Configure translation for a range of s-vlans beginning with a tag, per ifl.

   [edit vlans]
   `user@switch#` **set *vlan-name* *vlan-range***
   `user@switch#` **set *vlan-name* interface *intf-name* mapping-range *ctag-range* swap vlan-id-start *tag***

CHAPTER 16

Configuring Spanning Tree Protocol

Understanding the Spanning Tree Protocol

Supported Platforms SRX Series

NOTE: Starting in Junos OS Release 15.1X49-D70, the Spanning Tree Protocol (STP) is supported on SRX300, SRX320, SRX340, SRX345, SRX550M, and SRX1500 devices.

NOTE: Starting in Junos OS Release 15.1X49-D40, the Spanning Tree Protocol (STP) is no longer supported.

Spanning Tree Protocol (STP), defined in IEEE 802.1D, creates a tree of links in the Ethernet switched network. Links that cause loops in the network are disabled, thereby providing a single active link between any two devices.

Rapid Spanning Tree Protocol (RSTP), originally defined in IEEE 802.1w and later merged into IEEE 802.1D, facilitates faster spanning-tree convergence after a topology change.

Multiple Spanning Tree Protocol (MSTP), initially defined in IEEE 802.1s and later included in IEEE 802.1Q, supports mapping of multiple VLANs onto a single spanning-tree instance. This reduces the number of spanning-tree instances required in a switched network with many VLANs.

Juniper Networks devices provide Layer 2 loop prevention through STP, RSTP, and MSTP. You can configure bridge protocols data unit (BPDU) protection on interfaces to prevent them from receiving BPDUs that could result in STP misconfigurations, which could lead to network outages.

For STP configuration parameters, see Table 15 on page 138.

Table 15: STP Configuration Parameters

Field	Function	Action
Protocol Name	Displays the spanning-tree protocol.	View only.
Disable	Disables STP on the interface.	To enable this option, select the check box.
BPDU Protect	Specifies that BPDU blocks are to be processed.	To enable this option, select the check box.
Bridge Priority	Specifies the bridge priority. The bridge priority 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.	Select a value.
Forward Delay	Specifies the number of seconds an interface waits before changing from spanning-tree learning and listening states to the forwarding state.	Enter a value from 4 through 30 seconds.
Hello Time	Specifies time interval in seconds at which the root bridge transmits configuration BPDUs.	Enter a value from 1 through 10 seconds.
Max Age	Specifies the maximum aging time in seconds for all MST instances. The maximum aging time is the number of seconds a switch waits without receiving spanning-tree configuration messages before attempting a reconfiguration.	Enter a value from 6 through 40 seconds.

For RSTP configuration parameters, see Table 16 on page 138.

Table 16: RSTP Configuration Parameters

Field	Function	Action
Protocol Name	Displays the spanning-tree protocol.	View only.
Disable	Specifies whether RSTP must be disabled on the interface.	To enable this option, select the check box.

Table 16: RSTP Configuration Parameters *(continued)*

Field	Function	Action
BPDU Protect	Specifies that BPDU blocks are to be processed.	To enable this option, select the check box.
Bridge Priority	Specifies the bridge priority. The bridge priority 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.	Select a value.
Forward Delay	Specifies the number of seconds a port waits before changing from its spanning-tree learning and listening states to the forwarding state.	Enter a value from 4 through 30 seconds.
Hello Time	Specifies the hello time in seconds for all MST instances.	Enter a value from 1 through 10 seconds.
Max Age	Specifies the maximum aging time in seconds for all MST instances. The maximum aging time is the number of seconds a switch waits without receiving spanning-tree configuration messages before attempting a reconfiguration.	Enter a value from 6 through 40 seconds.

For MSTP configuration parameters, see Table 17 on page 139.

Table 17: MSTP Configuration Parameters

Field	Function	Action
Protocol Name	Displays the spanning-tree protocol.	View only.
Disable	Specifies whether MSTP must be disabled on the interface.	To enable this option, select the check box.
BPDU Protect	Specifies that BPDU blocks are to be processed.	To enable this option, select the check box.
Bridge Priority	Specifies the bridge priority. The bridge priority 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.	Select a value.
Forward Delay	Specifies the number of seconds a port waits before changing from its spanning-tree learning and listening states to the forwarding state.	Enter a value from 4 through 30 seconds.
Hello Time	Specifies the hello time in seconds for all MST instances.	Enter a value from 1 through 10 seconds.
Max Age	Specifies the maximum aging time for all MST instances. The maximum aging time is the number of seconds a switch waits without receiving spanning-tree configuration messages before attempting a reconfiguration.	Enter a value from 6 through 40 seconds.

Table 17: MSTP Configuration Parameters *(continued)*

Field	Function	Action
Configuration Name	MSTP region name carried in the MSTP bridge protocol data units (BPDUs).	Enter a name.
Max Hops	Maximum number of hops a BPDU can be forwarded in the MSTP region.	Enter a value from 1 through 255.
Revision Level	Revision number of the MSTP region configuration.	Enter a value from 0 through 65,535.
MSTI tab		
MSTI Id	Specifies the multiple spanning-tree instance (MSTI) identifier. MSTI IDs are local to each region, so you can reuse the same MSTI ID in different regions.	Click one: • **Add**—Creates a MSTI. • **Edit**—Edits an existing MSTI. • **Delete**—Deletes an existing MSTI.
Bridge Priority	Specifies the bridge priority. The bridge priority 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.	Select a value.
VLAN	Specifies the VLANs for the MSTI.	Click one: • **Add**—Selects VLANs from the list. • **Remove**—Deletes the selected VLAN.
Interfaces	Specifies the interface for the MSTP protocol.	Click one: • **Add**—Selects interfaces from the list. • **Edit**—Edits the selected interface. • **Remove**—Deletes the selected interface.

For spanning-tree port configuration details, see Table 18 on page 140.

Table 18: Spanning-Tree Ports Configuration Details

Field	Function	Action
Interface Name	Specifies the interface for the spanning-tree protocol type.	Select an interface.
Cost	Specifies the link cost to control which bridge is the designated bridge and which interface is the designated interface.	Enter a value from 1 through 200,000,000.
Priority	Specifies the interface priority to control which interface is elected as the root port.	Select a value.

Table 18: Spanning-Tree Ports Configuration Details *(continued)*

Field	Function	Action
Edge	Configures the interface as an edge interface. Edge interfaces immediately transition to a forwarding state.	Select to configure the interface as an edge interface.
Mode	Specifies the link mode.	Select one: • **Point to Point**—For full-duplex links, select this mode. • **Shared**—For half-duplex links, select this mode.

Release History Table

Release	Description
15.1X49-D70	Starting in Junos OS Release 15.1X49-D70, the Spanning Tree Protocol (STP) is supported on SRX300, SRX320, SRX340, SRX345, SRX550M, and SRX1500 devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, the Spanning Tree Protocol (STP) is no longer supported.

Related Documentation

- Configuring the Spanning Tree Protocol (J- WebProcedure) on page 141
- Ethernet Ports Switching Overview on page 100

- *Verifying Switching Mode Configuration*

Configuring the Spanning Tree Protocol (J- WebProcedure)

Supported Platforms SRX Series

NOTE: Starting in Junos OS Release 15.1X49-D70, the Spanning Tree Protocol (STP) is supported on SRX300, SRX320, SRX340, SRX345, SRX550M, and SRX1500 devices.

NOTE: Starting in Junos OS Release 15.1X49-D40, the Spanning Tree Protocol (STP) is no longer supported.

This example shows you how to configure the Spanning Tree Protocol on a Ethernet switched network.

- Requirements on page 142
- Overview on page 142
- Configuration on page 142

Requirements

Before you begin:

- Determine which interfaces to use and verify that they are in switch mode. See "Example: Configuring Switching Modes" on page 106.
- Review information about switching modes. See "Understanding Switching Modes" on page 99.

Overview

In this example, you enable the Spanning Tree Protocol on switched Ethernet ports.

Configuration

GUI Step-by-Step Procedure

To access the Spanning Tree Quick Configuration:

1. In the J-Web user interface, select **Configure>Switching>Spanning Tree**.

   The Spanning Tree Configuration page displays a list of existing spanning-trees. If you select a specific spanning tree, the specific spanning tree details are displayed in the General and Interfaces tabs.

2. Click one of the following:

   - **Add**—Creates a spanning tree.
   - **Edit**—Edits an existing spanning-tree configuration.
   - **Delete**—Deletes an existing spanning tree.

   When you are adding a spanning tree, select a protocol name: STP, RSTP, or MSTP.

   Select the **Ports** tab to configure the ports associated with this spanning tree. Click one of the following:

   - **Add**—Creates a new spanning-tree interface configuration.
   - **Edit**—Modifies an existing spanning-tree interface configuration.
   - **Delete**—Deletes an existing spanning-tree interface configuration.

   When you are adding or editing a spanning-tree port, enter information describing the port.

3. Click one:

   - Click **OK** to check your configuration and save it as a candidate configuration, then click **Commit Options**>**Commit**.
   - Click **Cancel** to cancel the configuration without saving changes.

Release History Table

Release	Description
15.1X49-D70	Starting in Junos OS Release 15.1X49-D70, the Spanning Tree Protocol (STP) is supported on SRX300, SRX320, SRX340, SRX345, SRX550M, and SRX1500 devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, the Spanning Tree Protocol (STP) is no longer supported.

Related Documentation

- Understanding the Spanning Tree Protocol on page 137
- Ethernet Ports Switching Overview on page 100
- *Verifying Switching Mode Configuration*

Configuring the Spanning Tree Protocol (CLI Procedure)

Supported Platforms SRX Series

NOTE: **Starting in Junos OS Release 15.1X49-D70, the Spanning Tree Protocol (STP) is supported on SRX300, SRX320, SRX340, SRX345, SRX550M, and SRX1500 devices.**

NOTE: **Starting in Junos OS Release 15.1X49-D40, the Spanning Tree Protocol (STP) is no longer supported.**

This example shows how to configure the Spanning Tree Protocol by using the CLI.

- Requirements on page 143
- Overview on page 143
- Configuration on page 144
- Verification on page 145

Requirements

Before you begin, understand the Spanning Tree Protocol. See "Understanding the Spanning Tree Protocol" on page 137.

Overview

The default spanning-tree protocol for SRX Series devices is Rapid Spanning Tree Protocol (RSTP). RSTP provides faster convergence times than the original Spanning Tree Protocol (STP). However, some legacy networks require the slower convergence times of basic STP that work with 802.1D 1998 bridges.

If your network includes 802.1D 1998 bridges, you can remove RSTP and explicitly configure STP. When you explicitly configure STP, the devices 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.

This configuration runs a version of RSTP that is compatible with the classic, basic STP.

Configuration

CLI Quick Configuration

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set protocols rstp
set protocols rstp interface ge-0/0/1
set protocols rstp force-version stp interface all
set protocols rstp force-version stp interface ge-0/0/1
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure STP:

1. Configure RSTP on the entire device or on a specific interfaces:
   - To configure RSTP on the entire device:
     ```
     [edit protocols]
     user@host# set rstp
     ```
   - To configure RSTP on a specific interface:
     ```
     [edit protocols]
     user@host# set rstp interface ge-0/0/1
     ```
2. Enable STP either on all interfaces or on a specific interface:
   - To enable STP on all interfaces:
     ```
     [edit protocols]
     user@host# set rstp force-version stp interface all
     ```
   - To enable STP on a specific interface:
     ```
     [edit protocols]
     user@host# set rstp force-version stp interface ge-0/0/1
     ```

Results

From configuration mode, confirm your configuration by entering the **show protocols** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
l2-learning {
  global-mode switching;
}
rstp {
  interface ge-0/0/1;
  interface all;
  force-version stp;
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Verifying STP

Purpose Verify that STP is configured on your system.

Action From operational mode, enter the **show spanning-tree interface** command.

```
user@host> show spanning-tree interface
Spanning tree interface parameters for instance 0

Interface                  Port ID    Designated         Designated         Port
    State  Role
                                       port ID            bridge ID          Cost
ge-0/0/1                     128:2        128:2  32768.307c5e44b250        20000
    BLK    DIS
```

Meaning The output shows the STP is configured on an interface ge-0/0/1.

Release History Table

Release	Description
15.1X49-D70	Starting in Junos OS Release 15.1X49-D70, the Spanning Tree Protocol (STP) is supported on SRX300, SRX320, SRX340, SRX345, SRX550M, and SRX1500 devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, the Spanning Tree Protocol (STP) is no longer supported.

Related Documentation

- Understanding the Spanning Tree Protocol on page 137
- Configuring the Spanning Tree Protocol (J- WebProcedure) on page 141

Understanding BPDU Protection for STP, RSTP, and MSTP

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

Networks frequently use multiple protocols simultaneously to achieve different goals and in some cases those protocols might conflict with each other. One such case is when spanning-tree protocols are active on the network, where a special type of switching frame called a bridge protocol data unit (BPDU) can conflict with BPDUs generated on other devices such as PCs. The different kinds of BPDUs are not compatible, but they can still be recognized by other devices that use BPDUs and cause network outages. You need to protect any device that recognizes BPDUs from picking up incompatible BPDUs.

- Different Kinds of BPDUs on page 146
- Protecting Devices from Incompatible BPDUs on page 146

Different Kinds of BPDUs

Spanning-tree protocols such as Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), and Multiple Spanning Tree Protocol (MSTP) generate their own BPDUs. These peer STP applications use their BPDUs to communicate, and ultimately, the exchange of BPDUs determines which interfaces block traffic and which interfaces become root ports and forward traffic.

User bridge applications running on a PC can also generate BPDUs. If these BPDUs are picked up by STP applications running on the device, they can trigger STP miscalculations, and those miscalculations can lead to network outages. Similarly, BPDUs generated by STP protocols can cause problems if they are picked up by devices such as PCs that are not using STP. Some mechanism for BPDU protection must be implemented in these cases.

Protecting Devices from Incompatible BPDUs

To protect the state of spanning-tree protocols on devices from outside BPDUs, enable BPDU protection on the interfaces of a device on which spanning-tree protocols are configured and are connected to user devices (such as PCs)—for example, on edge ports connected to PCs. Use the same strategy when a device on which STP is not configured is connected to a device through a trunk interface that forwards BPDUs generated by spanning-tree protocols. In this case, you protect the device from BPDUs generated by the STP on the device.

To prevent a device from forwarding BPDUs generated by spanning-tree protocols to a device, you can enable **bpdu-block** on an interface.

- On Juniper Networks SRX Series devices that run Juniper Networks Junos operating system (Junos OS) that supports the Enhanced Layer 2 Software (ELS) configuration style, enable **bpdu-block** at the **[edit protocols layer2-control]** hierarchy level. To clear the BPDU error, use **clear error bpdu interface**.

When an interface configured with BPDU protection encounters an incompatible BPDU, it drops that BPDU and then, either shuts down or continues to receive packets other than spanning-tree protocol BPDUs depending on the configuration defined in the **bpdu-block** statement. If the interface continues to be open after dropping all incompatible BPDUs, all packets except incompatible BPDUs continue to ingress and egress through the interface.

If the interface shuts down after dropping all BPDUs, you can re-enable the interface as follows:

- On Juniper Networks SRX Series devices running Juniper Networks Junos operating system (Junos OS) that supports the Enhanced Layer 2 Software (ELS) configuration style:
  - Include the **disable-timeout** statement at the **[edit protocols layer2-control bpdu-block]** hierarchy level to enable the interfaces to automatically return to service when the specified timer expires.

- Issue the operational mode command **clear error bpdu interface** on the device.

Related Documentation

- Example: Configuring BPDU Protection on Edge Interfaces to Prevent STP Miscalculations on page 147
- Example: Configuring BPDU Protection on Interfaces to Prevent STP Miscalculations on page 150
- Configuring BPDU Protection on Spanning Tree Interfaces on page 156

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

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

SRX Series devices 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 devices within a spanning-tree topology receive BPDUs from other devices, network outages can occur because of STP miscalculations.

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

- Requirements on page 147
- Overview on page 147
- Configuration on page 148
- Verification on page 149

Requirements

This example uses the following software and hardware components:

- Two SRX Series devices in an RSTP topology
- Junos OS Release 15.1X49-D70 or later

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

- RSTP enabled on the devices.

Overview

The devices, being in an RSTP, support a loop-free network through the exchange of BPDUs. Receipt of outside BPDUs in an RSTP or MSTP, 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.

In this example, device 1 and device 2 are configured for RSTP. The interfaces on device 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 device 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 device 2.

Configuration

To configure BPDU protection on two access interfaces:

CLI Quick Configuration

Quickly configure RSTP on the two device 2 interfaces, and then configure BPDU protection on all edge ports on device 2 by copying the following commands and pasting them into the device terminal window:

NOTE: This example configures BPDU protection on specific interfaces. SRX Series devices 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 156 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 bpdu-block-on-edge
```

Step-by-Step Procedure

To configure RSTP on the two device 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@host# set interface ge-0/0/5 edge
   user@host# set interface ge-0/0/6 edge
   ```

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

   ```
   [edit protocols rstp]
   user@host# set bpdu-block-on-edge
   ```

Results

Check the results of the configuration:

```
user@host> show configuration protocols rstp
interface ge-0/0/5 {
  edge;
}
```



```
interface ge-0/0/6 {
  edge;
}
bpdu-block-on-edge;
```

Verification

To confirm that the configuration is working properly:

- Displaying the Interface State Before BPDU Protection Is Triggered on page 149
- Verifying That BPDU Protection Is Working Correctly on page 149

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@host> show spanning-tree interface

Spanning tree interface parameters for instance 0

Interface      Port ID     Designated       Designated          Port     State   Role
                            port ID         bridge ID           Cost
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 device 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@host> show spanning-tree interface

Spanning tree interface parameters for instance 0

Interface     Port ID    Designated       Designated         Port    State  Role
                          port ID          bridge ID          Cost
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 device 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 reenable the interface. However, if the **disable-timeout (Spanning Trees)** 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 reenable the interface.

If the PCs connected to device 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 device 2.

Related Documentation

- Understanding BPDU Protection for STP, RSTP, and MSTP on page 145
- Example: Configuring BPDU Protection on Interfaces to Prevent STP Miscalculations on page 150
- Configuring BPDU Protection on Spanning Tree Interfaces on page 156

Example: Configuring BPDU Protection on Interfaces to Prevent STP Miscalculations

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

NOTE: This example uses Junos OS for SRX Series devices with support for the Enhanced Layer 2 Software (ELS) configuration style. For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

Spanning-tree protocols support loop-free network communication through the exchange of a special type of frame called a bridge protocol data unit (BPDU). However, when BPDUs generated by spanning-tree protocols are communicated to devices on which spanning-tree protocols are not configured, these devices recognize the BPDUs, which can lead to network outages. You can, however, enable BPDU protection on device interfaces to prevent BPDUs generated by spanning-tree protocols from passing through those interfaces. When BPDU protection is enabled, an interface shuts down when any incompatible BPDU is encountered, thereby preventing the BPDUs generated by spanning-tree protocols from reaching the device.

This example configures BPDU protection on STP device downstream interfaces that connect to two PCs:

Requirements

This example uses the following software and hardware components:

- One SRX Series device in an RSTP
- One SRX Series device that is not in any spanning-tree
- Junos OS Release 15.1X49-D70 or later

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

- Ensured that RSTP is operating on device 1.
- Disabled RSTP on device 2

Overview

SRX Series devices 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 BPDU to communicate. Other devices also use BPDUs—PC bridging applications, for example, 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 devices within a spanning-tree topology receive BPDUs from other devices, network outages can occur because of the miscalculations caused by the outside BPDUs. Therefore, you must configure BPDU protection on interfaces in a spanning-tree to avoid network outages.

This example explains how to block outside BPDUs from reaching a device interface connected to devices that are not part of the STP. In this scenario, an interface is shutdown when it encounters an outside BPDU.

This example configures downstream BPDU protection on device 2 interfaces **ge-0/0/5** and **ge-0/0/6**. When BPDU protection is enabled, the device interfaces will shut down if BPDUs generated by the laptops attempt to access device 2.

CAUTION: When configuring BPDU protection on an interface without spanning trees connected to a device with spanning trees, be careful that you do not configure BPDU protection on all interfaces. Doing so could prevent BPDUs being received on device interfaces (such as a trunk interface) that you intended to have receive BPDUs from a device with spanning trees.

Configuration

To configure BPDU protection on the interfaces:

CLI Quick Configuration

This configuration causes the interface to automatically shutdown if it receives BPDUs. To quickly configure BPDU protection on device 2 , copy the following commands and paste them into the device terminal window:

NOTE: This example configures BPDU protection on specific interfaces. For, SRX Series devices with support for the Enhanced Layer 2 Software (ELS) configuration style, you can configure BPDU protection globally on all spanning tree interfaces. See "Configuring BPDU Protection on Spanning Tree Interfaces" on page 156 for additional information.

```
[edit]
user@host# set protocols layer2-control bpdu-block interface ge-0/0/5
[edit]
user@host# set protocols layer2-control bpdu-block interface ge-0/0/6
```

Step-by-Step Procedure

To configure BPDU protection for automatic shutdown.

1. To shutdown the BPDU interface on the downstream interface **ge-0/0/5** on device 2:

   ```
   [edit protocol layer 2]
   user@host# set bpdu-block interface ge-0/0/5
   ```

2. To shutdown the BPDU interface on the downstream interface **ge-0/0/6** on device 2:

   ```
   [edit protocol layer 2]
   user@host# set bpdu-block interface ge-0/0/6
   ```

Results

Check the results of the configuration:

```
user@host> show protocol layer 2
bpdu-block {
  interface ge-0/0/5 {
  interface ge-0/0/6 {
```



```
}
```

Verification

To confirm that the configuration is working properly, perform these tasks:

- Displaying the Interface State Before BPDU Protection Is Triggered on page 153
- Verifying That BPDU Shutdown Protection Is Working Correctly on page 155

Displaying the Interface State Before BPDU Protection Is Triggered

Purpose Before any BPDUs can be received on device 2 on either interface **ge-0/0/5** or interface **ge-0/0/6**, confirm the state of those interfaces.

Action Use the operational mode command **show interfaces extensive <interface name>**:

```
user@host> show interfaces extensive ge-0/0/5


Physical interface: ge-0/0/5, Enabled, Physical link is Down
  Interface index: 141, SNMP ifIndex: 516, Generation: 144
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Link-mode: Full-duplex,
Speed: 1000mbps, BPDU Error: None, MAC-REWRITE Error: None, Loopback: Disabled,
Source filtering: Disabled,
  Flow control: Disabled, Auto-negotiation: Enabled, Remote fault: Online
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 30:7c:5e:44:b1:c6, Hardware address: 30:7c:5e:44:b1:c6
  Last flapped   : 2017-01-16 20:23:55 PST (05:44:46 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                   0                    0 bps
   Output bytes  :                   0                    0 bps
   Input  packets:                   0                    0 pps
   Output packets:                   0                    0 pps
  Dropped traffic statistics due to STP State:
   Input  bytes  :                   0
   Output bytes  :                   0
   Input  packets:                   0
   Output packets:                   0
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0, L3
incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, FIFO errors: 0,
Resource errors: 0
  Output errors:
    Carrier transitions: 0, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
 FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
  Active alarms  : LINK
  Active defects : LINK
  MAC statistics:                      Receive         Transmit
    Total octets                             0                0
    Total packets                            0                0
    Unicast packets                          0                0
    Broadcast packets                        0                0
    Multicast packets                        0                0
    CRC/Align errors                         0                0
    FIFO errors                              0                0
    MAC control frames                       0                0
    MAC pause frames                         0                0
    Oversized frames                         0
    Jabber frames                            0
    Fragment frames                          0
    VLAN tagged frames                       0
    Code violations                          0
  Filter statistics:
    Input packet count                       0
    Input packet rejects                     0
    Input DA rejects                         0
    Input SA rejects                         0
    Output packet count                                       0
    Output packet pad count                                   0
```



```
    Output packet error count                                  0
    CAM destination filters: 1, CAM source filters: 0
  Autonegotiation information:
    Negotiation status: Incomplete
  Packet Forwarding Engine configuration:
    Destination slot: 0
  CoS information:
    Direction : Output
    CoS transmit queue               Bandwidth               Buffer Priority
Limit
                              %            bps     %           usec
    0 best-effort            95      950000000    95              0       low
none
    3 network-control         5       50000000     5              0       low
none
  Interface transmit statistics: Disabled
  MACSec statistics:
    Output
        Secure Channel Transmitted
        Protected Packets             : 0
        Encrypted Packets             : 0
        Protected Bytes               : 0
        Encrypted Bytes               : 0
     Input
        Secure Channel Received
        Accepted Packets              : 0
        Validated Bytes               : 0
        Decrypted Bytes               : 0
```

Meaning The output from the operational mode command **show interfaces extensive** shows that **ge-0/0/5** a is enabled.

Verifying That BPDU Shutdown Protection Is Working Correctly

Purpose Verify that BPDU protection is working correctly in the network by checking to see whether BPDUs have been blocked appropriately.

Action Issue **show interfaces extensive <interface name>** to see what happened when the BPDUs reached the two interfaces configured for BPDU protection on device 2:

```
user@host> show interfaces extensive ge-0/0/5
Physical interface: ge-0/0/5, Enabled, Physical link is Down
  Interface index: 659, SNMP ifIndex: 639, Generation: 161
  Link-level type: Ethernet, MTU: 1514, MRU: 0, Link-mode: Auto, Speed: Auto,
  BPDU Error: Detected, MAC-REWRITE Error: None, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Disabled, Auto-negotiation: Enabled,

  Remote fault: Online, Media type: Copper,
  IEEE 802.3az Energy Efficient Ethernet: Disabled
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 12 supported, 12 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
```

Meaning When the BPDUs sent from laptops reached interface **ge-0/0/5** on device 2, the interface transitioned to a BPDU inconsistent state, shutting down the interface to prevent BPDUs from reaching the laptops.

You need to reenable the blocked interface. There are two ways to do this. If you included the statement **disable-timeout(Spanning Trees)** in the BPDU configuration, the interface returns to service after the timer expires. Otherwise, use the operational mode command **clear error bpdu interface *interface-name*** to unblock and reenable **ge-0/0/5**. 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.

If BPDUs reach the downstream interface on device 2 again, BPDU protection is triggered again and the interface shuts down. In such cases, you must find and repair the misconfiguration that is sending BPDUs to interface **ge-0/0/5** .

Related Documentation

- Configuring BPDU Protection on Spanning Tree Interfaces on page 156
- Understanding BPDU Protection for STP, RSTP, and MSTP on page 145
- Example: Configuring BPDU Protection on Edge Interfaces to Prevent STP Miscalculations on page 147

Configuring BPDU Protection on Spanning Tree Interfaces

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

NOTE: This topic applies to Junos OS for SRX Series devices 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 bpdu-block ]
     user@hostt# set interface interface-name
     ```

     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-contorl bpdu-block interface interface-name]
     user@host# 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-contorl bpdu-block interface interface-name]
  user@host# set disable-timeout seconds
  ```

Related Documentation

- Example: Configuring BPDU Protection on Edge Interfaces to Prevent STP Miscalculations on page 147
- Understanding BPDU Protection for STP, RSTP, and MSTP on page 145
- Configuring BPDU Protection on Spanning Tree Interfaces on page 156

Understanding Loop Protection for STP, RSTP, and MSTP

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

Juniper Networks SRX Series devices provide Layer 2 loop prevention through Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), and Multiple Spanning Tree Protocol (MSTP). Loop protection increases the efficiency of STP, RSTP, and MSTP by preventing ports from moving into a forwarding state that would result in a loop opening up in the network.

A loop-free network in spanning-tree topologies is supported through the exchange of a special type of frame called bridge protocol data unit (BPDU). Peer STP applications running on the device interfaces use BPDUs to communicate. Ultimately, the exchange of BPDUs determines which interfaces block traffic (preventing loops) and which interfaces become root ports and forward traffic.

However, a blocking interface can transition to the forwarding state in error if the interface stops receiving BPDUs from its designated port on the segment. Such a transition error can occur when there is a hardware error on the device or software configuration error between the device and its neighbor.

When loop protection is enabled, the spanning-tree topology detects root ports and blocked ports and makes sure both keep receiving BPDUs. If a loop-protection-enabled interface stops receiving BPDUs from its designated port, it reacts as it would react to a problem with the physical connection on this interface. It does not transition the interface to a forwarding state, but instead transitions it to a loop-inconsistent state. The interface recovers and then it transitions back to the spanning-tree blocking state as soon as it receives a BPDU.

We recommend that you enable loop protection on all device interfaces that have a chance of becoming root or designated ports. Loop protection is most effective when enabled in the entire deviced network. When you enable loop protection, you must configure at least one action (**log**, **block**, or both).

Note that an interface can be configured for either loop protection or root protection, but not for both.

Related Documentation

- Understanding BPDU Protection for STP, RSTP, and MSTP on page 145
- **clear error bpdu interface on page 335**
- Example: Configuring Loop Protection to Prevent Interfaces from Transitioning from Blocking to Forwarding in a Spanning Tree on page 158

Example: Configuring Loop Protection to Prevent Interfaces from Transitioning from Blocking to Forwarding in a Spanning Tree

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

NOTE: This example uses Junos OS for SRX Series devices with support for the Enhanced Layer 2 Software (ELS) configuration style. For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

SRX Series devices provide Layer 2 loop prevention through Spanning Tree Protocol (STP), Rapid Spanning Tree protocol (RSTP), and Multiple Spanning Tree Protocol (MSTP). Loop protection increases the efficiency of STP, RSTP, and MSTP by preventing interfaces from moving into a forwarding state that would result in a loop opening up in the network.

This example describes how to configure loop protection for an interface on a SRX Series device in an RSTP topology:

Requirements

This example uses the following software and hardware components:

- Junos OS Release 15.1X49-D70 or later
- Three SRX Series devices in an RSTP topology

Before you configure the interface for loop protection, be sure you have:

- RSTP operating on the devices.

Overview

A loop-free network in spanning-tree topologies is supported through the exchange of a special type of frame called bridge protocol data unit (BPDU). Peer STP applications running on the device interfaces use BPDUs to communicate. Ultimately, the exchange of BPDUs determines which interfaces block traffic (preventing loops) and which interfaces become root ports and forward traffic.

A blocking interface can transition to the forwarding state in error if the interface stops receiving BPDUs from its designated port on the segment. Such a transition error can occur when there is a hardware error on the device or software configuration error between the device and its neighbor. When this happens, a loop opens up in the spanning tree. Loops in a Layer 2 topology cause broadcast, unicast, and multicast frames to continuously circle the looped network. As a device processes a flood of frames in a looped network, its resources become depleted and the ultimate result is a network outage.

CAUTION: **An interface can be configured for either loop protection or root protection, but not for both.**

In this example, they are configured for RSTP and create a loop-free topology. Interface **ge-0/0/6** is blocking traffic between device 3 and device 1; thus, traffic is forwarded through interface **ge-0/0/7** on device 2. BPDUs are being sent from the root bridge on device 1 to both of these interfaces.

This example shows how to configure loop protection on interface **ge-0/0/6** to prevent it from transitioning from a blocking state to a forwarding state and creating a loop in the spanning-tree topology.

A spanning-tree 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.

This configuration example uses an RSTP topology. However, you also can configure loop protection for MSTP topologies at the [**edit protocols mstp**] hierarchy level.

Configuration

To configure loop protection on an interface:

CLI Quick Configuration

To quickly configure loop protection on interface **ge-0/0/6**:

```
[edit]
set protocols rstp interface ge-0/0/6 bpdu-timeout-action block
```

Step-by-Step Procedure

To configure loop protection:

1. Configure interface **ge-0/0/6** on device 3:

```
[edit protocols rstp]
user@host# set interface ge-0/0/6 bpdu-timeout-action block
```

Results

Check the results of the configuration:

```
user@host> show configuration protocols rstp
interface ge-0/0/6 {
  bpdu-timeout-action {
    block;
  }
}
```

Verification

To confirm that the configuration is working properly, perform these tasks:

- Displaying the Interface State Before Loop Protection Is Triggered on page 160
- Verifying That Loop Protection Is Working on an Interface on page 161

Displaying the Interface State Before Loop Protection Is Triggered

Purpose

Before loop protection is triggered on interface **ge-0/0/6**, confirm that the interface is blocking.

Action Use the operational mode command:

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

Spanning tree interface parameters for instance 0

Interface     Port ID    Designated       Designated         Port     State  Role
                          port ID         bridge ID          Cost
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       128:2  16384.00aabbcc0348      20000   BLK    ALT
[output truncated]
```

Meaning The output from the operational mode command **show spanning-tree interface** shows that **ge-0/0/6** is the alternate port and in a blocking state.

Verifying That Loop Protection Is Working on an Interface

Purpose Verify the loop protection configuration on interface **ge-0/0/6**. RSTP has been disabled on interface **ge-0/0/4** on device 1. This will stop BPDUs from being sent to interface **ge-0/0/6** and trigger loop protection on the interface.

Action Use the operational mode command:

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

Spanning tree interface parameters for instance 0

Interface     Port ID    Designated       Designated         Port     State  Role
                          port ID         bridge ID          Cost
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   BLK    DIS
(Loop-Incon)
[output truncated]
```

Meaning The operational mode command **show spanning-tree interface** shows that interface **ge-0/0/6** has detected that BPDUs are no longer being forwarded to it and has moved into a loop-inconsistent state. The loop-inconsistent state prevents the interface from transitioning to a forwarding state. To clear the BPDU error, issue the operational mode command **clear error bpdu interface** on the device. The interface recovers and transitions back to its original state as soon as it receives BPDUs.

Related Documentation

- Example: Configuring Loop Protection to Prevent Interfaces from Transitioning from Blocking to Forwarding in a Spanning Tree on page 158

- Understanding BPDU Protection for STP, RSTP, and MSTP on page 145
- **clear error bpdu interface on page 335**

Understanding Root Protection for STP, RSTP, and MSTP

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

Juniper Networks SRX Series devices provide Layer 2 loop prevention through Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), and Multiple Spanning Tree Protocol (MSTP). A loop-free network is supported through the exchange of a special type of frame called bridge protocol data unit (BPDU). Peer STP applications running on the device interfaces use BPDUs to communicate. Ultimately, the exchange of BPDUs determines which interfaces block traffic and which interfaces become root ports and forward traffic.

However, a root port elected through this process has the possibility of being wrongly elected. A user bridge application running on a PC can generate BPDUs, too, and interfere with root port election. Root protection allows network administrators to manually enforce the root bridge placement in the network.

Enable root protection on interfaces that must not receive superior BPDUs from the root bridge and must not be elected as the root port. These interfaces become designated ports and are typically located on an administrative boundary. If the bridge receives superior STP BPDUs on a port that has root protection enabled, that port transitions to a root-prevented STP state (inconsistency state) and the interface is blocked. This blocking prevents a bridge that should not be the root bridge from being elected the root bridge. After the bridge stops receiving superior STP BPDUs on the interface with root protection, the interface returns to a listening state, followed by a learning state, and ultimately back to a forwarding state. Recovery back to the forwarding state is automatic.

When root protection is enabled on an interface, it is enabled for all the STP instances on that interface. The interface is blocked only for instances for which it receives superior BPDUs. Otherwise, it participates in the spanning-tree topology.

An interface can be configured for either root protection or loop protection, but not for both.

Related Documentation

- **clear error bpdu interface on page 335**
- Understanding BPDU Protection for STP, RSTP, and MSTP on page 145
- Example: Configuring Loop Protection to Prevent Interfaces from Transitioning from Blocking to Forwarding in a Spanning Tree on page 158
- Example: Configuring Root Protection to Enforce Root Bridge Placement in Spanning Trees on page 163

Example: Configuring Root Protection to Enforce Root Bridge Placement in Spanning Trees

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

NOTE: This example uses Junos OS for SRX Series devices with support for the Enhanced Layer 2 Software (ELS) configuration style. For ELS details, see *Getting Started with Enhanced Layer 2 Software*.

SRX Series devices provide Layer 2 loop prevention through Spanning Tree Protocol (STP), Rapid Spanning Tree protocol (RSTP), and Multiple Spanning Tree Protocol (MSTP). Root protection increases the efficiency of STP, RSTP, and MSTP by allowing network administrators to manually enforce the root bridge placement in the network.

This example describes how to configure root protection on an interface on a SRX Series device:

Requirements

This example uses the following software and hardware components:

- Junos OS Release 15.1X49-D70 or later
- Four SRX Series devices in an RSTP topology

Before you configure the interface for root protection, be sure you have:

- RSTP operating on the devices.

Overview

Peer STP applications running on device interfaces exchange a special type of frame called a bridge protocol data unit (BPDU). Devices communicate interface information using BPDUs to create a loop-free topology that ultimately determines the root bridge and which interfaces block or forward traffic in the spanning tree.

However, a root port elected through this process has the possibility of being wrongly elected. A user bridge application running on a PC can generate BPDUs, too, and interfere with root port election.

To prevent this from happening, enable root protection on interfaces that must not receive superior BPDUs from the root bridge and must not be elected as the root port. These interfaces are typically located on an administrative boundary and are designated ports.

When root protection is enabled on an interface:

- The interface is blocked from becoming the root port.
- Root protection is enabled for all STP instances on that interface.
- The interface is blocked only for instances for which it receives superior BPDUs. Otherwise, it participates in the spanning-tree topology.

CAUTION: **An interface can be configured for either root protection or loop protection, but not for both.**

In this example, they are configured for RSTP and create a loop-free topology. Interface **ge-0/0/7** on device 1 is a designated port on an administrative boundary. It connects to device 4. Device 3 is the root bridge. Interface **ge-0/0/6** on device 1 is the root port.

This example shows how to configure root protection on interface **ge-0/0/7** to prevent it from transitioning to become the root port.

- 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.

This configuration example uses an RSTP topology. However, you also can configure root protection for STP or MSTP topologies at the [**edit protocols mstp**] hierarchy level.

Configuration

To configure root protection on an interface:

CLI Quick Configuration

To quickly configure root protection on interface **ge-0/0/7**, copy the following command and paste it into the device terminal window:

```
[edit]
set protocols rstp interface ge-0/0/7 no-root-port
```

Step-by-Step Procedure

To configure root protection:

1. Configure interface **ge-0/0/7**:

```
[edit protocols rstp]
user@host#
set interface ge-0/0/7 no-root-port
```

Results

Check the results of the configuration:

```
user@host> show configuration protocols rstp
interface ge-0/0/7 {
  no-root-port;
}
```


Verification

To confirm that the configuration is working properly:

Displaying the Interface State Before Root Protection Is Triggered

Purpose Before root protection is triggered on interface **ge-0/0/7**, confirm the interface state.

Action Use the operational mode command:

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

Spanning tree interface parameters for instance 0

Interface     Port ID    Designated      Designated         Port    State  Role
                          port ID         bridge ID         Cost
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       128:2  16384.00aabbcc0348     20000  BLK    ALT
ge-0/0/6      128:519       128:1  16384.00aabbcc0348     20000  FWD    ROOT
ge-0/0/7      128:520     128:520  32768.0019e2503f00     20000  FWD    DESG
[output truncated]
```

Meaning The output from the operational mode command **show spanning-tree interface** shows that **ge-0/0/7** is a designated port in a forwarding state.

Verifying That Root Protection Is Working on the Interface

Purpose A configuration change takes place on device 4. A smaller bridge priority on the device 4 causes it to send superior BPDUs to interface **ge-0/0/7**. Receipt of superior BPDUs on interface **ge-0/0/7** will trigger root protection. Verify that root protection is operating on interface **ge-0/0/7**.

Action Use the operational mode command:

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

Spanning tree interface parameters for instance 0

Interface     Port ID    Designated       Designated          Port     State  Role
                          port ID          bridge ID           Cost
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       128:2  16384.00aabbcc0348     20000  BLK    ALT
ge-0/0/6      128:519       128:1  16384.00aabbcc0348     20000  FWD    ROOT
ge-0/0/7      128:520     128:520  32768.0019e2503f00     20000  BLK    DIS
(Root-Incon)
[output truncated]
```

Meaning The operational mode command **show spanning-tree interface** shows that interface **ge-0/0/7** has transitioned to a root inconsistent state. The root inconsistent state makes the interface block, discarding any received BPDUs, and prevents the interface from becoming a candidate for the root port. When the root bridge no longer receives superior STP BPDUs from the interface, the interface will recover and transition back to a forwarding state. Recovery is automatic.

Related Documentation

- Understanding BPDU Protection for STP, RSTP, and MSTP on page 145
- Understanding Root Protection for STP, RSTP, and MSTP on page 162
- disable-timeout (Spanning Trees) on page 280

CHAPTER 17

Configuring Link Aggregation Control Protocol

Understanding Link Aggregation Control Protocol

Supported Platforms SRX Series, vSRX

LACP, a subcomponent of IEEE 802.3ad, provides additional functionality for link aggregation groups (LAGs). Use the link aggregation feature to aggregate one or more Ethernet interfaces to form a logical point-to-point link, known as a LAG, virtual link, or bundle. The MAC client can treat this virtual link like a single link.

Starting with Junos OS Release 15.1X49-D80, Link Aggregation Control Protocol (LACP) is supported in Layer 2 transparent mode in addition to existing support in Layer 3 mode for SRX300, SRX320, SRX340, SRX345, SRX1500, SRX4100, SRX4200 devices and vSRX instances. Starting with Junos OS Release 15.1X49-D40, Link Aggregation Control Protocol (LACP) is supported in Layer 2 transparent mode in addition to existing support in Layer 3 mode for SRX5400, SRX5600 and SRX5800 devices. When the SRX Series device uses LACP to bundle the member links, it creates high-speed connections, also known as *fat pipe*, with peer systems. Bandwidth can be increased by adding member links. Increased bandwidth is important especially for redundant Ethernet (reth) and aggregated Ethernet (ae) interfaces, for transmitting and receiving packets to and from the peer end for the whole system. LACP also provides automatic determination, configuration, and monitoring member links. LACP is compatible with other peers that run the 802.3ad LACP protocol. It automatically binds the member links without manually configuring the LAG, thereby avoiding errors.

NOTE: Tentative sessions are created for all interfaces in a particular VLAN. If there is plenty of one-way traffic, numerous tentative sessions are created. When sessions reach the maximum limit, vector fails and packet loss might be seen.

This topic contains the following sections:

Link Aggregation Benefits

Link aggregation increases bandwidth, provides graceful degradation as failure occurs, and increases availability. It provides network redundancy by load-balancing traffic across all available links. If one of the links should fail, the system automatically load-balances traffic across all remaining links.

When LACP is not enabled, a local LAG might attempt to transmit packets to a remote single interface, which causes the communication to fail. When LACP is enabled, a local LAG cannot transmit packets unless a LAG with LACP is also configured on the remote end of the link.

A typical LAG deployment includes aggregate trunk links between an access switch and a distribution switch or customer edge (CE) device.

Link Aggregation Configuration Guidelines

When configuring link aggregation, note the following guidelines and restrictions:

- Link aggregation is supported only for Ethernet interfaces that are configured in switching mode (**family ethernet-switching**). Aggregating interfaces that are configured in routed mode (**family inet**) is also supported.
- You can configure a LAG by specifying the link number as a physical device and then associating a set of ports with the link. All the ports must have the same speed and be in full-duplex mode. Junos OS assigns a unique ID and port priority to each port. The ID and priority are not configurable.
- You can optionally configure LACP for link negotiation.
- You can optionally configure LACP for link protection.
- You can create up to eight Ethernet ports in each bundle.
- Each LAG must be configured on both sides of the link. The ports on either side of the link must be set to the same speed. At least one end of the LAG should be configured as active.
- LAGs are not supported on virtual chassis port links.
- By default, Ethernet links do not exchange protocol data units (PDUs), which contain information about the state of the link. You can configure Ethernet links to actively transmit PDUs, or you can configure the links to passively transmit them, sending out LACP PDUs only when they receive them from another link. The transmitting link is known as the actor and the receiving link is known as the partner.
- LAGs can only be used for a point-to-point connection.

For LACP configuration details, see Table 19 on page 169 and Table 20 on page 169.

Table 19: LACP (Link Aggregation Control Protocol) Configuration

Field	Function
Aggregated Interface	Indicates the name of the aggregated interface.
Link Status	Indicates whether the interface is linked (Up) or not linked (Down).
VLAN (VLAN ID)	Virtual LAN identifier value for IEEE 802.1Q VLAN tags (0.4094).
Description	The description for the LAG.

Table 20: Details of Aggregation

Field	Function
Administrative Status	Displays if the interface is enabled (Up) or disabled (Down).
Logical Interfaces	Shows the logical interface of the aggregated interface.
Member Interfaces	Member interfaces hold all the aggregated interfaces of the selected interfaces.
Port Mode	Specifies the mode of operation for the port: trunk or access.
Native VLAN (VLAN ID)	VLAN identifier to associate with untagged packets received on the interface.
IP Address/Subnet Mask	Specifies the address of the aggregated interfaces.
IPV6 Address/Subnet Mask	Specifies the IPV6 address of the aggregated interfaces.

For aggregated Ethernet interface options, see Table 21 on page 169.

Table 21: Aggregated Ethernet Interface Options

Field	Function	Action
Aggregated Interface	Indicates the name of the aggregated interface.	Enter the aggregated interface name. If an aggregated interface already exists, then the field is displayed as read-only.
LACP Mode	Specifies the mode in which LACP packets are exchanged between the interfaces. The modes are: • None—Indicates that no mode is applicable. • Active—Indicates that the interface initiates transmission of LACP packets • Passive—Indicates that the interface only responds to LACP packets.	Select from the list.

Table 21: Aggregated Ethernet Interface Options *(continued)*

Field	Function	Action
Description	The description for the LAG.	Enter the description.
Interface	Indicates that the interfaces available for aggregation.	Click **Add** to select the interfaces. NOTE: Only interfaces that are configured with the same speeds can be selected together for a LAG.
Speed	Indicates the speed of the interface.	
Enable Log	Specifies whether to enable generation of log entries for LAG.	Select to enable log generation.

NOTE: On SRX100, SRX110, SRX210, SRX220, SRX240, SRX300, SRX320, SRX340, SRX345 and SRX650 devices, the speed mode and link mode configuration are available for member interfaces of ae. (Platform support depends on the Junos OS release in your installation.)

For VLAN options, see Table 22 on page 170.

Table 22: Edit VLAN Options

Field	Function	Action
Port Mode	Specifies the mode of operation for the port: trunk or access.	If you select Trunk, you can: 1. Click **Add** to add a VLAN member. 2. Select the VLAN and click **OK**. 3. (Optional) Associate a native VLAN ID with the port. If you select Access, you can: 1. Select the VLAN member to be associated with the port. 2. (Optional) Associate a VoIP VLAN with the interface. Only a VLAN with a VLAN ID can be associated as a VoIP VLAN. 3. Click **OK**.
VLAN Options	For trunk interfaces, the VLANs for which the interface can carry traffic.	Click **Add** to select VLAN members.
Native VLAN	VLAN identifier to associate with untagged packets received on the interface.	Select the VLAN identifier.

Release History Table

Release	Description
15.1X49-D80	Starting with Junos OS Release 15.1X49-D80, Link Aggregation Control Protocol (LACP) is supported in Layer 2 transparent mode in addition to existing support in Layer 3 mode for SRX300, SRX320, SRX340, SRX345, SRX1500, SRX4100, SRX4200 devices and vSRX instances.
15.1X49-D40	Starting with Junos OS Release 15.1X49-D40, Link Aggregation Control Protocol (LACP) is supported in Layer 2 transparent mode in addition to existing support in Layer 3 mode for SRX5400, SRX5600 and SRX5800 devices.

Related Documentation

- Example: Configuring Link Aggregation Control Protocol on page 171
- Ethernet Ports Switching Overview on page 100
- *Verifying Switching Mode Configuration*

Example: Configuring Link Aggregation Control Protocol

Supported Platforms SRX Series, vSRX

This example shows how to configure LACP.

Requirements

Before you begin:

- Verify that the Ethernet interfaces are in switch mode. See “Understanding VLANs” on page 109.
- Link aggregation of one or more interfaces must be set up to form a virtual link or link aggregation group (LAG) before you can apply LACP.

Overview

In this example, you configure link aggregation for switched Ethernet interfaces then apply LACP.

Configuration

GUI Step-by-Step Procedure

To access the LACP Configuration:

1. In the J-Web user interface, select **Configure>Interfaces>Link Aggregation**.

   The Aggregated Interfaces list is displayed.

2. Click one of the following:

   - **Device Count**—Creates an aggregated Ethernet interface, or LAG. You can choose the number of device that you want to create.
   - **Add**—Adds a new aggregated Ethernet Interface, or LAG.
   - **Edit**— Modifies a selected LAG

- **Aggregation**—Modifies an selected LAG.
- **VLAN**—Specifies VLAN options for the selected LAG.
- **IP Option**—Configuring IP address to LAG is not supported and when you try to configure the IP address an error message is displayed.

- **Delete**—Deletes the selected LAG.
- **Disable Port** or **Enable Port**—Disables or enables the administrative status on the selected interface.

3. Click one:
   - Click **OK** to check your configuration and save it as a candidate configuration, then click **Commit Options**>**Commit**.
   - Click **Cancel** to cancel the configuration without saving changes.

Related Documentation

- Understanding Link Aggregation Control Protocol on page 167
- Ethernet Ports Switching Overview on page 100

Example: Configuring Link Aggregation Control Protocol (CLI Procedure)

Supported Platforms SRX Series

This example shows how to configure LACP.

tRequirements

This example uses an SRX Series device.

Before you begin:

- Determine which interfaces to use and verify that they are in switch mode. See “Understanding VLANs” on page 109.

Overview

In this example, for aggregated Ethernet interfaces, you configure the Link Aggregation Control Protocol (LACP). LACP is one method of bundling several physical interfaces to form one logical interface.

Configuration

CLI Quick Configuration

To quickly configure this section of the example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/6 ether-options 802.3ad ae0
set interfaces ge-0/0/7 ether-options 802.3ad ae0
set interfaces ae0 vlan-tagging
set interfaces ae0 aggregated-ether-options lacp active periodic fast
set interfaces ae0 unit 0 family ethernet-switching interface-mode trunk
set vlan vlan1000 vlan-id 1000
set interfaces ae0 unit 0 family ethernet-switching vlan members vlan1000
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure LACP:

1. Configure the interfaces for ae0.

   ```
   [edit ]
   user@host# set interfaces ge-0/0/6 ether-options 802.3ad ae0
   user@host# set interfaces ge-0/0/7 ether-options 802.3ad ae0
   ```

2. Configure ae0 interface for vlan tagging.

   ```
   [edit ]
   user@host# set interfaces ae0 vlan-tagging
   ```

3. Configure LACP for ae0 and configure periodic transmission of LACP packets.

   ```
   [edit ]
   user@host# set interfaces ae0 aggregated-ether-options lacp active periodic fast
   ```

4. Configure ae0 as a trunk port.

   ```
   [edit ]
   user@host# set interfaces ae0 unit 0 family ethernet-switching interface-mode
     trunk
   ```

5. Configure the VLAN.

   ```
   [edit ]
   user@host# set vlan vlan1000 vlan-id 1000
   ```

6. Add the ae0 interface to the VLAN.

   ```
   [edit ]
   user@host# set interfaces ae0 unit 0 family ethernet-switching vlan members
     vlan1000
   ```

7. If you are done configuring the device, commit the configuration.

   ```
   [edit ]
   user@host# commit
   ```

Results

From configuration mode, confirm your configuration by entering the **show interfaces** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show interfaces
ge-0/0/6 {
  ether-options {
    802.3ad ae0;
  }
}
ge-0/0/7 {
  ether-options {
    802.3ad ae0;
  }
}
ae0 {
  vlan- tagging;
  aggregated-ether-options {
    lacp {
      active;
      periodic fast;
    }
  }
  unit 0 {
    family ethernet-switching {
      interface-mode trunk;
      vlan {
        members vlan1000;
      }
    }
  }
}
```

Verification

Verifying LACP Statistics

Purpose Display LACP statistics for aggregated Ethernet interfaces.

Action From operational mode, enter the **show lacp statistics interfaces ae0** command.

```
user@host> show lacp statistics interfaces ae0
Aggregated interface: ae0
    LACP Statistics:       LACP Rx     LACP Tx   Unknown Rx   Illegal Rx
      ge-0/0/6                1352        2035            0            0
      ge-0/0/7                1352        2056            0            0
```

Meaning The output shows LACP statistics for each physical interface associated with the aggregated Ethernet interface, such as the following:

- The LACP received counter that increments for each normal hello packet received
- The number of LACP transmit packet errors logged
- The number of unrecognized packet errors logged
- The number of invalid packets received

Use the following command to clear the statistics and see only new changes:

user@host# **clear lacp statistics interfaces ae0**

Verifying LACP Aggregated Ethernet Interfaces

Purpose Display LACP status information for aggregated Ethernet interfaces.

Action From operational mode, enter the **show lacp interfaces ae0** command.

```
user@host> show lacp interfaces ae0
Aggregated interface: ae0
    LACP state:       Role   Exp   Def  Dist  Col  Syn  Aggr  Timeout  Activity
      ge-0/0/6       Actor    No    No   Yes  Yes  Yes   Yes     Fast    Active
      ge-0/0/6     Partner    No    No   Yes  Yes  Yes   Yes     Fast   Passive

      ge-0/0/7       Actor    No    No   Yes  Yes  Yes   Yes     Fast    Active
      ge-0/0/7     Partner    No    No   Yes  Yes  Yes   Yes     Fast   Passive

    LACP protocol:        Receive State  Transmit State          Mux State
      ge-0/0/6                  Current   Fast periodic Collecting distributing
      ge-0/0/7                  Current   Fast periodic Collecting distributing
```

Meaning The output shows aggregated Ethernet interface information, including the following information:

- The LACP state—Indicates whether the link in the bundle is an actor (local or near-end of the link) or a partner (remote or far-end of the link).
- The LACP mode—Indicates whether both ends of the aggregated Ethernet interface are enabled (active or passive)—at least one end of the bundle must be active.
- The periodic link aggregation control PDU transmit rate.
- The LACP protocol state—Indicates the link is up if it is collecting and distributing packets.

Related Documentation

- Understanding Link Aggregation Control Protocol on page 167
- Ethernet Ports Switching Overview on page 100

CHAPTER 18

Configuring Class of Service in Switching Mode

Class of Service Functions in Switching Mode Overview

Supported Platforms SRX1500

When a network experiences congestion and delay, some packets must be dropped. Juniper Networks Junos operating system (Junos OS) class of service (CoS) divides traffic into classes to which you can apply different levels of throughput and packet loss when congestion occurs. This allows packet loss to happen according to rules that you configure.

For interfaces that carry IPv4, IPv6, and MPLS traffic, you can configure Junos OS CoS features to provide multiple classes of service for different applications. CoS also allows you to rewrite the Differentiated Services code point (DSCP), IP precedence, 802.1p, or EXP CoS bits of packets egressing an interface, thus allowing you to tailor packets for the remote peers' network requirements.

CoS provides multiple classes of service for different applications. You can configure multiple forwarding classes for transmitting packets, define which packets are placed into each output queue, and schedule the transmission service level for each queue.

In designing CoS applications, you must carefully consider your service needs and thoroughly plan and design your CoS configuration to ensure consistency and interoperability across all platforms in a CoS domain.

Related Documentation

- Understanding Junos OS CoS Components for SRX Series Devices on page 178

Understanding Junos OS CoS Components for SRX Series Devices

Supported Platforms SRX1500

This topic describes the Juniper Networks Junos OS class-of-service (CoS) components for Juniper Networks SRX Series devices:

Code-Point Aliases

A code-point alias assigns a name to a pattern of code-point bits. You can use this name instead of the bit pattern when you configure other CoS components such as classifiers, drop-profile maps, and rewrite rules.

Policers

Policers limit traffic of a certain class to a specified bandwidth and *burst size*. Packets exceeding the policer limits can be discarded. You define policers with filters that can be associated with input interfaces.

NOTE: You can configure policers to discard packets that exceed the rate limits. If you want to configure CoS parameters such as **loss-priority** and **forwarding-class**, you must use firewall filters.

Classifiers

Packet classification associates incoming packets with a particular CoS servicing level. In Junos OS, *classifiers* associate packets with a forwarding class and loss priority and assign packets to output queues on the basis of associated forwarding classes. Junos OS supports two general types of classifiers:

- Behavior aggregate or CoS value traffic classifiers—Examines the CoS value in the packet header. The value in this single field determines the CoS settings applied to the packet. BA classifiers allow you to set the forwarding class and loss priority of a packet based on the Differentiated Services code point (DSCP) value, IP precedence value, and IEEE 802.1p value.
- Multifield traffic classifiers—Examines multiple fields in the packet such as source and destination addresses and source and destination port numbers of the packet. With multifield classifiers, you set the forwarding class and loss priority of a packet on the basis of firewall filter rules.

Forwarding Classes

Forwarding classes group the packets for transmission. Based on forwarding classes, you assign packets to output queues. Forwarding classes affect the forwarding, scheduling, and marking policies applied to packets as they transit a device. By default, four categories of forwarding classes are defined: best effort, assured forwarding, expedited forwarding, and network control. SRX Series devices support, 16 forwarding classes, providing granular classification capability.

Tail Drop Profiles

Drop profile is a mechanism that defines parameters that enable packets to be dropped from the network. Drop profiles define the meanings of the loss priorities. When you configure drop profiles, you are essentially setting the value for queue fullness. The queue fullness represents a percentage of the queue used to store packets in relation to the total amount that has been allocated for that specific queue.

Loss priorities set the priority of dropping a packet. Loss priority affects the scheduling of a packet without affecting the packet's relative ordering. You can use the loss priority setting to identify packets that have experienced congestion. Typically, you mark packets exceeding some service level with a high loss priority.

Schedulers

Each switch interface has multiple queues assigned to store packets. The switch determines which queue to service with regard to a particular method of scheduling. This process often involves determining which type of packet must be transmitted before another. You can define the priority, bandwidth, delay buffer size, and tail drop profiles to be applied to a particular queue for packet transmission.

A scheduler map associates a specified forwarding class with a scheduler configuration. You can associate up to four user-defined scheduler maps with the interfaces.

Rewrite Rules

A *rewrite rule* sets the appropriate CoS bits in the outgoing packet, thus allowing the next downstream device to classify the packet into the appropriate service group. Rewriting, or marking, outbound packets is useful when the switch is at the border of a network and must alter the CoS values to meet the policies of the targeted peer.

NOTE: **Egress firewall filters can also assign forwarding class and loss priority so that the packets are rewritten based on forwarding class and loss priority.**

Related Documentation

- Class of Service Functions in Switching Mode Overview on page 177

Classification Overview

Supported Platforms SRX Series

Packet classification refers to the examination of an incoming packet, which associates the packet with a particular class-of-service (CoS) servicing level. Junos operating system (OS) supports these classifiers:

- Behavior aggregate (BA) classifiers
- Multifield (MF) classifiers
- Default IP precedence classifiers

NOTE: **The total number of classifiers supported on a Services Processing Unit (SPU) is 79. Three classifiers are installed on the SPU as default classifiers in the Layer 3 mode, independent of any CoS configuration, which leaves 76 classifiers that can be configured using the CoS CLI commands. The default classifiers number can vary in future releases or in different modes.**

Verify the number of default classifiers installed on the SPU to determine how many classifiers can be configured using the CoS CLI commands.

When both BA and MF classifications are performed on a packet, the MF classification has higher precedence.

In Junos OS, classifiers associate incoming packets with a forwarding class (FC) and packet loss priority (PLP), and, based on the associated FC, assign packets to output queues. A packet's FC and PLP specify the behavior of a hop, within the system, to process the packet. The per-hop behavior (PHB) comprises packet forwarding, policing, scheduling, shaping, and marking. For example, a hop can put a packet in one of the priority queues according to its FC and then manage the queues by checking the packet's PLP. Junos OS supports up to eight FCs and four PLPs.

This topic includes the following sections:

Behavior Aggregate Classifiers

A BA classifier operates on a packet as it enters the device. Using BA classifiers, the device aggregates different types of traffic into a single FC so that all the types of traffic will receive the same forwarding treatment. The CoS value in the packet header is the single field that determines the CoS settings applied to the packet. BA classifiers allow you to set a packet’s FC and PLP based on the Differentiated Services (DiffServ) code point (DSCP) value, DSCP IPv4 value, DSCP IPv6 value, IP precedence value, MPLS EXP bits, or IEEE 802.1p value. The default classifier is based on the IP precedence value. For more information, see “Default IP Precedence Classifier” on page 182.

Junos OS performs BA classification for a packet by examining its Layer 2, Layer 3, and related CoS parameters, as shown in Table 23 on page 181.

Table 23: BA Classification

Layer	CoS Parameter
Layer 2	IEEE 802.1p value: User Priority
Layer 3	IPv4 precedence IPv4 Differentiated Services code point (DSCP) value IPv6 DSCP value

NOTE: **A BA classifier evaluates Layer 2 and Layer 3 parameters independently. The results from Layer 2 parameters override the results from the Layer 3 parameters.**

Multifield Classifiers

An MF classifier is a second means of classifying traffic flows. Unlike the BA classifier, an MF classifier can examine multiple fields in the packet—for example, the source and destination address of the packet, or the source and destination port numbers of the packet. With MF classifiers, you set the FC and PLP based on firewall filter rules.

NOTE: For a specified interface, you can configure both an MF classifier and a BA classifier without conflicts. Because the classifiers are always applied in sequential order (the BA classifier followed by the MF classifier) any BA classification result is overridden by an MF classifier if they conflict.

Junos OS performs MF traffic classification by directly scrutinizing multiple fields of a packet to classify a packet. This avoids having to rely on the output of the previous BA traffic classification. Junos OS can simultaneously check a packet's data for Layers 2, 3, 4, and 7, as shown in Table 24 on page 182.

Table 24: MF Classification

Layer	CoS Parameter
Layer 2	IEEE 802.1Q: VLAN ID IEEE 802.1p: User priority
Layer 3	IP precedence value DSCP or DSCP IPv6 value Source IP address Destination IP address Protocol ICMP: Code and type
Layer 4	TCP/UDP: Source port TCP/UDP: Destination port TCP: Flags AH/ESP: SPI
Layer 7	Not supported.

Using Junos OS, you configure an MF classifier with a firewall filter and its associated match conditions. This enables you to use any filter match criterion to locate packets that require classification.

Default IP Precedence Classifier

With Junos OS, all logical interface are automatically assigned a default IP precedence classifier when the logical interface is configured. This default traffic classifier maps IP precedence values to an FC and a PLP as shown in Table 25 on page 183. These mapping results are in effect for an ingress packet until the packet is further processed by another classification method.

Table 25: Default IP Precedence Classifier

IP Precedence CoS Values	Forwarding Class	Packet Loss Priority
000	best-effort	low
001	best-effort	high
010	best-effort	low
011	best-effort	high
100	best-effort	low
101	best-effort	high
110	network-control	low
111	network-control	high

Related Documentation

- Default Behavior Aggregate Classification on page 183
- Sample Behavior Aggregate Classification on page 185

- *Example: Configuring Behavior Aggregate Classifiers*

Understanding Packet Loss Priorities

Supported Platforms SRX Series, vSRX

Packet loss priorities (PLPs) allow you to set the priority for dropping packets. You can use the PLP setting to identify packets that have experienced congestion. Typically, you mark packets exceeding some service level with a high loss priority—that is, a greater likelihood of being dropped. You set PLP by configuring a classifier or a policer. The PLP is used later in the work flow to select one of the drop profiles used by random early detection (RED).

You can configure the PLP bit as part of a congestion control strategy. The PLP bit can be configured on an interface or in a filter. A packet for which the PLP bit is set has an increased probability of being dropped during congestion.

Related Documentation

- Classification Overview on page 180
- Default Behavior Aggregate Classification on page 183
- Sample Behavior Aggregate Classification on page 185

- *Example: Configuring Behavior Aggregate Classifiers*

Default Behavior Aggregate Classification

Supported Platforms SRX Series, vSRX

Table 26 on page 184 shows the forwarding class (FC) and packet loss priority (PLP) that are assigned by default to each well-known Differentiated Services (DiffServ) code point (DSCP). Although several DSCPs map to the expedited-forwarding (ef) and assured-forwarding (af) classes, by default no resources are assigned to these forwarding classes. All af classes other than af1*x* are mapped to best-effort, because RFC 2597, *Assured Forwarding PHB Group*, prohibits a node from aggregating classes. Assignment to the best-effort FC implies that the node does not support that class. You can modify the default settings through configuration.

Table 26: Default Behavior Aggregate Classification

DSCP and DSCP IPv6 Alias	Forwarding Class	Packet Loss Priority
ef	expedited-forwarding	low
af11	assured-forwarding	low
af12	assured-forwarding	high
af13	assured-forwarding	high
af21	best-effort	low
af22	best-effort	low
af23	best-effort	low
af31	best-effort	low
af32	best-effort	low
af33	best-effort	low
af41	best-effort	low
af42	best-effort	low
af43	best-effort	low
be	best-effort	low
cs1	best-effort	low
cs2	best-effort	low
cs3	best-effort	low
cs4	best-effort	low
cs5	best-effort	low

Table 26: Default Behavior Aggregate Classification *(continued)*

DSCP and DSCP IPv6 Alias	Forwarding Class	Packet Loss Priority
nc1/cs6	network-control	low
nc2/cs7	network-control	low
other	best-effort	low

Related Documentation

- Classification Overview on page 180
- Sample Behavior Aggregate Classification on page 185
- *Example: Configuring Behavior Aggregate Classifiers*
- Understanding Packet Loss Priorities on page 183

Sample Behavior Aggregate Classification

Supported Platforms SRX Series, vSRX

Table 27 on page 185 shows the device forwarding classes (FCs) associated with each well-known Differentiated Services (DiffServ) code point (DSCP) and the resources assigned to the output queues for a sample DiffServ CoS implementation. This example assigns expedited forwarding to queue 1 and a subset of the assured FCs (af*x*) to queue 2, and distributes resources among all four forwarding classes. Other DiffServ-based implementations are possible.

Table 27: Sample Behavior Aggregate Classification Forwarding Classes and Queues

DSCP and DSCP IPv6 Alias	DSCP and DSCP IPv6 Bits	Forwarding Class	Packet Loss Priority	Queue
ef	101110	expedited-forwarding	low	1
af11	001010	assured-forwarding	low	2
af12	001100	assured-forwarding	high	2
af13	001110	assured-forwarding	high	2
af21	010010	best-effort	low	0
af22	010100	best-effort	low	0
af23	010110	best-effort	low	0
af31	011010	best-effort	low	0
af32	011100	best-effort	low	0

Table 27: Sample Behavior Aggregate Classification Forwarding Classes and Queues *(continued)*

DSCP and DSCP IPv6 Alias	DSCP and DSCP IPv6 Bits	Forwarding Class	Packet Loss Priority	Queue
af33	011110	best-effort	low	0
af41	100010	best-effort	low	0
af42	100100	best-effort	low	0
af43	100110	best-effort	low	0
be	000000	best-effort	low	0
cs1	0010000	best-effort	low	0
cs2	010000	best-effort	low	0
cs3	011000	best-effort	low	0
cs4	100000	best-effort	low	0
cs5	101000	best-effort	low	0
nc1/cs6	110000=	network-control	low	3
nc2/cs7	111000=	network-control	low	3
other	—	best-effort	low	0

Related Documentation

- Classification Overview on page 180
- Default Behavior Aggregate Classification on page 183
- *Example: Configuring Behavior Aggregate Classifiers*
- Understanding Packet Loss Priorities on page 183

Example: Configuring Behavior Aggregate Classifiers

Supported Platforms SRX1500

This example shows how to configure behavior aggregate classifiers for a device to determine forwarding treatment of packets.

- Requirements on page 187
- Overview on page 187
- Configuration on page 187
- Verification on page 189

Requirements

Before you begin, determine the forwarding class and PLP that are assigned by default to each well-known DSCP that you want to configure for the behavior aggregate classifier. See "Default Behavior Aggregate Classification" on page 183.

Overview

You configure behavior aggregate classifiers to classify packets that contain valid DSCPs to appropriate queues. Once configured, you must apply the behavior aggregate classifier to the correct interfaces. You can override the default IP precedence classifier by defining a classifier and applying it to a logical interface. To define new classifiers for all code point types, include the **classifiers** statement at the **[edit class-of-service]** hierarchy level.

In this example, you set the DSCP behavior aggregate classifier to ba-classifier as the default DSCP map. You set a best-effort forwarding class as be-class, an expedited forwarding class as ef-class, an assured forwarding class as af-class, and a network control forwarding class as nc-class. Finally, you apply the behavior aggregate classifier to an IRB interface.

Table 28 on page 187 shows how the behavior aggregate classifier assigns loss priorities, to incoming packets in the four forwarding classes.

Table 28: Sample ba-classifier Loss Priority Assignments

mf-classifier Forwarding Class	For CoS Traffic Type	ba-classifier Assignments
be-class	Best-effort traffic	High-priority code point: **000001**
ef-class	Expedited forwarding traffic	High-priority code point: **101111**
af-class	Assured forwarding traffic	High-priority code point: **001100**
nc-class	Network control traffic	High-priority code point: **110001**

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from the configuration mode.

```
set class-of-service classifiers dscp ba-classifier import default
set class-of-service classifiers dscp ba-classifier forwarding-class be-class loss-priority
  high code-points 000001
set class-of-service classifiers dscp ba-classifier forwarding-class ef-class loss-priority
  high code-points 101111
set class-of-service classifiers dscp ba-classifier forwarding-class af-class loss-priority
  high code-points 001100
set class-of-service classifiers dscp ba-classifier forwarding-class nc-class loss-priority
  high code-points 110001
```

set class-of-service interfaces irb unit 0 classifiers dscp ba-classifier

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the CLI User Guide.

To configure behavior aggregate classifiers for a device:

1. Configure the class of service.

   ```
   [edit]
   user@host# edit class-of-service
   ```

2. Configure behavior aggregate classifiers for DiffServ CoS.

   ```
   [edit class-of-service]
   user@host# edit classifiers dscp ba-classifier
   user@host# set import default
   ```

3. Configure a best-effort forwarding class classifier.

   ```
   [edit class-of-service classifiers dscp ba-classifier]
   user@host# set forwarding-class be-class loss-priority high code-points 000001
   ```

4. Configure an expedited forwarding class classifier.

   ```
   [edit class-of-service classifiers dscp ba-classifier]
   user@host# set forwarding-class ef-class loss-priority high code-points 101111
   ```

5. Configure an assured forwarding class classifier.

   ```
   [edit class-of-service classifiers dscp ba-classifier]
   user@host# set forwarding-class af-class loss-priority high code-points 001100
   ```

6. Configure a network control forwarding class classifier.

   ```
   [edit class-of-service classifiers dscp ba-classifier]
   user@host# set forwarding-class nc-class loss-priority high code-points 110001
   ```

7. Apply the behavior aggregate classifier to an IRB interface.

   ```
   [edit]
   user@host# set class-of-service interfaces irb unit 0 classifiers dscp ba-classifier
   ```

NOTE: You can use interface wildcards for **interface-name** and **logical-unit-number**.

Results

From configuration mode, confirm your configuration by entering the **show class-of-service** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@host# show class-of-service
classifiers {
  dscp ba-classifier {
    import default;
```

```
        forwarding-class be-class {
            loss-priority high code-points 000001;
        }
        forwarding-class ef-class {
            loss-priority high code-points 101111;
        }
        forwarding-class af-class {
            loss-priority high code-points 001100;
        }
        forwarding-class nc-class {
            loss-priority high code-points 110001;
        }
    }
    forwarding-classes {
        class BE-data queue-num 0;
        class Premium-data queue-num 1;
        class Voice queue-num 2;
        class NC queue-num 3;
    }
    interfaces {
        irb {
            unit 0 {
                classifiers {
                    dscp ba-classifier;
                }
            }
        }
        irb {
            unit 0 {
                classifiers {
                    dscp v4-ba-classifier;
                }
                irb {
                    unit 0 {
                        classifiers {
                            dscp v4-ba-classifier;
                        }
                        irb {
                            unit 0 {
                                classifiers {
                                    dscp v4-ba-classifier;
                                }
                            }
                        }
                    }
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

- Verifying the Code-Point Aliases on page 190
- Verifying the DSCP Classifier on page 190

Verifying the Code-Point Aliases

Purpose Make sure that the code-point aliases are configured as expected.

Action Run the **show class-of-service code-point-aliases dscp** command.

`user@host>` **show class-of-service code-point-aliases dscp**

```
Code point type: dscp
  Alias              Bit pattern
  af11               001010
  af12               001100
  af13               001110
  af21               010010
  af22               010100
  af23               010110
  af31               011010
  af32               011100
  af33               011110
  af41               100010
  af42               100100
  af43               100110
  be                 000000
  be1                000001
  cs1                001000
  cs2                010000
  cs3                011000
  cs4                100000
  cs5                101000
  cs6                110000
  cs7                111000
  ef                 101110
  ef1                101111
  nc1                110000
  nc2                111000
```

Meaning The code-point aliases are configured as expected. Note that the custom aliases that you configure are added to the default code-point aliases.

Verifying the DSCP Classifier

Purpose Make sure that the DSCP classifier is configured as expected.

Action Run the **show class-of-service classifiers name v4-ba-classifier** command.

`user@host>` **show class-of-service classifiers name v4-ba-classifier**

```
Classifier: v4-ba-classifier, Code point type: dscp, Index: 10755
  Code point         Forwarding class                    Loss priority
  000000             BE-data                             high
  000001             BE-data                             low
  000010             BE-data                             low
```



```
000011              BE-data                             low
000100              BE-data                             low
000101              BE-data                             low
000110              BE-data                             low
000111              BE-data                             low
001000              BE-data                             low
001001              BE-data                             low
001010              Voice                               low
001011              BE-data                             low
001100              Voice                               high
001101              BE-data                             low
001110              Voice                               high
001111              BE-data                             low
010000              BE-data                             low
010001              BE-data                             low
010010              BE-data                             low
010011              BE-data                             low
010100              BE-data                             low
010101              BE-data                             low
010110              BE-data                             low
010111              BE-data                             low
011000              BE-data                             low
011001              BE-data                             low
011010              BE-data                             low
011011              BE-data                             low
011100              BE-data                             low
011101              BE-data                             low
011110              BE-data                             low
011111              BE-data                             low
100000              BE-data                             low
100001              BE-data                             low
100010              BE-data                             low
100011              BE-data                             low
100100              BE-data                             low
100101              BE-data                             low
100110              BE-data                             low
100111              BE-data                             low
101000              BE-data                             low
101001              BE-data                             low
101010              BE-data                             low
101011              BE-data                             low
101100              BE-data                             low
101101              BE-data                             low
101110              Premium-data                        high
101111              Premium-data                        low
110000              NC                                  low
110001              BE-data                             low
110010              BE-data                             low
110011              BE-data                             low
110100              BE-data                             low
110101              BE-data                             low
110110              BE-data                             low
110111              BE-data                             low
111000              NC                                  low
111001              BE-data                             low
111010              BE-data                             low
111011              BE-data                             low
111100              BE-data                             low
111101              BE-data                             low
111110              BE-data                             low
```



```
  111111            BE-data                             low
```

Meaning Notice that the default classifier is incorporated into the customer classifier. If you were to remove the **import default** statement from the custom classifier, the custom classifier would look like this:

```
user@host> show class-of-service classifier name v4-ba-classifier
Classifier: v4-ba-classifier, Code point type: dscp, Index: 10755
  Code point         Forwarding class                    Loss priority
  000000             BE-data                             high
  000001             BE-data                             low
  101110             Premium-data                        high
  101111             Premium-data                        low
```

Verifying the Forwarding Classes and Output Queues

Purpose Make sure that the forwarding classes are configured as expected.

Action Run the **show class-of-service forwarding-class** command.

```
user@host> show class-of-service forwarding-class


Forwarding class                       ID      Queue  Restricted queue  Fabric
priority  Policing priority   SPU priority
  BE-data                               0       0          0             low
            normal             low
  Premium-data                          1       1          1             low
            normal             low
  Voice                                 2       2          2             low
            normal             low
  NC                                    3       3          3             low
            normal             low
```

Meaning The forwarding classes are configured as expected.

Verifying That the Classifier Is Applied to the Interfaces

Purpose Make sure that the classifier is applied to the correct interfaces.

Action Run the **show class-of-service interface** command.

```
user@host> show class-of-service interface irb

Physical interface: irb, Index: 144
Queues supported: 8, Queues in use: 4
  Scheduler map: <default>, Index: 2
  Congestion-notification: Disabled

  Logical interface: irb, Index: 333
Object                  Name                Type                    Index
Classifier              v4-ba-classifier    dscp                    10755
```

Meaning The interfaces are configured as expected.

Related Documentation

- *Interfaces Feature Guide for Security Devices*
- Classification Overview on page 180
- Sample Behavior Aggregate Classification on page 185
- Understanding Packet Loss Priorities on page 183

Example: Configuring and Applying a Firewall Filter for a Multifield Classifier

Supported Platforms SRX Series

This example shows how to configure a firewall filter to classify traffic using a multifield classifier. The classifier detects packets of interest to CoS as they arrive on an interface.

Requirements

One common way to detect packets of CoS interest is by source or destination address. The destination address is used in this example, but many other matching criteria for packet detection are available to firewall filters.

Overview

In this example, you configure the firewall filter mf-classifier. You create and name the assured forwarding traffic class, set the match condition, and specify the destination address as 192.168.44.55. You create the forwarding class for assured forwarding DiffServ traffic as af-class and set the loss priority to low.

Then you create and name the expedited forwarding traffic class, set the match condition, for the expedited forwarding traffic class, and specify the destination address as 192.168.66.77. You then create the forwarding class for expedited forwarding DiffServ traffic as ef-class and set the policer to ef-policer. Then you create and name the network-control traffic class and set the match condition.

You then create and name the forwarding class for the network control traffic class as nc-class. You create and name the forwarding class for the best-effort traffic class as be-class. Finally, you apply the multifield classifier firewall filter as an input filter on each customer-facing or host-facing that needs the filter. In this example, the interface is ge-0/0/0.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

```
set firewall filter mf-classifier interface-specific
set firewall filter mf-classifier term assured-forwarding from destination-address
  192.168.44.55
set firewall filter mf-classifier term assured-forwarding then forwarding-class af-class
set firewall filter mf-classifier term assured-forwarding then loss-priority low
set firewall filter mf-classifier term expedited-forwarding from destination-address
  192.168.66.77
set firewall filter mf-classifier term expedited-forwarding then forwarding-class ef-class
set firewall filter mf-classifier term expedited-forwarding then policer ef-policer
set firewall filter mf-classifier term network-control from precedence net-control
set firewall filter mf-classifier term network-control then forwarding-class nc-class
set firewall filter mf-classifier term best-effort then forwarding-class be-class
set interfaces irb unit 0 family inet filter input mf-classifier
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure a firewall filter for a multifield classifier for a device:

1. Create and name the multifield classifier filter.

   ```
   [edit]
   user@host# edit firewall filter mf-classifier
   user@host# set interface-specific
   ```

2. Create and name the term for the assured forwarding traffic class.

   ```
   [edit firewall filter mf-classifier]
   user@host# edit term assured-forwarding
   ```

3. Specify the destination address for assured forwarding traffic.

   ```
   [edit firewall filter mf-classifier term assured-forwarding]
   user@host# set from destination-address 192.168.44.55
   ```

4. Create the forwarding class and set the loss priority for the assured forwarding traffic class.

   ```
   [edit firewall filter mf-classifier term assured-forwarding]
   user@host# set then forwarding-class af-class
   user@host# set then loss-priority low
   ```

5. Create and name the term for the expedited forwarding traffic class.

   ```
   [edit]
   user@host# edit firewall filter mf-classifier
   user@host# edit term expedited-forwarding
   ```

6. Specify the destination address for the expedited forwarding traffic.

   ```
   [edit firewall filter mf-classifier term expedited-forwarding]
   user@host# set from destination-address 192.168.66.77
   ```

7. Create the forwarding class and apply the policer for the expedited forwarding traffic class.

   ```
   [edit firewall filter mf-classifier term expedited-forwarding]
   user@host# set then forwarding-class ef-class
   user@host# set then policer ef-policer
   ```

8. Create and name the term for the network control traffic class.

   [edit]
   user@host# **edit firewall filter mf-classifier**
   user@host# **edit term network-control**

9. Create the match condition for the network control traffic class.

   [edit firewall filter mf-classifier term network-control]
   user@host# **set from precedence net-control**

10. Create and name the forwarding class for the network control traffic class.

    [edit firewall filter mf-classifier term network-control]
    user@host# **set then forwarding-class nc-class**

11. Create and name the term for the best-effort traffic class.

    [edit]
    user@host# **edit firewall filter mf-classifier**
    user@host# **edit term best-effort**

12. Create and name the forwarding class for the best-effort traffic class.

    [edit firewall filter mf-classifier term best-effort]
    user@host# **set then forwarding-class be-class**

    NOTE: Because this is the last term in the filter, it has no match condition.

13. Apply the multifield classifier firewall filter as an input filter.

    [edit]
    user@host# **set interfaces irb unit 0 family inet filter input mf-classifier**

Results From configuration mode, confirm your configuration by entering the **show firewall filter mf-classifier** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
  user@host# show firewall filter mf-classifier
  interface-specific;
  term assured-forwarding {
  from {
    destination-address {
    192.168.44.55;
  }
  }
  then {
    loss-priority low;
    forwarding-class af-class;
  }
  }
  term expedited-forwarding {
    from {
    destination-address {
```

```
        192.168.66.77;
      }
      }
      then {
        policer ef-policer;
        forwarding-class ef-class;
      }
      }
      term network-control {
        from {
      precedence net-control;
      }
      then forwarding-class nc-class;
        }
        term best-effort {
      then forwarding-class be-class;
    }
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Verifying a Firewall Filter for a Multifield Classifier Configuration

Purpose Verify that a firewall filter for a multifield classifier is configured properly on a device.

Action From configuration mode, enter the **show firewall filter mf-classifier** command.

Related Documentation

- Understanding Junos OS CoS Components for SRX Series Devices on page 178

Single-Rate Three-Color Policer Overview

Supported Platforms SRX1500

A single-rate three-color policer defines a bandwidth limit and a maximum burst size for guaranteed traffic and a second burst size for peak traffic. A single-rate three-color policer is most useful when a service is structured according to packet length and not peak arrival rate.

Single-rate three-color policing meters a traffic stream based on the following configured traffic criteria:

- Committed information rate (CIR)—Bandwidth limit for guaranteed traffic.
- Committed burst size (CBS)—Maximum packet size permitted for bursts of data that exceed the CIR.
- Excess burst size (EBS)—Maximum packet size permitted for peak traffic.

Single-rate tricolor marking (single-rate TCM) classifies traffic as belonging to one of three color categories and performs congestion-control actions on the packets based on the color marking:

- Green—Traffic that conforms to *either* the bandwidth limit *or* the burst size for guaranteed traffic (CIR or CBS). For a green traffic flow, single-rate marks the packets with an implicit loss priority of **low** and transmits the packets.
- Yellow—Traffic that exceeds *both* the bandwidth limit *and* the burst size for guaranteed traffic (CIR and CBS) but not the burst size for peak traffic (EBS). For a yellow traffic flow, single-rate marks the packets with an implicit loss priority of **medium-high** and transmits the packets.
- Red—Traffic that exceeds the burst size for peak traffic (EBS), single-rate marks packets with an implicit loss priority of **high** and, optionally, discards the packets.

If congestion occurs downstream, the packets with higher loss priority are more likely to be discarded.

Related Documentation

- Example: Configuring a Single-Rate Three-Color Policer on page 197

Example: Configuring a Single-Rate Three-Color Policer

Supported Platforms SRX1500

This example shows how to configure a single-rate three-color policer.

Requirements

No special configuration beyond device initialization is required before configuring this example.

Overview

A single-rate three-color policer meters a traffic flow against a bandwidth limit and burst-size limit for guaranteed traffic, plus a second burst-size limit for excess traffic. Traffic that conforms to the limits for guaranteed traffic is categorized as green, and nonconforming traffic falls into one of two categories:

- Nonconforming traffic that does not exceed the burst size for excess traffic is categorized as yellow.
- Nonconforming traffic that exceeds the burst size for excess traffic is categorized as red.

Each category is associated with an action. For green traffic, packets are implicitly set with a loss-priority value of **low** and then transmitted. For yellow traffic, packets are implicitly set with a loss-priority value of **medium-high** and then transmitted. For red traffic, packets are implicitly set with a loss-priority value of **high** and then transmitted. If the policer configuration includes the optional **action** statement (**action loss-priority high then discard**), then packets in a red flow are discarded instead.

You can apply a three-color policer to Layer 3 traffic as a firewall filter policer only. You reference the policer from a stateless firewall filter term, and then you apply the filter to the input or output of a logical interface at the protocol level.

Topology

In this example, you apply a color-aware, single-rate three-color policer to the input IPv4 traffic at IRB interface. The IPv4 firewall filter term that references the policer does not apply any packet-filtering. The filter is used only to apply the three-color policer to the interface.

You configure the policer to rate-limit traffic to a bandwidth limit of 40 Mbps and a burst-size limit of 100 KB for green traffic, but also allow an excess burst-size limit of 200 KB for yellow traffic. Only nonconforming traffic that exceeds the peak burst-size limit is categorized as red. In this example, you configure the three-color policer action **loss-priority high then discard**, which overrides the implicit marking of red traffic to a **high** loss priority.

Configuration

The following example requires you to navigate various levels in the configuration hierarchy. For information about navigating the CLI, see *Using the CLI Editor in Configuration Mode*.

To configure this example, perform the following tasks:

- Configuring a Single-Rate Three-Color Policer on page 199
- Applying the Filter to the Logical Interface on page 200

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, and then copy and paste the commands into the CLI at the **[edit]** hierarchy level.

```
set firewall three-color-policer srTCM1-ca single-rate color-aware
set firewall three-color-policer srTCM1-ca single-rate committed-information-rate 40m
set firewall three-color-policer srTCM1-ca single-rate committed-burst-size 100k
set firewall three-color-policer srTCM1-ca single-rate excess-burst-size 200k
set firewall three-color-policer srTCM1-ca action loss-priority high then discard
set firewall family inet filter filter-srtcm1ca-all term 1 then three-color-policer single-rate
  srTCM1-ca
set class-of-service interfaces irb unit 0 forwarding-class af
set interfaces irb unit 0 family inet address 10.20.130.1/24
set interfaces irb unit 0 family inet filter input filter-srtcm1ca-all
```

Configuring a Single-Rate Three-Color Policer

Step-by-Step Procedure

To configure a single-rate three-color policer:

1. Enable configuration of a three-color policer.

   ```
   [edit]
   user@host# edit firewall three-color-policer srTCM1-ca
   ```

2. Configure the color mode of the single-rate three-color policer.

   ```
   [edit firewall three-color-policer srTCM1-ca]
   user@host# set single-rate color-aware
   ```

3. Configure the single-rate guaranteed traffic limits.

   ```
   [edit firewall three-color-policer srTCM1-ca]
   user@host# set single-rate committed-information-rate 40m
   user@host# set single-rate committed-burst-size 100k
   ```

4. Configure the single-rate burst-size limit that is used to classify nonconforming traffic.

   ```
   [edit firewall three-color-policer srTCM1-ca]
   user@host# set single-rate excess-burst-size 200k
   ```

5. (Optional) Configure the action for nonconforming traffic.

   ```
   [edit firewall three-color-policer srTCM1-ca]
   user@host# set action loss-priority high then discard
   ```

   For three-color policers, the only configurable action is to discard packets in a red traffic flow. In this example, packets in a red traffic flow have been implicitly marked with a **high** packet loss priority (PLP) level because the traffic flow exceeded the rate-limiting defined by the single rate-limit (specified by the **committed-information-rate 40m** statement) and the larger burst-size limit (specified by the **excess-burst-size 200k** statement). Because the optional **action** statement is included, this example takes the more severe action of discarding packets in a red traffic flow.

Results

Confirm the configuration of the hierarchical policer by entering the **show firewall** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```
three-color-policer srTCM1-ca {
  action {
    loss-priority high then discard;
  }
  single-rate {
    color-aware;
    committed-information-rate 40m;
    committed-burst-size 100k;
    excess-burst-size 200k;
  }
}
```


Applying the Filter to the Logical Interface

Step-by-Step Procedure

To apply the filter to the IRB interface:

1. Enable configuration of the IRB interface.

   ```
   [edit]
   user@host# edit interfaces irb unit 0 family inet
   ```

2. Configure an IP address.

   ```
   [edit interfaces irb unit 0 family inet]
   user@host# set address 10.20.130.1/24
   ```

3. Reference the filter as an input filter.

   ```
   [edit interfaces irb unit 0 family inet]
   user@host# set filter input filter-srtcm1ca-all
   ```

Results

Confirm the configuration of the interface by entering the **show class-of-service** and **show interfaces** configuration mode commands. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```
[edit]
user@host# show class-of-service
interfaces {
  irb {
    unit 0 {
      forwarding-class af;
    }
  }
}
[edit]
user@host# show interfaces
irb {
  unit 0 {
    family inet {
      filter {
        input filter-srtcm1ca-all;
        }
      address 10.20.130.1/24;
    }
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

Displaying the Firewall Filters Applied to the IRB Interface

Purpose

Verify that the firewall filter is applied to the IRB interface.

Action Use the **show interfaces** operational mode command for the logical interface **ge-2/0/5.0**, and specify **detail** mode. The **Protocol inet** section of the command output displays information for the IRB interface.

```
user@host> show interfaces irb detail
  Physical interface irb (Index 105) (SNMP ifIndex 556) (Generation 170)
    Flags: Device-Down SNMP-Traps 0x4004000 Encapsulation: ENET2
    Traffic statistics:
     Input  bytes  :                 0
     Output bytes  :                 0
     Input  packets:                 0
     Output packets:                 0
    Local statistics:
     Input  bytes  :                 0
     Output bytes  :                 0
     Input  packets:                 0
     Output packets:                 0
    Transit statistics:
     Input  bytes  :                 0                    0 bps
     Output bytes  :                 0                    0 bps
     Input  packets:                 0                    0 pps
     Output packets:                 0                    0 pps
    Protocol inet, MTU: 1500, Generation: 242, Route table: 0
      Flags: Sendbcast-pkt-to-re
      Input Filters: filter-srtcm1ca-all
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 10.20.130/24, Local: 10.20.130.1, Broadcast: 10.20.130.255,

        Generation: 171
    Protocol multiservice, MTU: Unlimited, Generation: 243, Route table: 0
      Policer: Input: __default_arp_policer__
```

Meaning The firewall filter is applied to the IRB interface as expected.

Related Documentation

- Single-Rate Three-Color Policer Overview on page 196

Rewrite Rules Overview

Supported Platforms SRX Series, vSRX

A rewrite rule modifies the appropriate class-of-service (CoS) bits in an outgoing packet. Modification of CoS bits allows the next downstream device to classify the packet into the appropriate service group. Rewriting or marking outbound packets is useful when the device is at the border of a network and must alter the CoS values to meet the policies of the targeted peer. A rewrite rule examines the forwarding class and loss priority of a packet and sets its bits to a corresponding value specified in the rule.

Typically, a device rewrites CoS values in outgoing packets on the outbound interfaces of an edge device, to meet the policies of the targeted peer. After reading the current forwarding class and loss priority information associated with the packet, the transmitting device locates the chosen CoS value from a table, and writes this CoS value into the packet header.

NOTE: You can configure up to 32 IEEE 802.1p rewriters on each SRX5K-MPC on the SRX5600 and SRX5800 devices.

Related Documentation

- *Example: Configuring and Applying Rewrite Rules*

Rewriting Frame Relay Headers

Supported Platforms SRX Series

Assigning the Default Frame Relay Rewrite Rule to an Interface

Supported Platforms SRX Series

For Juniper Networks device interfaces with Frame Relay encapsulation, you can rewrite the discard eligibility (DE) bit based on the loss priority of Frame Relay traffic. For each outgoing frame with the loss priority set to low, medium-low, medium-high, or high, you can set the DE bit CoS value to **0** or **1**. You can combine a Frame Relay rewrite rule with other rewrite rules on the same interface. For example, you can rewrite both the DE bit and MPLS EXP bit.

The default Frame Relay rewrite rule contains the following settings:

```
loss-priority low code-point 0;
loss-priority medium-low code-point 0;
loss-priority medium-high code-point 1;
loss-priority high code-point 1;
```

This default rule sets the DE CoS value to **0** for each outgoing frame with the loss priority set to low or medium-low. This default rule sets the DE CoS value to **1** for each outgoing frame with the loss priority set to medium-high or high.

To assign the default rule to an interface, include the **frame-relay-de default** statement at the **[edit class-of-service interfaces interface *interface-name* unit *logical-unit-number* unit rewrite-rules]** hierarchy level:

```
[edit class-of-service interfaces interface-name unit logical-unit-number rewrite-rules]
frame-relay-de default;
```

Defining a Custom Frame Relay Rewrite Rule

Supported Platforms SRX Series

To define a custom Frame Relay rewrite rule, include the following statements at the **[edit class-of-service]** hierarchy level:

```
[edit class-of-service]
rewrite-rules {
```

```
    frame-relay-de rewrite-name {
      import (rewrite-name | default);
      forwarding-class class-name {
        loss-priority level code-point (0 | 1);
      }
    }
  }
```

A custom rewrite rule sets the DE bit to the **0** or **1** CoS value based on the assigned loss priority of low, medium-low, medium-high, or high for each outgoing frame.

The rule does not take effect until you apply it to a logical interface. To apply the rule to a logical interface, include the **frame-relay-de *map-name*** statement at the **[edit class-of-service interfaces interface *interface-name* unit *logical-unit-number* rewrite-rules]** hierarchy level:

```
[edit class-of-service interfaces interface-name unit logical-unit-number rewrite-rules]
frame-relay-de map-name;
```

Related Documentation

- Rewrite Rules Overview on page 201
- *Example: Configuring and Applying Rewrite Rules*

Code-Point Aliases Overview

Supported Platforms SRX Series, vSRX

A code-point alias assigns a name to a pattern of code-point bits. You can use this name instead of the bit pattern when you configure other class-of-service (CoS) components, such as classifiers, drop-profile maps, and rewrite rules.

When you configure classes and define classifiers, you can refer to the markers by alias names. You can configure user-defined classifiers in terms of alias names. If the value of an alias changes, it alters the behavior of any classifier that references it.

The following types of code points are supported by Junos operating system (OS):

- DSCP—Defines aliases for DiffServ code point (DSCP) IPv4 values.

  You can refer to these aliases when you configure classes and define classifiers.
- DSCP-IPv6—Defines aliases for DSCP IPv6 values.

  You can refer to these aliases when you configure classes and define classifiers.
- EXP—Defines aliases for MPLS EXP bits.

  You can map MPLS EXP bits to the device forwarding classes.
- inet-precedence—Defines aliases for IPv4 precedence values.

  Precedence values are modified in the IPv4 type-of-service (ToS) field and mapped to values that correspond to levels of service.

Related Documentation

- Default CoS Values and Aliases on page 204

- Example: Defining Code-Point Aliases for Bits on page 207

Default CoS Values and Aliases

Supported Platforms SRX Series, vSRX

Table 29 on page 205 shows the default mapping between the standard aliases and the bit values.

Table 29: Standard CoS Aliases and Bit Values

CoS Value Type	Alias	Bit Value
MPLS EXP	be	000
	be1	001
	ef	010
	ef1	011
	af11	100
	af12	101
	nc1/cs6	110
	nc2/cs7	111

Table 29: Standard CoS Aliases and Bit Values *(continued)*

CoS Value Type	Alias	Bit Value
DSCP and DSCP IPv6	ef	101110
	af11	001010
	af12	001100
	af13	001110
	af21	010010
	af22	010100
	af23	010110
	af31	011010
	af32	011100
	af33	011110
	af41	100010
	af42	100100
	af43	100110
	be	000000
	cs1	001000
	cs2	010000
	cs3	011000
	cs4	100000
	cs5	101000
	nc1/cs6	110000
	nc2/cs7	111000

Table 29: Standard CoS Aliases and Bit Values *(continued)*

CoS Value Type	Alias	Bit Value
IEEE 802.1	be	000
	be1	001
	ef	010
	ef1	011
	af11	100
	af12	101
	nc1/cs6	110
	nc2/cs7	111
IP precedence	be	000
	be1	001
	ef	010
	ef1	011
	af11	100
	af12	101
	nc1/cs6	110
	nc2/cs7	111

Related Documentation

- Code-Point Aliases Overview on page 203
- Example: Defining Code-Point Aliases for Bits on page 207

Example: Defining Code-Point Aliases for Bits

Supported Platforms SRX Series, vSRX

This example shows how to define code-point aliases for bits on a device.

- Requirements on page 208
- Overview on page 208

Requirements

Before you begin, determine which default mapping to use. See “Default CoS Values and Aliases” on page 204.

Overview

In this example, you configure class of service and specify names and values for the CoS code-point aliases that you want to configure. Finally, you specify CoS value using the appropriate formats.

Configuration

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To define code-point aliases for bits on a device:

1. Configure class of service.

   ```
   [edit]
   user@host# edit class-of-service
   ```

2. Specify CoS values.

   ```
   [edit class-of-service]
   user@host# set code-point-aliases dscp my1 110001
   user@host# set code-point-aliases dscp my2 101110
   user@host# set code-point-aliases dscp be 000001
   user@host# set code-point-aliases dscp cs7 110000
   ```

3. If you are done configuring the device, commit the configuration.

   ```
   [edit]
   user@host# commit
   ```

Verification

To verify the configuration is working properly, enter the **show class-of-service code-point-aliases dscp** command.

Related Documentation

- Code-Point Aliases Overview on page 203

Schedulers Overview

Supported Platforms SRX Series, vSRX

You use schedulers to define the properties of output queues. These properties include the amount of interface bandwidth assigned to the queue, the size of the memory buffer allocated for storing packets, the priority of the queue, and the random early detection (RED) drop profiles associated with the queue.

You associate the schedulers with forwarding classes by means of scheduler maps. You can then associate each scheduler map with an interface, thereby configuring the hardware queues, packet schedulers, and RED processes that operate according to this mapping.

An individual device interface has multiple queues assigned to store packets temporarily before transmission. To determine the order to service the queues, the device uses a round-robin scheduling method based on priority and the queue's weighted round-robin (WRR) credits. Junos OS schedulers allow you to define the priority, bandwidth, delay buffer size, rate control status, and RED drop profiles to be applied to a particular queue for packet transmission.

You can configure per-unit scheduling (also called logical interface scheduling) to allow multiple output queues on a logical interface and to associate an output scheduler with each queue.

NOTE: For Juniper Network devices, when configuring the *protocol parameter* in the **drop-profile-map** statement, TCP and non-TCP values are not supported; only the value *any* is supported.

This topic contains the following sections:

Transmit Rate

The transmission rate determines the traffic transmission bandwidth for each forwarding class you configure. The rate is specified in bits per second (bps). Each queue is allocated some portion of the bandwidth of the outgoing interface.

This bandwidth amount can be a fixed value, such as 1 megabit per second (Mbps), a percentage of the total available bandwidth, or the rest of the available bandwidth. You can limit the transmission bandwidth to the exact value you configure, or allow it to exceed the configured rate if additional bandwidth is available from other queues (SRX5400, SRX5600, and SRX5800 devices do not support an exact value transmit rate). This property helps ensure that each queue receives the amount of bandwidth appropriate to its level of service.

The minimum transmit rate supported on high-speed interfaces is one-ten thousandth of the speed of that interface. For example, on a Gigabit Ethernet interface with a speed of 1000 Mbps, the minimum transmit rate is 100 Kbps (1,000 Mbps x 1/10,000). You can configure transmit rates in the range 3200 bps through 160,000,000,000 bps. When the configured rate is less than the minimum transmit rate, the minimum transmit rate is used instead.

NOTE: **Interfaces with slower interface speeds, like T1, E1, or channelized T1/E1/ISDN PRI, cannot support minimum transmit rates because the minimum transmit rate supported on a device is 3,200 bps.**

Transmit rate assigns the weighted round-robin (WRR) priority values within a given priority level and not between priorities.

The transmit rate defines the transmission rate of a scheduler. The transmit rate determines the traffic bandwidth from each forwarding class you configure.

By default, queues 0 through 7 have the following percentage of transmission capacity:

- Queue 0—95 percent
- Queue 1—0 percent
- Queue 2—0 percent
- Queue 3—0 percent
- Queue 4—0 percent
- Queue 6—0 percent
- Queue 7—5 percent

To define a transmit rate, select the appropriate option:

- To specify a transmit rate, select **rate** and type an integer from 3200 to 160,000,000,000 bits per second.
- To enforce an exact transmit rate, select **rate**.
- To specify the remaining transmission capacity, select **remainder**.
- To specify a percentage of transmission capacity, select **percent** and type an integer from 1 through 100.

Optionally, you can specify the percentage of the remainder to be used for allocating the transmit rate of the scheduler on a prorated basis. If there are still points left even after allocating the remainder percentage with the transmit rate and there are no queues, then the points are allocated point by point to each queue in a round-robin method. If the remainder percentage is not specified, the remainder value will be shared equally.

Delay Buffer Size

You can configure the delay buffer size to control congestion at the output stage. A delay buffer provides packet buffer space to absorb burst traffic up to a specified duration of delay. When the buffer is full, all packets are dropped.

On Juniper Networks devices, you can configure larger delay buffers on channelized T1/E1 interfaces. Larger delay buffers help these slower interfaces to avoid congestion and packet dropping when they receive large bursts of traffic.

By default, SRX300, SRX320, SRX340, SRX345, and SRX550M device interfaces support a delay buffer time of 100,000 microseconds.

To define a delay buffer size for a scheduler, select the appropriate option:

- To enforce exact buffer size, select **Exact**.
- To specify a buffer size as a temporal value (microseconds), select **Temporal**.
- To specify buffer size as a percentage of the total buffer, select **Percent** and type an integer from 1 through 100.
- To specify buffer size as the remaining available buffer, select **Remainder**.

Optionally, you can specify the percentage of the remainder to be used for allocating the buffer size of the scheduler on a prorated basis.

By default, sizes of the delay buffer queues 0 through 7 have the following percentage of the total available buffer space:

- Queue 0—95 percent
- Queue 1—0 percent
- Queue 2—0 percent
- Queue 3—0 percent
- Queue 4—0 percent
- Queue 5—0 percent
- Queue 6—0 percent
- Queue 7—5 percent

NOTE: A large buffer size value correlates with a greater possibility of packet delays. This might not be practical for sensitive traffic such as voice or video.

NOTE: For a Juniper Networks device, if the buffer size percentage is set to zero for T1 interfaces, traffic does not pass.

Scheduling Priority

Scheduling priority determines the order in which an output interface transmits traffic from the queues, thus ensuring that queues containing important traffic are provided better access to the outgoing interface.

The queues for an interface are divided into sets based on their priority. Each set contains queues of the same priority. The device examines the sets in descending order of priority. If at least one queue in a set has a packet to transmit, the device selects that set. If multiple queues in the set have packets to transmit, the device selects a queue from the set according to the weighted round-robin (WRR) algorithm that operates within the set.

The packets in a queue are transmitted based on the configured scheduling priority, the transmit rate, and the available bandwidth.

The scheduling priority of the scheduler determines the order in which an output interface transmits traffic from the queues. You can set scheduling priority at different levels in an order of increasing priority from low to high. A high-priority queue with a high transmission rate might lock out lower-priority traffic.

To specify a scheduling priority, select one of the following levels:

- **high**—Packets in this queue have high priority.
- **low**—Packets in this queue are transmitted last.
- **medium—low**—Packets in this queue have medium-low priority.
- **medium—high**—Packets in this queue have medium-high priority.
- **strict—high**—Packets in this queue are transmitted first.

Shaping Rate

Shaping rates control the maximum rate of traffic transmitted on an interface. You can configure the shaping rate so that the interface transmits less traffic than it is physically capable of carrying.

You can configure shaping rates on logical interfaces. By default, output scheduling is not enabled on logical interfaces. Logical interface scheduling (also called per-unit scheduling) allows you to enable multiple output queues on a logical interface and associate an output scheduler and shaping rate with the queues.

By default, the logical interface bandwidth is the average of unused bandwidth for the number of logical interfaces that require default bandwidth treatment. You can specify a peak bandwidth rate in bits per second (bps), either as a complete decimal number or as a decimal number followed by the abbreviation *k* (1000), *m* (1,000,000), or *g* (1,000,000,000). The range is from 1000 through 32,000,000,000 bps.

For low-speed interfaces, the queue-limit values might become lower than the interface MTU so that traffic with large packets can no longer pass through some of the queues. If you want larger-sized packets to flow through, set the buffer-size configuration in the scheduler to a larger value. For more accuracy, the 100-ms queue-limit values are calculated based on shaping rate and not on interface rates.

The shaping rate defines the minimum bandwidth allocated to a queue. The default shaping rate is 100 percent, which is the same as no shaping at all. To define a shaping rate, select the appropriate option:

- To specify shaping rate as an absolute number of bits per second, select **rate** and type an integer from 3200 to 160,000,000,000 bits per second.
- To specify shaping rate as a percentage, select **percent** and type an integer from 0 through 100.

Related Documentation

- *Default Scheduler Settings*
- *Example: Configuring Class-of-Service Schedulers*
- *Scheduler Buffer Size Overview*
- *Example: Configuring a Large Delay Buffer on a Channelized T1 Interface*
- *Example: Configuring and Applying Scheduler Maps*
- *Transmission Scheduling Overview*

Example: Configuring Class-of-Service Schedulers

Supported Platforms SRX Series, vSRX

This example shows how to configure CoS schedulers on a device.

Requirements

Before you begin, determine the buffer size allocation method to use. See *Scheduler Buffer Size Overview*.

Overview

An individual device interface has multiple queues assigned to store packets temporarily before transmission. To determine the order in which to service the queues, the device uses a round-robin scheduling method based on priority and the queue's weighted round-robin (WRR) credits. Junos OS schedulers allow you to define the priority, bandwidth, delay buffer size, rate control status, and RED drop profiles to be applied to a particular queue for packet transmission.

You configure schedulers to assign resources, priorities, and drop profiles to output queues. By default, only queues 0 and 3 have resources assigned.

NOTE: Juniper Network devices support hierarchical schedulers, including per-unit schedulers.

In this example, you configure a best-effort scheduler called be-scheduler. You set the priority as low and the buffer size to 40. You set the be-scheduler transmit-rate remainder percentage to 40. You configure an expedited forwarding scheduler called ef-scheduler and set the priority as high and the buffer size to 10. You set the ef-scheduler transmit-rate remainder percentage to 50.

Then you configure an assured forwarding scheduler called af-scheduler and set the priority as high and buffer size to 45. You set an assured forwarding scheduler transmit rate to 45. You then configure a drop profile map for assured forwarding as low and high priority. (DiffServ can have a RED drop profile associated with assured forwarding.)

Finally, you configure a network control scheduler called nc-scheduler and set the priority as low and buffer size to 5. You set a network control scheduler transmit rate to 5.

Table 30 on page 214 shows the schedulers created in this example.

Table 30: Sample Schedulers

Scheduler	For CoS Traffic Type	Assigned Priority	Allocated Portion of Queue Buffer	Allocated Portion of Remainder (Transmit Rate)
be-scheduler	Best-effort traffic	Low	40 percent	40 percent
ef-scheduler	Expedited forwarding traffic	High	10 percent	50 percent
af-scheduler	Assured forwarding traffic	High	45 percent	—
nc-scheduler	Network control traffic	Low	5 percent	—

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from the configuration mode.

```
set class-of-service schedulers be-scheduler priority low buffer-size percent 40
set class-of-service schedulers be-scheduler transmit-rate remainder 40
set class-of-service schedulers ef-scheduler priority high buffer-size percent 10
set class-of-service schedulers ef-scheduler transmit-rate remainder 50
set class-of-service schedulers af-scheduler priority high buffer-size percent 45
set class-of-service schedulers af-scheduler transmit-rate percent 45
set class-of-service schedulers af-scheduler drop-profile-map loss-priority low protocol
  any drop-profile af-normal
set class-of-service schedulers af-scheduler drop-profile-map loss-priority high protocol
  any drop-profile af-with-PLP
set class-of-service schedulers nc-scheduler priority low buffer-size percent 5
set class-of-service schedulers nc-scheduler transmit-rate percent 5
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure CoS schedulers:

1. Configure a best-effort scheduler.

   ```
   [edit]
   user@host# edit class-of-service schedulers be-scheduler
   ```

2. Specify a best-effort scheduler priority and buffer size.

   ```
   [edit class-of-service schedulers be-scheduler]
   user@host# set priority low
   user@host# set buffer-size percent 40
   ```

3. Configure a remainder option for a best-effort scheduler transmit rate.

   ```
   [edit class-of-service schedulers be-scheduler]
   user@host# set transmit-rate remainder 40
   ```

4. Configure an expedited forwarding scheduler.

   ```
   [edit]
   user@host# edit class-of-service schedulers ef-scheduler
   ```

5. Specify an expedited forwarding scheduler priority and buffer size.

   ```
   [edit class-of-service schedulers ef-scheduler]
   user@host# set priority high
   user@host# set buffer-size percent 10
   ```

6. Configure a remainder option for an expedited forwarding scheduler transmit rate.

   ```
   [edit class-of-service schedulers ef-scheduler]
   user@host# set transmit-rate remainder 50
   ```

7. Configure an assured forwarding scheduler.

   ```
   [edit]
   user@host# edit class-of-service schedulers af-scheduler
   ```

8. Specify an assured forwarding scheduler priority and buffer size.

   ```
   [edit class-of-service schedulers af-scheduler]
   user@host# set priority high
   user@host# set buffer-size percent 45
   ```

9. Configure an assured forwarding scheduler transmit rate.

   ```
   [edit class-of-service schedulers af-scheduler]
   user@host# set transmit-rate percent 45
   ```

10. Configure a drop profile map for assured forwarding low and high priority.

    ```
    [edit class-of-service schedulers af-scheduler]
    user@host# set drop-profile-map loss-priority low protocol any drop-profile
      af-normal
    user@host# set drop-profile-map loss-priority high protocol any drop-profile
      af-with-PLP
    ```

11. Configure a network control scheduler.

```
[edit]
user@host# edit class-of-service schedulers nc-scheduler
```

12. Specify a network control scheduler priority and buffer size.

```
[edit class-of-service schedulers nc-scheduler]
user@host# set priority low
user@host# set buffer-size percent 5
```

13. Configure a network control scheduler transmit rate.

```
[edit class-of-service schedulers nc-scheduler]
user@host# set transmit-rate percent 5
```

Results From configuration mode, confirm your configuration by entering the **show class-of-service** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
  user@host# show class-of-service
  schedulers {
  be-scheduler {
  transmit-rate remainder 40;
    buffer-size percent 40;
  priority low;
  }
  ef-scheduler {
    transmit-rate remainder 50;
    buffer-size percent 10;
  priority high;
  }
  af-scheduler {
    transmit-rate percent 45;
    buffer-size percent 45;
    priority high;
      drop-profile-map loss-priority low protocol any drop-profile af-normal;
    drop-profile-map loss-priority high protocol any drop-profile af-with-PLP;
    }
    nc-scheduler {
      transmit-rate percent 5;
      buffer-size percent 5;
    priority low;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Verifying Schedulers Configuration

Purpose Verify that the schedulers are configured properly.

Action From operational mode, enter the **show class-of-service** command.

Related Documentation

- Schedulers Overview on page 208
- *Default Scheduler Settings*
- *Example: Configuring a Large Delay Buffer on a Channelized T1 Interface*
- *Example: Configuring and Applying Scheduler Maps*
- *Transmission Scheduling Overview*

Example: Configuring a Large Delay Buffer on an IRB Interface

Supported Platforms SRX1500

This example shows how to configure a large delay buffer on an IRB interface to help slower interfaces avoid congestion and packet dropping when they receive large bursts of traffic.

Requirements

Before you begin, enable the large buffer feature on the IRB interface and then configure a buffer size for each queue in the CoS scheduler. See *Scheduler Buffer Size Overview*.

Overview

On devices, you can configure large delay buffers on an irb interfaces.

In this example, you configure scheduler map to associate schedulers to a defined forwarding class **be-class**, **ef-class** , **af-class**, and **nc-class** using scheduler map **large-buf-sched-map**. You apply scheduler maps to irb interface, and define per-unit scheduler for the IRB interface.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from the configuration mode.

```
set class-of-service scheduler-maps large-buf-sched-map forwarding-class be-class
  scheduler be-scheduler
set class-of-service scheduler-maps large-buf-sched-map forwarding-class ef-class
  scheduler ef-scheduler
set class-of-service scheduler-maps large-buf-sched-map forwarding-class af-class
  scheduler af-scheduler
set class-of-service scheduler-maps large-buf-sched-map forwarding-class nc-class
  scheduler nc-scheduler
set class-of-service interfaces irb unit 0 scheduler-map large-buf-sched-map
```

set interfaces irb per-unit-scheduler

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure a large delay buffer on a channelized T1 interface:

1. Configure the scheduler map to associate schedulers with defined forwarding classes.

```
[edit class-of-service]
set scheduler-maps large-buf-sched-map forwarding-class be-class scheduler
  be-scheduler
set scheduler-maps large-buf-sched-map forwarding-class ef-class scheduler
  ef-scheduler
set scheduler-maps large-buf-sched-map forwarding-class af-class scheduler
  af-scheduler
set scheduler-maps large-buf-sched-map forwarding-class nc-class scheduler
  nc-scheduler
```

2. Apply the scheduler map to the IRB interface.

```
[edit ]
user@host# set interfaces irb unit 0 scheduler-map large-buf-sched-map
```

3. Define the per-unit scheduler for the irb interface.

```
[edit ]
user@host# set interfaces irb per-unit-scheduler
```

Results

From configuration mode, confirm your configuration by entering the **show class-of-service** and **show chassis** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
  user@host# show class-of-service
  interfaces {
  irb {
    unit 0 {
      scheduler-map large-buf-sched-map;
    }
  }
}
scheduler-maps {
  large-buf-sched-map {
    forwarding-class be-class scheduler be-scheduler;
    forwarding-class ef-class scheduler ef-scheduler;
    forwarding-class af-class scheduler af-scheduler;
    forwarding-class nc-class scheduler nc-scheduler;
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Verifying Large Delay Buffers Configuration

Purpose Verify that the large delay buffers are configured properly.

Action From configuration mode, enter the **show class-of-service interface irb** command.

`user@host>` **show class-of-service interface irb**

```
Physical interface: irb, Index: 132
Maximum usable queues: 8, Queues in use: 4Code point type: dscp
Scheduler map: <default>, Index :2
Congestion-notification: Disabled
Logical interface: irb.10, Index: 73
Object                Name                  Type                    Index
Classifier            ipprec-compatibility  ip                         13
```

Meaning The large delay buffers are configured on IRB interface as expected.

Related Documentation

- Schedulers Overview on page 208
- *Default Scheduler Settings*
- *Example: Configuring Class-of-Service Schedulers*
- *Example: Configuring and Applying Scheduler Maps*
- *Transmission Scheduling Overview*

Virtual Channels Overview

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, vSRX

You can configure virtual channels to limit traffic sent from a corporate headquarters to its branch offices. Virtual channels might be required when the headquarters site has an expected aggregate bandwidth higher than that of the individual branch offices. The headquarters router must limit the traffic sent to each branch office router to avoid oversubscribing their links. For instance, if branch 1 has a 1.5 Mbps link and the headquarters router attempts to send 6 Mbps to branch 1, all of the traffic in excess of 1.5-Mbps is dropped in the ISP network.

You configure virtual channels on a logical interface. Each virtual channel has a set of eight queues with a scheduler and an optional shaper. You can use an output firewall filter to direct traffic to a particular virtual channel. For example, a filter can direct all traffic with a destination address for branch office 1 to virtual channel 1, and all traffic with a destination address for branch office 2 to virtual channel 2.

Although a virtual channel group is assigned to a logical interface, a virtual channel is quite different from a logical interface. The only features supported on a virtual channel are queuing, packet scheduling, and accounting. Rewrite rules and routing protocols apply to the entire logical interface.

When you configure virtual channels on an interface, the virtual channel group uses the same scheduler and shaper you configure at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level. In this way, virtual channels are an extension of regular scheduling and shaping and are not independent entities.

Related Documentation

- Understanding Virtual Channels on page 220
- Example: Configuring Virtual Channels on page 221

Understanding Virtual Channels

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, vSRX

You configure a virtual channel to set up queuing, packet scheduling, and accounting rules to be applied to one or more logical interfaces. You must apply then the virtual channel to a particular logical interface.

You also create a list of virtual channels that you can assign to a virtual channel group. To define a virtual channel group that you can assign to a logical interface, include the **virtual-channel-groups** statement at the **[edit class-of-service]** hierarchy level.

The *virtual-channel-group-name* can be any name that you want. The *virtual-channel-name* must be one of the names that you define at the **[edit class-of-service virtual-channels]** hierarchy level. You can include multiple virtual channel names in a group.

The scheduler map is required. The *map-name* must be one of the scheduler maps that you configure at the **[edit class-of-service scheduler-maps]** hierarchy level. For more information, see *Example: Configuring Class-of-Service Schedulers*.

The shaping rate is optional. If you configure the shaping rate as a percentage, when the virtual channel is applied to a logical interface, the shaping rate is set to the specified percentage of the interface bandwidth. If you configure a shaper on a virtual channel, the shaper limits the maximum bandwidth transmitted by that virtual channel. Virtual channels without a shaper can use the full logical interface bandwidth. If there are multiple unshaped virtual channels, they share the available logical interface bandwidth equally.

When you apply the virtual channel group to a logical interface, a set of eight queues is created for each of the virtual channels in the group. The **scheduler-map** statement applies a scheduler to these queues. If you include the **shaping-rate** statement, a shaper is applied to the entire virtual channel.

You must configure one of the virtual channels in the group to be the default channel. Therefore, the **default** statement is required in the configuration of one virtual channel per channel group. Any traffic not explicitly directed to a particular channel is transmitted by this default virtual channel.

For the corresponding physical interface, you must also include the **per-unit-scheduler** statement at the **[edit interfaces *interface-name*]** hierarchy level as follows:

[edit interfaces *interface-name*]
per-unit-scheduler;

The **per-unit-scheduler** statement enables one set of output queues for each logical interface configured under the physical interface.

When you apply a virtual channel group to a logical interface, the software creates a set of eight queues for each of the virtual channels in the group.

If you apply a virtual channel group to multiple logical interfaces, the software creates a set of eight queues on each logical interface. The virtual channel names listed in the group are used on all the logical interfaces. We recommend specifying the scheduler and shaping rates in the virtual channel configuration in terms of percentages, rather than absolute rates. This allows you to apply the same virtual channel group to logical interfaces that have different bandwidths.

When you apply a virtual channel group to a logical interface, you cannot include the **scheduler-map** and **shaping-rate** statements at the [edit class-of-service interfaces *interface-name* unit *logical-unit-number*] hierarchy level. In other words, you can configure a scheduler map and a shaping rate on a logical interface, or you can configure virtual channels on the logical interface, but not both.

If you configure multiple logical interfaces on a single physical interface, each logical interface is guaranteed an equal fraction of the physical interface bandwidth as follows:

logical-interface-bandwidth =
physical-interface-bandwidth / number-of-logical-interfaces

If one or more logical interfaces do not completely use their allocation, the other logical interfaces share the excess bandwidth equally.

If you configure multiple virtual channels on a logical interface, they are each guaranteed an equal fraction of the logical interface bandwidth as follows:

virtual-channel-bandwidth =
logical-interface-bandwidth / number-of-virtual-channels

If you configure a shaper on a virtual channel, the shaper limits the maximum bandwidth transmitted by that virtual channel. Virtual channels without a shaper can use the full logical interface bandwidth. If there are multiple unshaped virtual channels, they share the available logical interface bandwidth equally.

Related Documentation

- Virtual Channels Overview on page 219
- Example: Configuring Virtual Channels on page 221

Example: Configuring Virtual Channels

Supported Platforms SRX1500

This example shows how to create virtual channels between a headquarters and its branch office.

Requirements

Before you begin, ensure that your headquarters and branch office have a network connection where the expected aggregate bandwidth is higher for your headquarters than for your branch office. The devices at your headquarters will then be set up to limit the traffic sent to the branch office to avoid oversubscribing the link.

Overview

In this example, you create the virtual channels as branch1–vc, branch2–vc, branch3–vc, and default-vc. You then define the virtual channel group as wan-vc-group to include the four virtual channels and assign the scheduler map as bestscheduler to each virtual channel. Three of the virtual channels are shaped to 1.5 Mbps. The fourth virtual channel is default-vc, and it is not shaped so it can use the full interface bandwidth.

Then you apply them in the firewall filter as choose-vc to the device's irb interface. The output filter on the interface sends all traffic with a destination address matching 192.168.10.0/24 to branch1-vc, and similar configurations are set for branch2-vc and branch3-vc. Traffic not matching any of the addresses goes to the default, unshaped virtual channel.

Configuration

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from the configuration mode.

```
set class-of-service virtual-channels branch1-vc
set class-of-service virtual-channels branch2-vc
set class-of-service virtual-channels branch3-vc
set class-of-service virtual-channels default-vc
set class-of-service virtual-channel-groups wan-vc-group branch1-vc scheduler-map
  bestscheduler
set class-of-service virtual-channel-groups wan-vc-group branch2-vc scheduler-map
  bestscheduler
set class-of-service virtual-channel-groups wan-vc-group branch3-vc scheduler-map
  bestscheduler
set class-of-service virtual-channel-groups wan-vc-group default-vc scheduler-map
  bestscheduler
set class-of-service virtual-channel-groups wan-vc-group default-vc default
set class-of-service virtual-channel-groups wan-vc-group branch1-vc shaping-rate
  1500000
set class-of-service virtual-channel-groups wan-vc-group branch2-vc shaping-rate
  1500000
```

```
set class-of-service virtual-channel-groups wan-vc-group branch3-vc shaping-rate
  1500000
set class-of-service interfaces t3-1/0/0 unit 0 virtual-channel-group wan-vc-group
set firewall family inet filter choose-vc term branch1 from destination-address
  192.168.10.0/24
set firewall family inet filter choose-vc term branch1 then accept
set firewall family inet filter choose-vc term branch1 then virtual-channel branch1-vc
set firewall family inet filter choose-vc term branch1 then virtual-channel branch2-vc
set firewall family inet filter choose-vc term branch1 then virtual-channel branch3-vc
set interfaces irb unit 0 family inet filter output choose-vc
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure virtual channels:

1. Define the virtual channels and the default virtual channel.

```
[edit]
user@host# edit class-of-service
user@host# set virtual-channels branch1-vc
user@host# set virtual-channels branch2-vc
user@host# set virtual-channels branch3-vc
user@host# set virtual-channels default-vc
```

2. Define the virtual channel group and assign each virtual channel a scheduler map.

```
[edit class-of-service]
user@host# set virtual-channel-groups wan-vc-group branch1-vc scheduler-map
  bestscheduler
user@host# set virtual-channel-groups wan-vc-group branch2-vc scheduler-map
  bestscheduler
user@host# set virtual-channel-groups wan-vc-group branch3-vc scheduler-map
  bestscheduler
user@host# set virtual-channel-groups wan-vc-group default-vc scheduler-map
  bestscheduler
user@host# set virtual-channel-groups wan-vc-group default-vc default
```

3. Specify a shaping rate.

```
[edit class-of-service]
user@host# set virtual-channel-groups wan-vc-group branch1-vc shaping-rate 1.5m
user@host# set virtual-channel-groups wan-vc-group branch2-vc shaping-rate
  1.5m
user@host# set virtual-channel-groups wan-vc-group branch3-vc shaping-rate
  1.5m
```

4. Apply the virtual channel group to the irb interface.

```
[edit class-of-service]
user@host# set interfaces irb unit 0 virtual-channel-group wan-vc-group
```

5. Create the firewall filter to select the traffic.

```
[edit firewall]
user@host# set family inet filter choose-vc term branch1 from destination
  192.168.10.0/24
user@host# set family inet filter choose-vc term branch1 then accept
```



```
user@host# set family inet filter choose-vc term branch1 then virtual-channel
  branch1-vc
user@host# set family inet filter choose-vc term branch1 then virtual-channel
  branch2-vc
user@host# set family inet filter choose-vc term branch1 then virtual-channel
  branch3-vc
```

6. Apply the firewall filter to output traffic.

```
[edit interfaces]
user@host# set irb unit 0 family inet filter output choose-vc
```

Results From configuration mode, confirm your configuration by entering the **show class-of-service**, **show firewall**, and **show interfaces irb** commands. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
user@host# show class-of-service
virtual-channels {
  branch1-vc;
  branch2-vc;
  branch3-vc;
  default-vc;
}
virtual-channel-groups {
  wan-vc-group {
    branch1-vc {
    scheduler-map bestscheduler;
    shaping-rate 1500000;
  }
  branch2-vc {
    scheduler-map bestscheduler;
    shaping-rate 1500000;
  }
  branch3-vc {
    scheduler-map bestscheduler;
    shaping-rate 1500000;
  }
  default-vc {
    scheduler-map bestscheduler;
    default;
  }
}
}
interfaces {
  irb {
    unit 0 {
      virtual-channel-group wan-vc-group;
    }
  }
}
[edit]
user@host# show firewall
family inet {
  filter choose-vc {
    term branch1 {
```



```
            from {
                destination-address {
                    192.168.10.0/24;
                }
            }
            then {
                virtual-channel branch3-vc;
                accept;
            }
        }
    }
}
[edit]
user@host# show interfaces irb
unit 0 {
    family inet {
        filter {
            output choose-vc;
        }
    }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Verifying Virtual Channel Configuration

Purpose Verify that the virtual channels are properly configured.

Action From configuration mode, enter the **show class-of-service**, **show firewall**, and **show interfaces irb** commands.

Related Documentation

- Virtual Channels Overview on page 219
- Understanding Virtual Channels on page 220

CHAPTER 19

Configuring Layer 2 Switching Mode Chassis Clusters

Layer 2 Ethernet Switching Capability in Chassis Cluster Mode

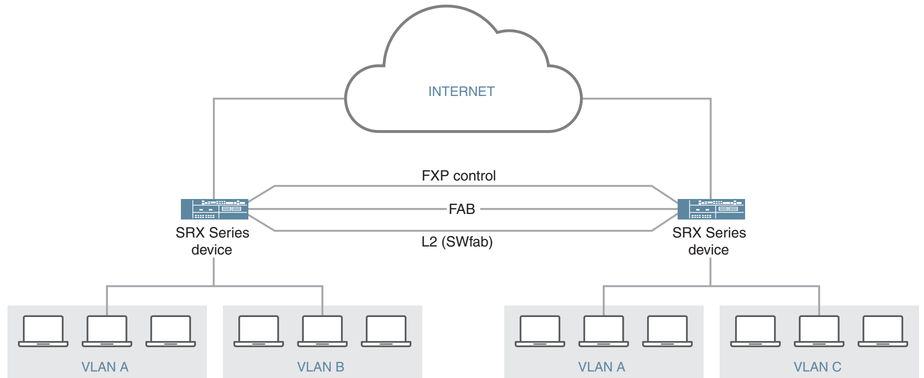
Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Understanding Layer 2 Ethernet Switching Capability in Chassis Cluster on SRX Series Devices

Ethernet ports support various Layer 2 features such as spanning-tree protocols (STPs), IEEE 802.1x, link layer discovery protocol (LLDP), Multiple VLAN Registration Protocol (MVRP), and snooping. With the extension of Layer 2 switching capability to devices in a chassis cluster, users can use Ethernet switching features on both nodes of a chassis cluster.. This feature enables you to use Ethernet switching features on both nodes of a chassis cluster. You can configure the Ethernet ports on either of the nodes for family Ethernet switching. You can also configure a Layer 2 VLAN domain with member ports from both the nodes and the Layer 2 switching protocols on both the devices.

Figure 10 on page 228 shows the Layer 2 switching across chassis cluster nodes:

Figure 10: Layer 2 Ethernet Switching Across Chassis Cluster Nodes



To ensure that Layer 2 switching works seamlessly across chassis cluster nodes, a dedicated physical link connecting the nodes is required. This type of link is called a *switching fabric interface*. Its purpose is to carry Layer 2 traffic between the nodes.

NOTE: Configuring a LAG with members across nodes is not supported.

WARNING: If a switching fabric interface is not configured on both the nodes and if you try to configure Ethernet switching-related features on the nodes, behavior of the nodes might be unpredictable.

Understanding Chassis Cluster Failover and New Primary Election

When chassis cluster failover occurs, a new primary node is elected and the Ethernet Switching Daemon (ESWD) runs in a different node. During failover, the chassis control subsystem is restarted. Also during failover, traffic outage occurs until the PICs are up and the VLAN entries are reprogrammed. After failover, all Layer 2 protocol reconverge because Layer 2 protocols states are not maintained in the secondary node.

NOTE: The Q-in-Q feature in chassis cluster mode is not supported because of chip limitation for swfab interface configuration in Broadcom chipsets.

Related Documentation

- Example: Configuring Switch Fabric Interfaces to Enable Switching in Chassis Cluster Mode (CLI) on page 229
- Example: Configuring IRB and VLAN with Members Across Two Nodes (CLI) on page 230
- Example: Configuring Aggregated Ethernet Device with LAG and LACP (CLI) on page 232

Example: Configuring Switch Fabric Interfaces to Enable Switching in Chassis Cluster Mode (CLI)

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

This example shows how to configure switching fabric interfaces to enable switching in chassis cluster mode.

Requirements

The physical link used as the switch fabric members must be directly connected. Switching-supported ports must be used for switching fabric interfaces interfaces.

Before you begin, read through the following example to understand the configuration of chassis cluster fabric:

- *Example: Configuring the Chassis Cluster Fabric Interfaces*

Overview

New pseudointerfaces swfab0 and swfab1 will be created for Layer 2 fabric functionality. You also configure dedicated Ethernet ports on each side of the node to be associated with the swfab interfaces.

Configuration

Step-by-Step Procedure

To configure swfab interfaces:

1. Configure swfab0 and swfab1 and associate these switch fabric interfaces to enable switching across the nodes. Note that swfab0 corresponds to node 0 and swfab1 corresponds to node 1.

   ```
   {primary:node0} [edit]
   user@host# set interfaces swfab0 fabric-options member-interfaces ge-0/0/6
   user@host# set interfaces swfab0 fabric-options member-interfaces ge-0/0/7
   user@host# set interfaces swfab1 fabric-options member-interfaces ge-5/0/6
   user@host# set interfaces swfab1 fabric-options member-interfaces ge-5/0/7
   ```

2. If you are done configuring the device, commit the configuration.

   ```
   {primary:node0} [edit]
   user@host# commit
   ```

Verification

Purpose Verify that you are able to configure multiple ports as members of switching fabric ports.

Action From configuration mode, enter the **show interfaces swfab0** command to view the configured interfaces for each port.

```
user@host# show interfaces swfab0
fabric-options{
 member-interfaces {
   ge-0/0/6;
   ge-0/0/7;
}
}
```

From the configuration mode, enter the **show chassis cluster ethernet-switching interfaces** command to view the appropriate member interfaces.

```
user@host# show chassis cluster ethernet-switching interfaces
swfab0:
    Name               Status
    ge-0/0/6             up
    ge-0/0/7      up
  swfab1:
    Name               Status
    ge-5/0/6             up
  ge-5/0/7      up
```

Related Documentation

- *SRX Series Chassis Cluster Configuration Overview*

Example: Configuring IRB and VLAN with Members Across Two Nodes (CLI)

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Requirements

No special configuration beyond device initialization is required before configuring this feature.

Overview

This example shows configuration of IRB and configuration of VLAN with members across node 0 and node 1.

Configuration

Step-by-Step Procedure To configure VLAN, perform Step 1 through Step 4 and then commit the configuration. To configure IRB, perform Step 1 through Step 8.

1. Configure Ethernet switching on the node0 interface.

   {primary:node0} [edit]

user@host# **set interfaces ge-2/0/0 unit 0 family ethernet-switching interface-mode trunk**

2. Configure Ethernet switching on the node1 interface.

   {primary:node0} [edit]
   user@host# **set interfaces ge-11/0/0 unit 0 family ethernet-switching interface-mode trunk**

3. Create VLAN vlan10 with vlan-id 10.

   {primary:node0} [edit]
   user@host# **set vlans vlan10 vlan-id 10**

4. Add interfaces from both nodes to the VLAN.

   {primary:node0} [edit]
   user@host# **set interface ge-2/0/0 unit 0 family ethernet-switching vlan members vlan10**
   user@host# **set interface ge-11/0/0 unit 0 family ethernet-switching vlan members vlan10**

5. Create an IRB logical interface.

   user@host# **set interface irb unit 0 family inet address 192.0.2.0.222**

6. 6. Associate a IRB interface with the VLAN.

   user@host# **set vlans vlan10 l3-interface irb.10**

7. Check the configuration by entering the **show vlans** and **show interfaces** commands.

```
user@host# show vlans
vlan10 {
    vlan-id 10;
    interface {
        ge-2/0/0.0;
        ge-11/0/0.0;
    }
    l3-interface irb.10;
}
```

```
user@host# show interfaces
ge-2/0/0 {
    unit 0 {
        family ethernet-switching;
    }
}
ge-11/0/0 {
    unit 0 {
        family ethernet-switching;
    }
}
vlan {
    unit 10 {
        family inet {
            address 192.0.2.0.222;
        }
    }
}
```

8. If you are done configuring the device, commit the configuration.

   [edit]

user@host# **commit**

Verification

Verifying VLAN and IRB

Purpose Verify that the configurations of VLAN and IRB are working properly.

Action From configuration mode, enter the **show interfaces terse ge-2/0/0** command to view the node 0 interface.

```
user@host# run show interfaces terse ge-2/0/0
Interface               Admin Link Proto    Local                 Remote
ge-2/0/0                up    up
ge-2/0/0.0              up    up   eth-switch
```

From configuration mode, enter the **show interfaces terse ge-11/0/0** command to view the node 1 interface.

```
user@host# run show interfaces terse ge-11/0/0
Interface               Admin Link Proto    Local                 Remote
ge-11/0/0               up    up
ge-11/0/0.0             up    up   eth-switch
```

From configuration mode, enter the **show vlans** command to view the VLAN interface.

```
user@host# run show vlans
Name           Tag     Interfaces
default         1      None
vlan10          10     ge-2/0/0.0*, ge-11/0/0.0*
```

Meaning The output shows the VLAN and IRB are configured and working fine.

Related Documentation

- *SRX Series Chassis Cluster Configuration Overview*

Example: Configuring Aggregated Ethernet Device with LAG and LACP (CLI)

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M, vSRX

Requirements

No special configuration beyond device initialization is required before configuring this feature.

Overview

This example shows the configuration of aggregated Ethernet (ae) devices with LAG and LACP.

Configuration

Step-by-Step Procedure

To configure LAG:

1. Configure the number of aggregated Ethernet interfaces with LAG interface that you need to create. Set the device-count option to 5.

   [edit]
   user@host# **set chassis aggregated-devices ethernet device-count 5**

2. Add a port to the aggregated Ethernet interface with LAG.

   [edit]
   user@host# **set interfaces ge-2/0/1 ether-options 802.3ad ae0**
   user@host# **set interfaces ge-2/0/2 ether-options 802.3ad ae0**

3. Configure LACP for the aggregated Ethernet interface with LAG.

   [edit]
   user@host# **set interfaces ae0 aggregated-ether-options lacp active**

4. Configure family Ethernet switching for the aggregated Ethernet interface with LAG.

   [edit]
   user@host# **set interfaces ae0 unit 0 family ethernet-switching**

5. Configure the VLAN vlan20 with VLAN ID 20.

   [edit]
   user@host# **set vlans vlan20 vlan-id 20**

6. Add the aggregated Ethernet interface to the VLAN.

   [edit]
   user@host# **set vlans vlan20 interface ae0**

7. Check the configuration by entering the **show vlans** and **show interfaces** commands

```
user@host# show vlans
vlan20 {
    vlan-id 20;
    interface {
        ae0.0;
    }
}
```

```
user@host# show interfaces
ge-2/0/1 {
    ether-options {
        802.3ad ae0;
    }
}
ge-2/0/2 {
    ether-options {
        802.3ad ae0;
    }
}
ae0 {
    aggregated-ether-options {
        lacp {
            active;
        }
    }
```



```
        unit 0 {
            family ethernet-switching;
        }
    }
```

8. If you are done configuring the device, commit the configuration.

   [edit]
   user@host# **commit**

NOTE: Likewise, you can configure other devices with LAG and LACP.

Verification

Verifying Aggregated Ethernet Interface with LAG and LACP

Purpose Verify that you can configure aggregated Ethernet interfaces with LAG and LACP.

Action From configuration mode, enter the **show lacp interfaces** to view the LACP interfaces.

```
user@host# run show lacp interfaces
Aggregated interface: ae0
    LACP state:       Role   Exp   Def  Dist  Col  Syn  Aggr  Timeout  Activity
      ge-2/0/1      Actor    No    No   Yes  Yes  Yes   Yes     Fast    Active
      ge-2/0/1    Partner    No    No   Yes  Yes  Yes   Yes     Fast    Active
      ge-2/0/2      Actor    No    No   Yes  Yes  Yes   Yes     Fast    Active
      ge-2/0/2    Partner    No    No   Yes  Yes  Yes   Yes     Fast    Active
    LACP protocol:        Receive State  Transmit State          Mux State
      ge-2/0/1                  Current   Fast periodic Collecting distributing
      ge-2/0/2                  Current   Fast periodic Collecting distributing
```

From configuration mode, enter the **show vlans** command to view the VLAN interfaces.

```
user@host# run show vlans
Name           Tag     Interfaces
default         1      None
vlan20          20     ae0.0
```

From configuration mode, enter the **show interfaces (interface name)** command to view the status of the ge-2/0/1 and ge-2/0/2 interfaces.

```
user@host# run show interfaces ge-2/0/1 terse
Interface               Admin Link Proto    Local                 Remote
ge-2/0/1                up    up
ge-2/0/1.0              up    up   aenet    --> ae0.0
```

```
user@host# run show interfaces ge-2/0/2 terse
Interface               Admin Link Proto    Local                 Remote
ge-2/0/2                up    up
ge-2/0/2.0              up    up   aenet    --> ae0.0
```

Meaning The output shows the aggregated Ethernet Interface with LAG and LACP is configured.

Related Documentation

- *SRX Series Chassis Cluster Configuration Overview*

CHAPTER 20

Configuring Port Security

Port Security Overview

Supported Platforms SRX Series

Ethernet LANs are vulnerable to attacks such as address spoofing (forging) and Layer 2 denial of service (DoS) attacks on network devices. Port security features help protect the access ports on your services gateway against the losses of information and productivity that can result from such attacks.

Junos OS on SRX Series devices provides features to help secure ports on a switching port on the services gateway. The ports can be categorized as either trusted or untrusted. You apply policies appropriate to those categories to protect against various types of attacks.

The MAC limit port security feature can be turned on to obtain the most robust port security level. Basic port security features are enabled in the services gateway's default configuration. You can configure additional features with minimal configuration steps.

Related Documentation

- Ethernet Ports Switching Overview on page 100
- Understanding MAC Limiting on page 235

- *Verifying Switching Mode Configuration*

Understanding MAC Limiting

Supported Platforms SRX Series

MAC limiting protects against flooding of the Ethernet switching table (also known as the MAC forwarding table or Layer 2 forwarding table). You enable this feature on interfaces (ports).

MAC limiting sets a limit on the number of MAC addresses that can be learned dynamically on a single Layer 2 access interface or on all the Layer 2 access interfaces on the services gateway.

You configure the maximum number of dynamic MAC addresses allowed per interface. When the limit is exceeded, incoming packets with new MAC addresses are treated as specified by the configuration.

You can choose to have one of the following actions performed when the MAC addresses limit is exceeded:

NOTE: Starting in Junos OS Release 15.1X49-D40, the **log**, **none**, and **shutdown** actions are not supported.

- **drop**—Drop the packet and generate an alarm, an SNMP trap, or a system log entry. This is the default.
- **log**—Do not drop the packet but generate an alarm, an SNMP trap, or a system log entry.
- **none**—Take no action.
- **shutdown**—Disable the interface and generate an alarm. If you have configured the services gateway with the **port-error-disable** statement, the disabled interface recovers automatically upon expiration of the specified disable timeout. If you have not configured the services gateway for autorecovery from port error disabled conditions, you can bring up the disabled interfaces with running the **clear ethernet-switching recovery-timeout** command.

NOTE: MAC limit is applied only to new MAC learning requests. If you already have 10 learned MAC addresses and you configure the limit as 5, all the MACs will remain in the forwarding database (FDB) table. When the learned MAC addresses age out (or are cleared by the user with the clear ethernet-switching command), they are not relearned.

MAC limiting does not apply to static MAC addresses. Users can configure any number of static MAC addresses independent of MAC limiting and all of them are added to FDB.

Release History Table

Release	Description
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, the **log**, **none**, and **shutdown** actions are not supported.

Related Documentation

- Example: Configuring MAC Limiting on page 237
- Port Security Overview on page 235

- Ethernet Ports Switching Overview on page 100
- *Verifying Switching Mode Configuration*

Example: Configuring MAC Limiting

Supported Platforms SRX Series

This example shows how to configure port security features by setting a MAC limit of 5.

Requirements

Before you begin, verify that the interfaces that will be used are in switch mode. See "Example: Configuring Switching Modes" on page 106 and "Understanding Switching Modes" on page 99.

Overview

MAC limiting protects against flooding of the Ethernet switching table on the SRX Series Services Gateways. MAC limiting sets a limit on the number of MAC addresses that can be learned on a single Layer 2 access interface (port).

This example shows how to configure port security features by setting a MAC limit of 5.

CLI Quick Configuration

To quickly configure this example, copy the following command, paste it into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the command into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
[edit]
set switch-options interface ge-0/0/1 interface-mac-limit 5
set interface ge–0/0/2 ether-options source-address-filter 00:00:5E:00:AA
set interface ge–0/0/2 ether-options source-address-filter 00:00:5E:00:AB
set interface ge–0/0/2 ether-options source-address-filter 00:00:5E:00:AC
```


Configuration

Step-by-Step Procedure

The action is not specified, so the device performs the default action **drop** if the limit is exceeded:

NOTE: Do not set the mac-limit to 1. The first learned MAC address is often inserted into the FDB automatically (for example, for routed VLAN interfaces the first MAC address inserted into the forwarding database is the MAC address of the RVI; for Aggregated Ethernet bundles using LACP, the first MAC address inserted into the FDB in the forwarding table is the source address of the protocol packet). The services gateway will therefore not learn MAC addresses other than the automatic addresses when the mac-limit is set to 1, and this will cause problems with MAC learning and forwarding.

1. On a single interface (here, the interface is ge-0/0/1):

   [edit switch-options]
   user@host# **set switch-options interface ge-0/0/1 interface-mac-limit 5**

2. For specifying specific MAC addresses:

   - On a single interface (here, the interface is ge-0/0/2):

     [edit interfaces ether-options source-address-filter]
     user@host# **set interface ge–0/0/2 ether-options source-address-filter 00:00:5E:00:AA**
     user@host# **set interface ge–0/0/2 ether-options source-address-filter 00:00:5E:00:AB**
     user@host# **set interface ge–0/0/2 ether-options source-address-filter 00:00:5E:00:AC**

3. Enter **commit** from configuration mode.

Verification

Verifying That MAC Limiting Is Working Correctly on the Services Gateway

Purpose Verify that MAC limiting is working on the services gateway.

Action Display the learned MAC addresses. The following sample output shows the results when two packets were sent from hosts on ge-0/0/1 and five packets requests were sent from hosts on ge-0/0/2, with both interfaces set to a MAC limit of 4 with the action drop:

```
user@host> show ethernet-switching table
Ethernet-switching table: 7 entries, 6 learned
VLAN MAC address Type Age Interfaces
employee-vlan * Flood - ge-0/0/2.0
employee-vlan 00:00:5E:00:00 Learn 0 ge-0/0/1.0
employee-vlan 00:00:5E:00:AA Learn 0 ge-0/0/1.0
employee-vlan 00:00:5E:00:AB Learn 0 ge-0/0/2.0
employee-vlan 00:00:5E:00:AC Learn 0 ge-0/0/2.0
employee-vlan 00:00:5E:00:AD Learn 0 ge-0/0/2.0
employee-vlan 00:00:5E:00:AE Learn 0 ge-0/0/2.0
```

Meaning The sample output shows that with a MAC limit of 4 for each interface, the packet for a fifth MAC address on ge-0/0/2 was dropped because it exceeded the MAC limit. The address was not learned, and thus an asterisk (*) rather than an address appears in the MAC address column in the first line of the sample output.

Related Documentation

- Understanding MAC Limiting on page 235
- Ethernet Ports Switching Overview on page 100
- *Verifying Switching Mode Configuration*

Configuring Autorecovery From the Disabled State on Secure Interfaces (CLI Procedure)

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

An Ethernet switching access interface on a SRX Series device might shut down or be disabled as a result of one of the following port-security configurations:

- MAC limiting—**mac-limit** statement is configured with action **shutdown**.

You can configure the device to automatically restore the disabled interfaces to service after a specified period of time. Autorecovery applies to all the interfaces that have been disabled due to MAC limiting errors.

NOTE: You must specify the disable timeout value for the interfaces to recover automatically. There is no default disable timeout. If you do not specify a timeout value, you need to use the **clear ethernet-switching recovery-timeout** command to clear the errors and restore the interfaces or the specified interface to service.

To configure autorecovery from the disabled state due to MAC limiting shutdown actions:

```
[edit interfaces]
user@host# set interfaces ge-0/0/1 unit 0 family ethernet-switching recovery-timeout 60
```

Related Documentation

- Understanding MAC Limiting on page 235
- Example: Configuring MAC Limiting on page 237
- **clear ethernet-switching recovery-timeout on page 336**

CHAPTER 21

Configuring Ethernet OAM Connectivity Fault Management

Understanding Ethernet OAM Connectivity Fault Management

Supported Platforms SRX Series

NOTE: Starting in Junos OS Release 15.1X49-D80, Ethernet OAM connectivity fault management is supported on SRX1500 devices.

NOTE: Starting in Junos OS Release 15.1X49-D75, Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.

NOTE: Starting in Junos OS Release 15.1X49-D40, Ethernet OAM connectivity fault management is not supported.

Ethernet interfaces on SRX300, SRX320, SRX340, SRX345, and SRX550M devices support the IEEE 802.1ag standard for Operation, Administration, and Management (OAM). The 802.1ag is an IEEE standard for connectivity fault management (CFM). The IEEE 802.1ag provides a specification for Ethernet CFM. The Ethernet network can consist of one or more service instances. A service instance could be a VLAN or a concatenation of VLANs. The goal of CFM is to provide a mechanism to monitor, locate, and isolate faulty links.

NOTE: **Support for the IEEE 802.1ag standard for OAM on SRX Series devices depends on the Junos OS release running on the device.**

CFM support includes the following features:

- Fault monitoring using the Continuity Check Protocol. This is a neighbor discovery and health check protocol that discovers and maintains adjacencies at the VLAN or link level.
- Path discovery and fault verification using the Link Trace protocol.
- Fault isolation using the Loopback protocol.

  The Loopback protocol is used to check access to maintenance association end points (MEPs) under the same maintenance association (MA). The Loopback messages are triggered by an administrator using the **ping ethernet** command.

NOTE: **Virtual private LAN service (VPLS) is not supported on SRX100, SRX110, SRX210, SRX220, SRX240, SRX300, SRX320, SRX340, SRX345, SRX550M, SRX650, SRX1400, and SRX1500 devices.**

CFM partitions the service network into various administrative domains. For example, operators, providers, and customers might be part of different administrative domains. Each administrative domain is mapped into one maintenance domain providing enough information to perform its own management, thus avoiding security breaches and making end-to-end monitoring possible.

In a CFM maintenance domain, each service instance is called a maintenance association. A maintenance association can be thought of as a full mesh of maintenance association end points (MEPs) having similar characteristics. MEPs are active CFM entities generating and responding to CFM protocol messages. There is also a maintenance association intermediate point (MIP), which is a CFM entity similar to the MEP, but more passive (MIPs only respond to CFM messages).

Each maintenance domain is associated with a maintenance domain level from 0 through 7. Level allocation is based on the network hierarchy, where outer domains are assigned a higher level than the inner domains. You configure customer end points to have the highest maintenance domain level. The maintenance domain level is a mandatory parameter that indicates the nesting relationships between various maintenance domains. The level is embedded in each CFM frame. CFM messages within a given level are processed by MEPs at that same level.

To enable CFM on an Ethernet interface, you must configure maintenance domains, maintenance associations, and MEPs.

NOTE:

- You cannot configure MEP and MIP on the same VLAN.
- CFM and link fault management (LFM) can be configured on the same interface.
- You cannot configure CFM with Generic VLAN Registration Protocol (GVRP).
- CFM is not supported on VOIP VLAN ports.
- On SRX240, SRX550M, and SRX650 devices, the default Loopback message (LBM) packet size is 113 bytes.
- Lower level CFM frames are forwarded by a higher level down MEP.
- On SRX300, SRX320, SRX340, SRX345, and SRX550M devices, CFM is not supported on the 2-Port 10-Gigabit Ethernet XPIM interface.

Starting in Junos OS Release 15.1X49-D75, the following are the limitations on SRX320, SRX340, SRX345, and SRX550M devices when configuring Ethernet connectivity fault management (CFM) over very-high-bit-rate digital subscriber line (VDSL) or Layer 3 Interface:

- CFM Action Profiles are not supported on the Point-to-Point Protocol over Ethernet (PPPoE) logical interface.
- Synthetic loss measurement on demand is supported. Proactive synthetic loss measurement is not supported.
- When CFM over PPPOE is implemented, CFM should be applied on PPPoE logical interface and not on underlying interface.
- CFM over VDSL can be implemented as Maintenance Endpoint (MEP) and not as Maintenance Intermediate Point (MIP).
- CFM Higher level Pass-through over VDSL or Gigabit Ethernet interface in Layer 3 interface mode is not supported.
- For vlan tagged VDSL interface, CFM should always be applied on respective logical interface and not over physical interface.
- When CFM is enabled on VDSL, CFM packets are dropped randomly causing CFM sessions to flap based on timer when transit traffic exceeds line rate because VDSL mPIM cannot differentiate and prioritize CFM packets

Release History Table

Release	Description
15.1X49-D80	Starting in Junos OS Release 15.1X49-D80, Ethernet OAM connectivity fault management is supported on SRX1500 devices.
15.1X49-D75	Starting in Junos OS Release 15.1X49-D75, Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, Ethernet OAM connectivity fault management is not supported.

Related Documentation

- Example: Configuring Ethernet OAM Connectivity Fault Management on page 244

Example: Configuring Ethernet OAM Connectivity Fault Management

Supported Platforms SRX Series

NOTE: Starting in Junos OS Release 15.1X49-D80, Ethernet OAM connectivity fault management is supported on SRX1500 devices.

NOTE: Starting in Junos OS Release 15.1X49-D75, Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.

NOTE: Starting in Junos OS Release 15.1X49-D40, Ethernet OAM connectivity fault management is not supported.

Connectivity Fault Management (CFM) provides a mechanism to monitor, locate, and isolate faulty links.

This example describes how to enable and configure an end-to-end OAM CFM session on an Ethernet interface.

Requirements

This example uses the following hardware and software components:

- Three SRX Series devices connected by a point-to-point Ethernet link.

- Junos OS Release 12.1X44-D10 or later for SRX Series devices.

Overview

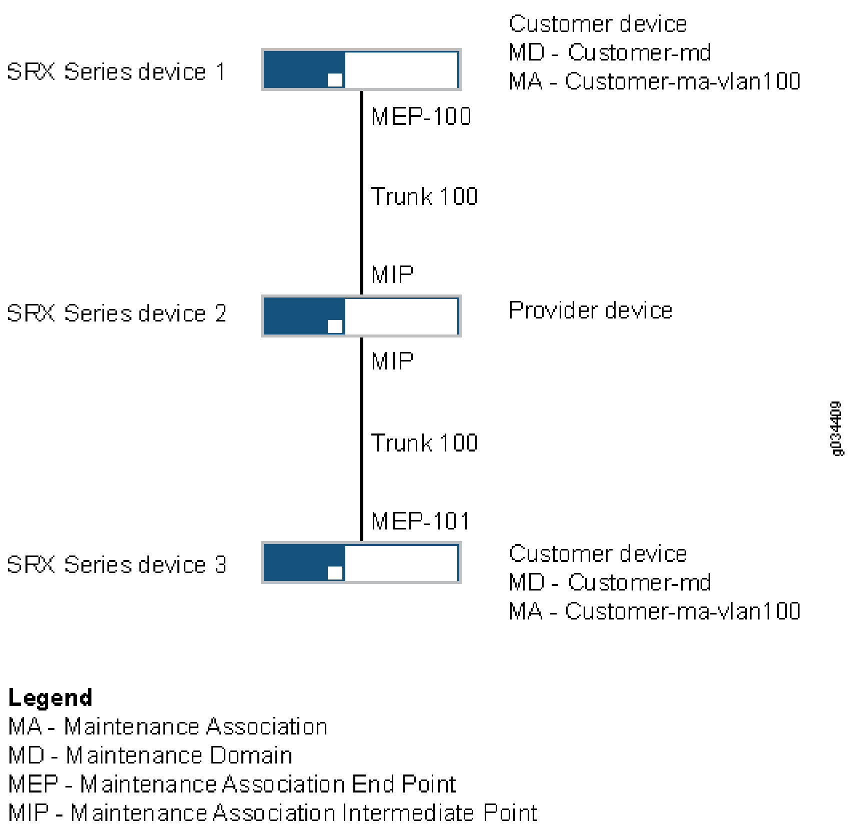
Ethernet interfaces on SRX Series devices support the IEEE 802.1ag standard for Operation, Administration, and Management (OAM). The IEEE 802.1ag specification provides a specification for Ethernet connectivity fault management (CFM). CFM can be used to detect faults in the network path between the customer premises devices. It also helps in detecting the device or node in the provider network, where the failure occurred.

This example describes how to configure an end to end CFM session. In this example, three devices are connected by a point-to-point Ethernet link. The link between these devices is monitored using CFM. To check connectivity or fault through the provider network, maintenance intermediate point (MIP) is configured.

Topology

Figure 11 on page 245 shows three SRX Series devices connected by a point-to-point Ethernet link.

Figure 11: Ethernet CFM with SRX Series Devices



Configuring Ethernet OAM Connectivity Fault Management

Configuring Ethernet OAM Connectivity Fault Management on Device 1

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/4 unit 0 family ethernet-switching interface-mode trunk
set interfaces ge-0/0/4 unit 0 family ethernet-switching vlan members v100
set vlans v100 vlan-id 100
set protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md level 5
set protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md maintenance-association Customer-ma mep 100 interface ge-0/0/4.0
set protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md maintenance-association Customer-ma mep 100 interface vlan 100
set protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md maintenance-association Customer-ma mep 100 auto-discovery
set protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md maintenance-association Customer-ma continuity-check interval 10s
set protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md maintenance-association Customer-ma continuity-check hold-interval
  20
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To enable and configure OAM CFM on device 1:

1. Define a VLAN and enable the interface for family Ethernet switching with interface mode trunk or access.

   ```
   [edit]
   user@host# set interfaces ge-0/0/4 unit 0 family ethernet-switching interface-mode
     trunk
   user@host# set interfaces ge-0/0/4 unit 0 family ethernet-switching vlan members
     v100
   user@host# set vlans v100 vlan-id 100
   ```

2. Specify the maintenance domain name and the maintenance domain level.

   ```
   [edit protocols oam ethernet connectivity-fault-management ]
   user@host# set maintenance-domain Customer-md level 5
   ```

3. Create a maintenance association and configure MEP.

   ```
   [edit protocols oam ethernet connectivity-fault-management maintenance-domain
     Customer-md]
   ```



```
user@host# set maintenance-association Customer-ma mep 100 interface
  ge-0/0/4.0
user@host# set maintenance-association Customer-ma mep 100 interface vlan
  100
```

4. Enable MEP automatic discovery.

```
[edit protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md maintenance-association Customer-ma]
user@host# set mep 100 auto-discovery
```

5. Enable the Continuity Check Protocol and specify the continuity check interval and hold interval.

```
[edit protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md maintenance-association Customer-ma]
user@host# set continuity-check interval 10s
user@host# set continuity-check hold-interval 20
```

Results From configuration mode, confirm your configuration by entering the **show protocols** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

For brevity, this **show protocols** command output includes only the configuration that is relevant to this example. Any other configuration on the system has been replaced with ellipses (...).

```
[edit]
user@host# show protocols
oam {
  ethernet {
    connectivity-fault-management {
      maintenance-domain Customer-md {
        level 5;
        maintenance-association Customer-ma {
          continuity-check {
            interval 10s;
            hold-interval 20;
          }
          mep 100 {
            interface ge-0/0/4.0 vlan 100;
            auto-discovery;
          }
        }
      }
    }
  }
}
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Ethernet OAM CFM with MIP Half Function on Device 2

CLI Quick Configuration To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/1 unit 0 family ethernet-switching interface-mode trunk
set interfaces ge-0/0/1 unit 0 family ethernet-switching vlan members v100
set interfaces ge-0/0/4 unit 0 family ethernet-switching interface-mode trunk
set interfaces ge-0/0/4 unit 0 family ethernet-switching vlan members v100
set vlans v100 vlan-id 100
set protocols oam ethernet connectivity-fault-management maintenance-domain
  default-5 v100
set protocols oam ethernet connectivity-fault-management maintenance-domain
  default-5 mip-half-function default
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To configure MIP half function:

1. Define a VLAN and enable the interface for family Ethernet switching with interface mode trunk or access.

   ```
   [edit]
   user@host# set interfaces ge-0/0/1 unit 0 family ethernet-switching interface-mode
     trunk
   user@host# set interfaces ge-0/0/1 unit 0 family ethernet-switching vlan members
     v100
   user@host# set interfaces ge-0/0/4 unit 0 family ethernet-switching interface-mode
     trunk
   user@host# set interfaces ge-0/0/4 unit 0 family ethernet-switching vlan members
     v100
   user@host# set vlans v100 vlan-id 100
   ```

2. Create a maintenance domain and configure VLAN.

   ```
   [edit protocols oam ethernet connectivity-fault-management]
   user@host# set maintenance-domain default-5 v100
   ```

3. Create a MIP half function.

   ```
   [edit protocols oam ethernet connectivity-fault-management ]
   user@host# set maintenance-domain default-5 mip-half-function default
   ```

NOTE: If you want to configure traceoptions, run the following commands:

```
set protocols oam ethernet connectivity-fault-management traceoptions
  file CFM_trace
set protocols oam ethernet connectivity-fault-management traceoptions
  flag all
```

Results

From configuration mode, confirm your configuration by entering the **show protocols** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

For brevity, this **show** command output includes only the configuration that is relevant to this example. Any other configuration on the system has been replaced with ellipses (...).

```
[edit]
user@host# show protocols
  oam {
    ethernet {
      connectivity-fault-management {
        traceoptions {
          file CFM_trace;
          flag all;
        }
        maintenance-domain default-5 {
          v100;
          mip-half-function default;
        }
      }
    }
  }
```

If you are done configuring the device, enter **commit** from configuration mode.

Configuring Ethernet OAM Connectivity Fault Management on Device 3

CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the commands into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set interfaces ge-0/0/1 unit 0 family ethernet-switching interface-mode trunk
set interfaces ge-0/0/1 unit 0 family ethernet-switching vlan members v100
set vlans v100 vlan-id 100
set protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md level 5
set protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md maintenance-association Customer-ma mep 101 interface ge-0/0/1.0
set protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md maintenance-association Customer-ma mep 101 interface vlan 100
set protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md maintenance-association Customer-ma mep 101 auto-discovery
set protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md maintenance-association Customer-ma continuity-check hold-interval
  20
set protocols oam ethernet connectivity-fault-management maintenance-domain
  Customer-md maintenance-association Customer-ma continuity-check interval 10s
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the *CLI User Guide*.

To enable and configure OAM CFM on Device 3:

1. Define a VLAN and enable the interface for family Ethernet switching with interface mode trunk or access.

   ```
   [edit]
   user@host# set interfaces ge-0/0/1 unit 0 family ethernet-switching interface-mode trunk
   user@host# set interfaces ge-0/0/1 unit 0 family ethernet-switching vlan members v100
   user@host# set vlans v100 vlan-id 100
   ```

2. Specify the maintenance domain name and the maintenance domain level.

   ```
   [edit protocols oam ethernet connectivity-fault-management ]
   user@host# set maintenance-domain Customer-md level 5
   ```

3. Create a maintenance association and configure MEP.

   ```
   [edit protocols oam ethernet connectivity-fault-management maintenance-domain Customer-md]
   user@host# set maintenance-association Customer-ma mep 101 interface ge-0/0/1.0
   user@host# set maintenance-association Customer-ma mep 101 interface vlan 100
   ```

4. Enable MEP automatic discovery.

   ```
   [edit protocols oam ethernet connectivity-fault-management maintenance-domain Customer-md]
   user@host# set maintenance-association Customer-ma mep 101 auto-discovery
   ```

5. Enable the Continuity Check Protocol and specify the continuity check interval and hold interval.

   ```
   [edit protocols oam ethernet connectivity-fault-management maintenance-domain Customer-md maintenance-association Customer-ma]
   user@host# set continuity-check interval 10s
   user@host# set continuity-check hold-interval 20
   ```

Results

From configuration mode, confirm your configuration by entering the **show protocols** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

For brevity, this **show** command output includes only the configuration that is relevant to this example. Any other configuration on the system has been replaced with ellipses (...).

```
[edit]
user@host# show protocols
  oam {
    ethernet {
      connectivity-fault-management {
        maintenance-domain Customer-md {
          level 5;
```

```
            maintenance-association Customer-ma {
              continuity-check {
                interval 10s;
                hold-interval 20;
              }
              mep 101 {
                interface ge-0/0/1.0 vlan 100;
                auto-discovery;
              }
            }
          }
        }
      }
    }
```

If you are done configuring the device, enter **commit** from configuration mode.

Verification

Confirm that the configuration is working properly.

Verifying the OAM CFM Configuration on Device 1

Purpose Verify that OAM CFM has been configured properly.

Action From operational mode, enter the following commands:

- **show oam ethernet connectivity-fault-management adjacencies** to display connectivity-fault-management adjacencies.
- **show oam ethernet connectivity-fault-management interfaces** to display the Ethernet OAM information for the specified interface.

These commands produce the following sample output:

```
user@host# show oam ethernet connectivity-fault-management adjacencies
Mep-id   Interface        State           Timer to Expire
          101     ge-0/0/4.0        ok                29

user@host# show oam ethernet connectivity-fault-management interfaces
Interface        Link      Status       Level  MEP        Neighbours
                                                Identifier
       ge-0/0/4.0         Up        Active       5      100         1

user@host# show oam ethernet connectivity-fault-management interfaces detail
Interface name: ge-0/0/4.0, vlan 100, Interface status: Active, Link status: Up
  Maintenance domain name: Customer-md, Format: string, Level: 5
    Maintenance association name: Customer-ma, Format: string
```



```
Continuity-check status: enabled, Interval: 10s
MEP identifier: 100, Direction: down, MAC address: 2c:6b:f5:62:29:84
MEP status: running
Defects:
  Remote MEP not receiving CCM                  : no
  Erroneous CCM received                        : no
  Cross-connect CCM received                    : no
  RDI sent by some MEP                          : no
Statistics:
  CCMs sent                                     : 7
  CCMs received out of sequence                 : 0
  LBMs sent                                     : 0
  Valid in-order LBRs received                  : 0
  Valid out-of-order LBRs received              : 0
  LBRs received with corrupted data             : 0
  LBRs sent                                     : 0
  LTMs sent                                     : 0
  LTMs received                                 : 0
  LTRs sent                                     : 0
  LTRs received                                 : 0
  Sequence number of next LTM request           : 0
  1DMs sent                                     : 0
  Valid 1DMs received                           : 0
  Invalid 1DMs received                         : 0
  DMMs sent                                     : 0
  DMRs sent                                     : 0
  Valid DMRs received                           : 0
  Invalid DMRs received                         : 0
Remote MEP count: 1
  Identifier     MAC address        State    Interface
    101      80:71:1f:ad:53:81       ok    ge-0/0/4.0
```

Meaning

- If the **show oam ethernet connectivity-fault-management interfaces detail** command output displays continuity-check status as **enabled** and displays details of the remote MEP, it means that connectivity fault management (CFM) was configured properly.
- If the **show oam ethernet connectivity-fault-management adjacencies** command output displays the state as **ok**, it indicates that the Continuity Check Protocol is up.

Verifying the OAM CFM Configuration with MIP Half Function on Device 2

Purpose Verify that OAM CFM has been configured properly.

Action From operational mode, run the **show oam ethernet connectivity-fault-management mip** command.

```
user@host# show oam ethernet connectivity-fault-management mip vlan 100
default maintenance-domain mhf    : default

  Interface       Level
  ge-0/0/1.0          5
  ge-0/0/4.0          5
```

Meaning The **show oam ethernet connectivity-fault-management mip** command output displays the MIP information.

Verifying the OAM CFM Configuration on Device 3

Purpose Verify that OAM CFM has been configured properly.

Action From operational mode, enter the following commands:

- **show oam ethernet connectivity-fault-management adjacencies** to display connectivity-fault-management adjacencies.
- **show oam ethernet connectivity-fault-management interfaces** to display the Ethernet OAM information for the specified interface.

```
user@host# show oam ethernet connectivity-fault-management adjacencies
Mep-id      Interface          State       Timer to Expire
         100        ge-0/0/1.0         ok             27
```

```
user@host# show oam ethernet connectivity-fault-management interfaces detail
Interface name: ge-0/0/1.0, vlan 100, Interface status: Active, Link status: Up
  Maintenance domain name: Customer-md, Format: string, Level: 5
    Maintenance association name: Customer-ma, Format: string
    Continuity-check status: enabled, Interval: 10s
    MEP identifier: 101, Direction: down, MAC address: 80:71:1f:ad:53:81
    MEP status: running
    Defects:
      Remote MEP not receiving CCM                  : no
      Erroneous CCM received                        : no
      Cross-connect CCM received                    : no
      RDI sent by some MEP                          : no
    Statistics:
      CCMs sent                                     : 77
      CCMs received out of sequence                 : 0
      LBMs sent                                     : 0
      Valid in-order LBRs received                  : 0
      Valid out-of-order LBRs received              : 0
      LBRs received with corrupted data             : 0
      LBRs sent                                     : 0
      LTMs sent                                     : 0
      LTMs received                                 : 0
      LTRs sent                                     : 0
      LTRs received                                 : 0
      Sequence number of next LTM request           : 0
      1DMs sent                                     : 0
      Valid 1DMs received                           : 0
      Invalid 1DMs received                         : 0
      DMMs sent                                     : 0
      DMRs sent                                     : 0
      Valid DMRs received                           : 0
      Invalid DMRs received                         : 0
    Remote MEP count: 1
      Identifier    MAC address        State    Interface
        100     2c:6b:f5:62:29:84       ok    ge-0/0/1.0
```

Meaning

- If the **show oam ethernet connectivity-fault-management interfaces detail** command output displays continuity-check status as **enabled** and displays details of the remote MEP, it means that connectivity fault management (CFM) was configured properly.
- If the **show oam ethernet connectivity-fault-management adjacencies** command output displays the state as **ok**, it indicates that the Continuity Check Protocol is up.

Verifying the Path Using the Link Trace Protocol

Purpose Verify the path between maintenance endpoints.

Action From operational mode, enter the **traceroute ethernet** command.

```
user@host# traceroute ethernet maintenance-domain Customer-md maintenance-association
Customer-ma mep 101
Linktrace to 80:71:1f:ad:53:81, Interface : ge-0/0/4.0
      Maintenance Domain: Customer-md, Level: 5
      Maintenance Association: Customer-ma, Local Mep: 100
      Transaction Identifier: 3
    Hop   TTL    Source MAC address         Next-hop MAC address
    .
    1     63     80:71:1f:ad:50:01          80:71:1f:ad:50:01
    2     62     80:71:1f:ad:53:81          00:00:00:00:00:00
```

Verifying MEP Continuity Using Ping

Purpose Verify access to MEPs under the same maintenance association.

Action From operational mode, enter the **ping ethernet** command.

```
user@host# ping ethernet maintenance-domain Customer-md maintenance-association
Customer-ma mep 101
PING to 80:71:1f:ad:53:81, Interface ge-0/0/4.0
60 bytes from 80:71:1f:ad:53:81: lbm_seq=0
60 bytes from 80:71:1f:ad:53:81: lbm_seq=1
60 bytes from 80:71:1f:ad:53:81: lbm_seq=2
60 bytes from 80:71:1f:ad:53:81: lbm_seq=3
--- ping statistics ---
4 packets transmitted, 4 packets received, 0% packet loss
```

Release History Table

Release	Description
15.1X49-D80	Starting in Junos OS Release 15.1X49-D80, Ethernet OAM connectivity fault management is supported on SRX1500 devices.
15.1X49-D75	Starting in Junos OS Release 15.1X49-D75, Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, Ethernet OAM connectivity fault management is not supported.

Related Documentation

- Understanding Ethernet OAM Connectivity Fault Management on page 241

Creating a Maintenance Domain

Supported Platforms SRX Series

NOTE: Starting in Junos OS Release 15.1X49-D80, creating a maintenance domain for Ethernet OAM connectivity fault management is supported on SRX1500 devices.

NOTE: Starting in Junos OS Release 15.1X49-D75, creating a maintenance domain for Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.

NOTE: Starting in Junos OS Release 15.1X49-D40, creating a maintenance domain for Ethernet OAM connectivity fault management is not supported.

A maintenance domain consists of network entities such as operators, providers, and customers. To enable CFM on an Ethernet interface, maintenance domains, maintenance associations, and MEPs must be created and configured.

To create a maintenance domain:

1. Specify a name for the maintenance domain.

   [edit protocols oam ethernet connectivity-fault-management]
   user@host# set maintenance-domain *domain-name*

2. Specify a format for the maintenance domain name. If you do not specify a format,, no name is configured.

   - A plain ASCII character string
   - A domain name service (DNS) format
   - A media access control (MAC) address plus a two-octet identifier in the range 0 through 65,535
   - none

   [edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name*]
   user@host# set name-format *format*

   For example, to specify the name format as a MAC address plus a two-octet identifier:

   [edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name*]

   user@host# set name-format *mac+2oct*

3. Configure the maintenance domain level, which is used to indicate the nesting relationship between this domain and other domains. Use a value from 0 through 7.

   [edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name*]

user@host# set level *level-number*

Release History Table

Release	Description
15.1X49-D80	Starting in Junos OS Release 15.1X49-D80, creating a maintenance domain for Ethernet OAM connectivity fault management is supported on SRX1500 devices.
15.1X49-D75	Starting in Junos OS Release 15.1X49-D75, creating a maintenance domain for Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, creating a maintenance domain for Ethernet OAM connectivity fault management is not supported.

Related Documentation

- Understanding Ethernet OAM Connectivity Fault Management on page 241
- Configuring the Continuity Check Protocol on page 261
- Configuring a Maintenance Domain MIP Half Function on page 259
- Creating a Maintenance Association on page 256
- Configuring a Maintenance Association End Point on page 257
- Configuring the Link Trace Protocol on page 262

Creating a Maintenance Association

Supported Platforms SRX Series

NOTE: Starting in Junos OS Release 15.1X49-D80, creating a maintenance association for Ethernet OAM connectivity fault management is supported on SRX1500 devices.

NOTE: Starting in Junos OS Release 15.1X49-D75, creating a maintenance association for Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.

NOTE: Starting in Junos OS Release 15.1X49-D40, creating a maintenance association for Ethernet OAM connectivity fault management is not supported.

In a CFM maintenance domain, each service instance is called a maintenance association.

To create a maintenance association:

[edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name*]
user@host# set maintenance-association *ma-name*

NOTE: On SRX300, SRX320, SRX340, SRX345, and SRX550M devices, a maximum of seven maintenance associations are supported.

Release History Table

Release	Description
15.1X49-D80	Starting in Junos OS Release 15.1X49-D80, creating a maintenance association for Ethernet OAM connectivity fault management is supported on SRX1500 devices.
15.1X49-D75	Starting in Junos OS Release 15.1X49-D75, creating a maintenance association for Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, creating a maintenance association for Ethernet OAM connectivity fault management is not supported.

Related Documentation

- Understanding Ethernet OAM Connectivity Fault Management on page 241
- Creating a Maintenance Domain on page 254
- Configuring a Maintenance Domain MIP Half Function on page 259
- Configuring the Continuity Check Protocol on page 261
- Configuring a Maintenance Association End Point on page 257
- Configuring the Link Trace Protocol on page 262

Configuring a Maintenance Association End Point

Supported Platforms SRX Series

NOTE: Starting in Junos OS Release 15.1X49-D80, configuring a maintenance association end point for Ethernet OAM connectivity fault management is supported on SRX1500 devices.

NOTE: Starting in Junos OS Release 15.1X49-D75, configuring a maintenance association end point for Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.

NOTE: Starting in Junos OS Release 15.1X49-D40, configuring a maintenance association end point for Ethernet OAM connectivity fault management is not supported.

To configure a maintenance association end point (MEP):

1. Specify an ID for the MEP. The value can be from 1 through 8191.

   [edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name* maintenance-association *ma-name*]
   user@host# set mep *mep-id*

2. Enable maintenance endpoint automatic discovery if you want to have the MEP accept continuity check messages (CCMs) from all remote MEPs of the same maintenance association.

   [edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name* maintenance-association *ma-name* mep *mep-id*]
   user@host# set auto-discovery

3. Specify that CFM CCM packets be transmitted only in one direction for the MEP. That is, set the direction as down so that CCMs are transmitted only out of (not into) the interface configured on this MEP.

   [edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name* maintenance-association *ma-name* mep *mep-id*]
   user@host# set direction down

4. Specify the logical interface to which the MEP is attached. It can be either an access interface or a trunk interface. If you specify a trunk interface, the VLAN associated with that interface must have a VLAN ID.

   [edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name* maintenance-association *ma-name* mep *mep-id*]
   user@host# set interface *interface-name*

5. Configure a remote MEP from which CCMs are expected. If automatic discovery is not enabled, the remote MEP must be configured under the **mep** statement or the CCMs from the remote MEP are treated as errors.

   [edit protocols oam ethernet connectivity-fault-management maintenance-domain domain-name maintenance-association ma-name mep mep-id]
   user@host# set remote-mep mep-id

NOTE: You cannot configure MEPs at different levels for the same VLANs.

Release History Table

Release	Description
15.1X49-D80	Starting in Junos OS Release 15.1X49-D80, configuring a maintenance association end point for Ethernet OAM connectivity fault management is supported on SRX1500 devices.
15.1X49-D75	Starting in Junos OS Release 15.1X49-D75, configuring a maintenance association end point for Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, configuring a maintenance association end point for Ethernet OAM connectivity fault management is not supported.

Related Documentation

- Understanding Ethernet OAM Connectivity Fault Management on page 241
- Creating a Maintenance Domain on page 254
- Configuring a Maintenance Domain MIP Half Function on page 259
- Creating a Maintenance Association on page 256
- Configuring the Continuity Check Protocol on page 261
- Configuring the Link Trace Protocol on page 262

Configuring a Maintenance Domain MIP Half Function

Supported Platforms SRX Series

NOTE: Starting in Junos OS Release 15.1X49-D80, configuring a maintenance domain MIP half function for Ethernet OAM connectivity fault management is supported on SRX1500 devices.

NOTE: Starting in Junos OS Release 15.1X49-D75, configuring a maintenance domain MIP half function for Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.

NOTE: Starting in Junos OS Release 15.1X49-D40, configuring a maintenance domain MIP half function for Ethernet OAM connectivity fault management is not supported.

MIP half function (MHF) divides the maintenance association intermediate point (MIP) functionality into two unidirectional segments, improves visibility with minimal configuration, and improves network coverage by increasing the number of points that can be monitored. MHF extends monitoring capability by responding to loopback and Link Trace messages to help isolate faults. Whenever a MIP is configured, the MIP half function value for all maintenance domains and maintenance associations must be the same.

To configure the MIP half function:

[edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name*]
user@host# set mip-half-function *default*

NOTE:

- If SRX340, or SRX345 devices are configured as MIPs, ensure that a static MAC is configured in the Ethernet switching table with the next-hop interface to the MEP MAC.
- You cannot configure MIP in a nondefault domain.
- In Q-in-Q mode, double tag packets are not retained by MIP.
- A maximum of 116 MIPs can be configured on a device.

Release History Table

Release	Description
15.1X49-D80	Starting in Junos OS Release 15.1X49-D80, configuring a maintenance domain MIP half function for Ethernet OAM connectivity fault management is supported on SRX1500 devices.
15.1X49-D75	Starting in Junos OS Release 15.1X49-D75, configuring a maintenance domain MIP half function for Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, configuring a maintenance domain MIP half function for Ethernet OAM connectivity fault management is not supported.

Related Documentation

- Understanding Ethernet OAM Connectivity Fault Management on page 241
- Creating a Maintenance Domain on page 254
- Creating a Maintenance Association on page 256
- Configuring the Continuity Check Protocol on page 261
- Configuring a Maintenance Association End Point on page 257
- Configuring the Link Trace Protocol on page 262

Configuring the Continuity Check Protocol

Supported Platforms SRX Series

NOTE: Starting in Junos OS Release 15.1X49-D80, configuring the continuity check protocol for Ethernet OAM connectivity fault management is supported on SRX1500 devices.

NOTE: Starting in Junos OS Release 15.1X49-D75, configuring the continuity check protocol for Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.

NOTE: Starting in Junos OS Release 15.1X49-D40, configuring the continuity check protocol for Ethernet OAM connectivity fault management is not supported.

The Continuity Check Protocol is used for fault detection by a maintenance association end point (MEP) within a maintenance association. The MEP periodically sends continuity check multicast messages. The receiving MEPs use the continuity check messages (CCMs) to build a MEP database of all MEPs in the maintenance association.

To configure the Continuity Check Protocol:

1. Enable the Continuity Check Protocol.

   [edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name* maintenance-association *ma-name*]
   user@host# set continuity-check

2. Specify the continuity check hold interval. The hold interval is the number of minutes to wait before flushing the MEP database if no updates occur. The default value is 10 minutes.

   [edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name* maintenance-association *ma-name* continuity-check]
   user@host# set hold-interval *number*

3. Specify the CCM interval. The interval is the time between the transmission of CCMs. You can specify 10 minutes (10m), 1 minute (1m), 10 seconds (10s), 1 second (1s), or 100 milliseconds (100ms).

   [edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name* maintenance-association *ma-name* continuity-check]
   user@host# set interval *number*

4. Specify the number of CCMs (that is, protocol data units) that can be lost before the MEP is marked as down. The default number of protocol data units (PDUs) is 3.

[edit protocols oam ethernet connectivity-fault-management maintenance-domain *domain-name* maintenance-association *ma-name* continuity-check]
user@host# set loss-threshold *number*

NOTE: If the CCM interval is 100 milliseconds, only four MEPs are supported on a device.

Release History Table

Release	Description
15.1X49-D80	Starting in Junos OS Release 15.1X49-D80, configuring the continuity check protocol for Ethernet OAM connectivity fault management is supported on SRX1500 devices.
15.1X49-D75	Starting in Junos OS Release 15.1X49-D75, configuring the continuity check protocol for Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, configuring the continuity check protocol for Ethernet OAM connectivity fault management is not supported.

Related Documentation

- Understanding Ethernet OAM Connectivity Fault Management on page 241
- Creating a Maintenance Domain on page 254
- Creating a Maintenance Association on page 256
- Configuring a Maintenance Domain MIP Half Function on page 259
- Configuring the Link Trace Protocol on page 262

Configuring the Link Trace Protocol

Supported Platforms SRX Series

NOTE: Starting in Junos OS Release 15.1X49-D80, configuring the Link Trace protocol for Ethernet OAM connectivity fault management is supported on SRX1500 devices.

NOTE: Starting in Junos OS Release 15.1X49-D75, configuring the Link Trace protocol for Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.

NOTE: Starting in Junos OS Release 15.1X49-D40, configuring the Link Trace protocol for Ethernet OAM connectivity fault management is not supported.

The Link Trace protocol is used for path discovery between a pair of maintenance points. Link Trace Messages (LTMs) are triggered by an administrator using the **traceroute ethernet** command to verify the path between a pair of MEPs under the same maintenance association. LTMs can also be used to verify the path between a MEP and a MIP under the same maintenance domain.

To configure the Link Trace protocol:

1. Configure the Link Trace path age timer. If no response to a Link Trace request is received, the request and response entries are deleted after the age timer expires.

   [edit protocols oam ethernet connectivity-fault-management]
   user@host# set linktrace age ***time***

2. Configure the number of Link Trace Reply (LTR) entries to be stored per Link Trace request.

   [edit protocols oam ethernet connectivity-fault-management]
   user@host# set linktrace path-database-size ***path-database-size***

Release History Table

Release	Description
15.1X49-D80	Starting in Junos OS Release 15.1X49-D80, configuring the Link Trace protocol for Ethernet OAM connectivity fault management is supported on SRX1500 devices.
15.1X49-D75	Starting in Junos OS Release 15.1X49-D75, configuring the Link Trace protocol for Ethernet OAM connectivity fault management is supported on SRX300, SRX320, SRX340, SRX345, and SRX550M devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, configuring the Link Trace protocol for Ethernet OAM connectivity fault management is not supported.

Related Documentation

- Understanding Ethernet OAM Connectivity Fault Management on page 241
- Creating a Maintenance Domain on page 254

- Creating a Maintenance Association on page 256
- Configuring a Maintenance Domain MIP Half Function on page 259
- Configuring the Continuity Check Protocol on page 261

CHAPTER 22

Configuring Ethernet OAM Link Fault Management

Understanding Ethernet OAM Link Fault Management for SRX Series Services Gateways

Supported Platforms SRX Series

NOTE: Starting in Junos OS Release 15.1X49-D70, Ethernet OAM link fault management for SRX Series services gateways is supported on SRX300, SRX320, SRX340, SRX345, SRX550M, and SRX1500 devices.

NOTE: Starting in Junos OS Release 15.1X49-D40, Ethernet OAM link fault management for SRX Series services gateways is not supported.

The Ethernet interfaces on SRX Series devices support the IEEE 802.3ah standard for Operation, Administration, and Maintenance (OAM). The standard defines OAM link fault management (LFM). You can configure IEEE 802.3ah OAM LFM on point-to-point Ethernet links that are connected either directly or through Ethernet repeaters. The IEEE 802.3ah standard meets the requirement for OAM capabilities as Ethernet moves from being solely an enterprise technology to a WAN and access technology, and the standard remains backward-compatible with existing Ethernet technology.

NOTE: For SRX550M devices, LFM is supported only on devices that have 16-port or 24-port GPIMs.

The following OAM LFM features are supported:

- Discovery and link monitoring—The discovery process is triggered automatically when OAM is enabled on the interface. The discovery process permits Ethernet interfaces to discover and monitor the peer on the link if it also supports the IEEE 802.3ah standard.

In active mode, the interface discovers and monitors the peer on the link if the peer also supports IEEE 802.3ah OAM functionality. In passive mode, the peer initiates the discovery process. After the discovery process has been initiated, both sides participate in discovery. The device performs link monitoring by sending periodic OAM protocol data units (PDUs) to advertise OAM mode, configuration, and capabilities.

You can specify the number of OAM PDUs that an interface can miss before the link between peers is considered down.

- Remote fault detection—Remote fault detection uses flags and events. Flags convey Link Fault (a loss of signal), Dying Gasp (an unrecoverable condition such as a power failure), and Critical Event (an unspecified vendor-specific critical event). You can specify the periodic OAM PDU sending interval for fault detection. SRX Series devices use the Event Notification OAM PDU to notify the remote OAM device when a problem is detected. You can specify the action to be taken by the system when the configured link-fault event occurs.
- Remote loopback—Remote loopback mode ensures link quality between the device and a remote peer during installation or troubleshooting. In this mode, when the interface receives a frame that is not an OAM PDU or a pause frame, it sends it back on the same interface on which it was received. The link appears to be in the active state. You can use the returned loopback acknowledgement to test delay, jitter, and throughput.

  Junos OS can place a remote data terminal equipment (DTE) into loopback mode (if remote loopback mode is supported by the remote DTE). When you place a remote DTE into loopback mode, the interface receives the remote loopback request and puts the interface into remote loopback mode. When the interface is in remote loopback mode, all frames except OAM PDUs are looped back without any changes made to the frames. OAM PDUs continue to be sent and processed.

Table 31 on page 266 lists the interfaces modes supported.

Table 31: Supported Interface Modes

Interfaces	Mode
Physical interface (fe/ge)	Family • ccc • ethernet-switching • inet6 • inet • iso • mpls • tcc
	IFD encapsulations • ethernet-ccc • extended-vlan-ccc (IFD vlan-tagging mode) • ethernet-tcc • extended-vlan-tcc

Table 31: Supported Interface Modes *(continued)*

Interfaces	Mode
Aggregated Ethernet interface (Static or LACP lag)	Family • ethernet-switching • inet • mpls • iso • inet6
	IFD encapsulations • ethernet-ccc • extended-vlan-ccc (IFD vlan-tagging mode) • vlan-ccc

Release History Table

Release	Description
15.1X49-D70	Starting in Junos OS Release 15.1X49-D70, Ethernet OAM link fault management for SRX Series services gateways is supported on SRX300, SRX320, SRX340, SRX345, SRX550M, and SRX1500 devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, Ethernet OAM link fault management for SRX Series services gateways is not supported.

Related Documentation

- Example: Configuring Ethernet OAM Link Fault Management on page 267

Example: Configuring Ethernet OAM Link Fault Management

Supported Platforms SRX Series

NOTE: **Starting in Junos OS Release 15.1X49-D70, configuring Ethernet OAM link fault management is supported on SRX300, SRX320, SRX340, SRX345, SRX550M, and SRX1500 devices.**

NOTE: **Starting in Junos OS Release 15.1X49-D40, configuring Ethernet OAM link fault management is not supported.**

The Ethernet interfaces on the SRX Series devices support the IEEE 802.3ah standard for Operation, Administration, and Maintenance (OAM). The standard defines OAM link fault management (LFM). You can configure IEEE 802.3ah OAM LFM on point-to-point Ethernet links that are connected either directly or through Ethernet repeaters.

This example describes how to enable and configure OAM LFM on a Gigabit Ethernet or Fast Ethernet interface:

- Requirements on page 268
- Overview on page 268
- Configuration on page 269
- Verification on page 271

Requirements

This example uses the following hardware and software components:

- Junos OS Release 12.1 R2 or later for SRX Series Services Gateways
- Any two models of SRX Series devices connected directly

Before you begin:

- Establish basic connectivity. See the Getting Started Guide for your device.
- Configure network interfaces as necessary. See *Example: Creating an Ethernet Interface*.
- Ensure that you configure the interfaces as per the interface modules listed in "Understanding Ethernet OAM Link Fault Management for SRX Series Services Gateways" on page 265

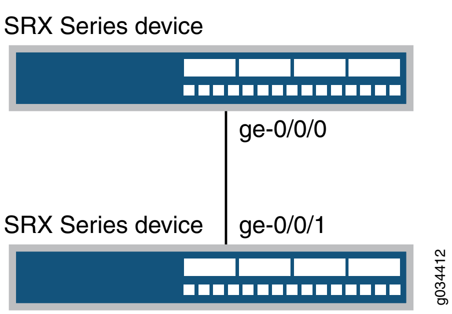
Overview

The Ethernet interfaces on the SRX Series devices support the IEEE 802.3ah standard for Operation, Administration, and Maintenance (OAM). The standard defines OAM link fault management (LFM). You can configure IEEE 802.3ah OAM LFM on point-to-point Ethernet links that are connected either directly or through Ethernet repeaters.

This example uses two SRX Series devices connected directly. Before you begin configuring Ethernet OAM LFM on these two devices, connect the two devices directly through supported interfaces. See "Understanding Ethernet OAM Link Fault Management for SRX Series Services Gateways" on page 265.

Figure 12 on page 268 shows the topology used in this example.

Figure 12: Ethernet LFM with SRX Series Devices



NOTE: For more information about configuring Ethernet OAM Link Fault Management, see Junos® OS Ethernet Interfaces.

Configuration

To configure Ethernet OAM LFM, perform these tasks:

- Configuring Ethernet OAM Link Fault Management on Device 1 on page 269
- Configuring Ethernet OAM Link Fault Management on Device 2 on page 270

Configuring Ethernet OAM Link Fault Management on Device 1

CLI Quick Configuration

To quickly configure this example, copy the following command, paste it into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the command into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set protocols oam ethernet link-fault-management interface ge-0/0/0
set protocols oam ethernet link-fault-management interface ge-0/0/0 pdu-interval 800
set protocols oam ethernet link-fault-management interface ge-0/0/0 link-discovery
  active
```

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode* in the Junos OS CLI User Guide.

To configure Ethernet OAM LFM on device 1:

1. Enable IEEE 802.3ah OAM support.

   ```
   [edit protocols oam ethernet link-fault-management]
   user@device1# set interface ge-0/0/0
   ```

2. Set the periodic OAM PDU-sending interval (in milliseconds) for fault detection.

   ```
   [edit protocols oam ethernet link-fault-management]
   user@device1# set interface pdu-interval 800
   ```

3. Specify that the interface initiates the discovery process.

   ```
   [edit protocols oam ethernet link-fault-management]
   user@device1# set interface ge-0/0/0 link-discovery active
   ```

Results

From configuration mode, confirm your configuration by entering the **show protocols** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@device1# show protocols
protocols {
  oam {
    ethernet {
      link-fault-management {
```



```
          interface ge-0/0/0 {
            pdu-interval 800;
            link-discovery active;
          }
        }
      }
    }
  }
```

Configuring Ethernet OAM Link Fault Management on Device 2

CLI Quick Configuration

To quickly configure this example, copy the following command, paste it into a text file, remove any line breaks, change any details necessary to match your network configuration, copy and paste the command into the CLI at the **[edit]** hierarchy level, and then enter **commit** from configuration mode.

```
set protocols oam ethernet link-fault-management interface ge-0/0/1
set protocols oam ethernet link-fault-management interface ge-0/0/1 pdu-interval 800
set protocols oam ethernet link-fault-management interface ge-0/0/1 negotiation-options
  allow-remote-loopback
```

Step-by-Step Procedure

To configure Ethernet OAM LFM on device 2:

1. Enable OAM on the peer interface.

   ```
   [edit protocols oam ethernet link-fault-management]
   user@device2# set interface ge-0/0/1
   ```

2. Set the periodic OAM PDU-sending interval (in milliseconds) for fault detection.

   ```
   [edit protocols oam ethernet link-fault-management]
   user@device2# set interface ge-0/0/1 pdu-interval 800
   ```

3. Enable remote loopback support for the local interface.

   ```
   [edit protocols oam ethernet link-fault-management]
   user@device2# set interface ge-0/0/1 negotiation-options allow-remote-loopback
   ```

Results

From configuration mode, confirm your configuration by entering the **show protocols** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```
[edit]
user@device2# show protocols
protocols {
  oam {
    ethernet {
      link-fault-management {
        interface ge-0/0/1 {
          negotiation-options {
            allow-remote-loopback;
          }
        }
      }
    }
  }
}
```


Verification

Verify the OAM LFM Configuration

Purpose Verify that OAM LFM is configured properly.

Action From operational mode, enter the **show oam ethernet link-fault-management** command.

user@device1> **show oam ethernet link-fault-management**

```
Interface: ge-0/0/0.0
Status: Running, Discovery state: Send Any
Peer address: 2001:bd8:00:31
Flags:Remote-Stable Remote-State-Valid Local-Stable 0x50
Remote entity information:
Remote MUX action: forwarding, Remote parser action: forwarding
Discovery mode: active, Unidirectional mode: unsupported
Remote loopback mode: supported, Link events: supported
Variable requests: unsupported
```

Meaning The output displays the MAC address and the discovery state is **Send Any** if OAM LFM has been configured properly.

Release History Table

Release	Description
15.1X49-D70	Starting in Junos OS Release 15.1X49-D70, configuring Ethernet OAM link fault management is supported on SRX300, SRX320, SRX340, SRX345, SRX550M, and SRX1500 devices.
15.1X49-D40	Starting in Junos OS Release 15.1X49-D40, configuring Ethernet OAM link fault management is not supported.

Related Documentation

- Understanding Ethernet OAM Link Fault Management for SRX Series Services Gateways on page 265

PART 4

Configuration Statements and Operational Commands

CHAPTER 23

Configuration Statements

bpdu-block

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax

```
bpdu-block {
  interface (interface-name disable | all);
  disable-timeout seconds;
}
```

Hierarchy Level [edit protocols layer2-control]

Release Information Statement introduced in Junos OS Release 15.1X49-D70.

Description Enable BPDU blocking on an interface.

The remaining statements are explained separately.

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

Related Documentation

- Understanding BPDU Protection for STP, RSTP, and MSTP on page 145
- Understanding Root Protection for STP, RSTP, and MSTP on page 162

bpdu-destination-mac-address

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax bpdu-destination-mac-address provider-bridge-group;

Hierarchy Level [edit protocols mvrp],
[edit routing-instances *routing-instance-name* protocols mvrp] (for virtual switch instance type)

Release Information Statement introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description For Multiple VLAN Registration Protocol (MVRP) configurations, specify the multicast address for MVRP. If configured, Junos OS uses the provider MVRP multicast MAC address; otherwise, it uses the customer MVRP multicast MAC address.

Default By default, the customer MVRP MAC address is used.

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

Related Documentation

- *Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration*

code-points (CoS)

Supported Platforms SRX Series, vSRX

Syntax code-points [*aliases*] [*bit-patterns*];

Hierarchy Level [edit class-of-service classifiers (dscp) *classifier-name* forwarding-class *class-name* loss-priority *level*]

Release Information Statement introduced in Junos OS Release 11.1 for the QFX Series.
Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

Description Configure one or more code-point aliases or bit sets to apply to a forwarding class.

NOTE: OCX Series switches do not support MPLS, so they do not support EXP code points or code point aliases.

Options ***aliases***—Name of the alias or aliases.

bit-patterns—Value of the code-point bits, in decimal form.

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

Related Documentation

- *Understanding Interfaces*
- Example: Configuring BA Classifiers on Transparent Mode Devices on page 56

destination-address (Security Policies)

Supported Platforms SRX Series, vSRX

Syntax

```
destination-address {
  [address];
  any;
  any-ipv4;
  any-ipv6;
}
```

Hierarchy Level [edit security policies from-zone *zone-name* to-zone *zone-name* policy *policy-name* match]

[edit security policies global policy *policy-name* match]

Release Information Statement introduced in Junos OS Release 8.5. Support for IPv6 addresses added in Junos OS Release 10.2. Support for IPv6 addresses in active/active chassis cluster configurations (in addition to the existing support of active/passive chassis cluster configurations) added in Junos OS Release 10.4. Support for wildcard addresses added in Junos OS Release 11.1.

Description Define the matching criteria. You can specify one or more IP addresses, address sets, or wildcard addresses. You can specify wildcards **any**, **any-ipv4**, or **any-ipv6**.

Options *address*—IP address (**any**, **any-ipv4**, **any-ipv6**), IP address set, or address book entry, or wildcard address (represented as A.B.C.D/wildcard-mask). You can configure multiple addresses or address prefixes separated by spaces and enclosed in square brackets.

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

Related Documentation

- *Security Policies Overview*

disable-timeout (Spanning Trees)

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax disable-timeout *seconds*;

Hierarchy Level [edit protocols layer2-control bpdu-block]

Release Information Statement introduced in Junos OS Release 15.1X49-D70.

Description For interfaces configured for BPDU protection, specify the amount of time an interface is disabled by BPDU blocking. If this option is not configured, the interface is not periodically checked and remains disabled.

Default The disable timeout is not enabled.

Options *seconds*—Amount of time, in seconds, the interface receiving BPDUs protect is disabled.
The range is 10 through 3600 seconds.

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

Related Documentation

- Understanding BPDU Protection for STP, RSTP, and MSTP on page 145
- Understanding Root Protection for STP, RSTP, and MSTP on page 162
- Example: Configuring Root Protection to Enforce Root Bridge Placement in Spanning Trees on page 163

domain-type (VLANs)

Supported Platforms SRX Series, vSRX

Syntax domain-type vlans;

Hierarchy Level [edit vlans *vlans-name*]

Release Information Statement modified in Junos OS Release 9.5.

Description Define the type of domain for a Layer 2 VLAN.

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

Related Documentation

- Layer 2 Transparent Mode Overview on page 23

encapsulation (Interfaces)

Supported Platforms SRX Series, vSRX

Syntax

```
encapsulation (ether-vpls-ppp | ethernet-bridge | ethernet-ccc | ethernet-tcc | ethernet-vpls
  | extended-frame-relay-ccc | extended-frame-relay-tcc | extended-vlan-bridge |
  extended-vlan-ccc | extended-vlan-tcc | extended-vlan-vpls | frame-relay-port-ccc |
  vlan-ccc | vlan-vpls);
```

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Specify logical link layer encapsulation.

Options

- **frame-relay**—Configure a Frame Relay encapsulation when the physical interface has multiple logical units, and the units are either point to point or multipoint.
- **multilink-frame-relay-uni-nni**—Link services interfaces functioning as FRF.16 bundles can use Multilink Frame Relay UNI NNI encapsulation.
- **ppp**—For normal mode (when the device is using only one ISDN B-channel per call). Point-to-Point Protocol is for communication between two computers using a serial interface.
- **ppp-over-ether**—This encapsulation is used for underlying interfaces of pp0 interfaces.

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

Related Documentation

- *Understanding Physical Encapsulation on an Interface*

ethernet-switching

Supported Platforms SRX Series, vSRX

Syntax

```
ethernet-switching {
  block-non-ip-all;
  bpdu-vlan-flooding;
  bypass-non-ip-unicast;
  no-packet-flooding {
    no-trace-route;
  }
}
```

Hierarchy Level [edit security flow]

Release Information Statement introduced in Junos OS Release 9.5.

Description Changes default Layer 2 forwarding behavior.

Options

- **block-non-ip-all**—Block all Layer 2 non-IP and non-ARP traffic, including multicast and broadcast traffic.
- **bypass-non-ip-unicast**—Allow all Layer 2 non-IP traffic to pass through the device.
- **no-packet-flooding**—Stop IP flooding and send ARP or ICMP requests to discover the destination MAC address for a unicast packet.
  - **no-trace-route**—Do not send ICMP requests to discover the destination MAC address for a unicast packet. Only ARP requests are sent. This option only allows the device to discover the destination MAC address for a unicast packet if the destination IP address is in the same subnetwork as the ingress IP address.

NOTE: The **block-non-ip-all** and **bypass-non-ip-unicast** options cannot be configured at the same time.

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

Related Documentation

- *Juniper Networks Devices Processing Overview*

family inet (Interfaces)

Supported Platforms SRX Series, vSRX

Syntax

```
inet {
  accounting {
    destination-class-usage;
    source-class-usage {
      input;
      output;
    }
  }
  address (source–address/prefix) {
    arp destination-address {
      (mac mac-address | multicast-mac multicast-mac-address);
      publish publish-address;
    }
    broadcast address;
    preferred;
    primary;
    vrrp-group group-id {
      (accept-data | no-accept-data);
      advertise-interval seconds;
      advertisements-threshold number;
      authentication-key key-value;
      authentication-type (md5 | simple);
      fast-interval milliseconds;
      inet6-advertise-interval milliseconds
      (preempt <hold-time seconds> | no-preempt );
      priority value;
      track {
        interface interface-name {
          bandwidth-threshold bandwidth;
          priority-cost value;
        }
        priority-hold-time seconds;
        route route-address{
          routing-instance routing-instance;
          priority-cost value;
        }
      }
      virtual-address [address];
      virtual-link-local-address address;
      vrrp-inherit-from {
        active-group value;
        active-interface interface-name;
      }
    }
    web-authentication {
      http;
      https;
      redirect-to-https;
    }
  }
  dhcp {
```

```
    client-identifier {
      (ascii string | hexadecimal string);
    }
    lease-time (length | infinite);
    retransmission-attempt value;
    retransmission-interval seconds;
    server-address server-address;
    update-server;
    vendor-id vendor-id ;
  }
  dhcp-client {
    client-identifier {
      prefix {
        host-name;
        logical-system-name;
        routing-instance-name;
      }
      use-interface-description (device | logical);
      user-id (ascii string| hexadecimal string);
    }
    lease-time (length | infinite);
    retransmission-attempt value;
    retransmission-interval seconds;
    server-address server-address;
    update-server;
    vendor-id vendor-id ;
  }
  filter {
    group number;
    input filter-name;
    input-list [filter-name];
    output filter-name;
    output-list [filter-name];
  }
  mtu value;
  no-neighbor-learn;
  no-redirects;
  policer {
    arp arp-name;
    input input-name;
    output output-name;
  }
  primary;
  rpf-check {
    fail-filter filter-name;
    mode {
      loose;
    }
  }
  sampling {
    input;
    output;
    simple-filter;
  }
  targeted-broadcast {
    (forward-and-send-to-re |forward-only);
```



```
  }
  unnumbered-address {
    interface-name;
    preferred-source-address preferred-source-address;
  }
}
```

Hierarchy Level [edit interfaces *interface* unit *unit*]

Release Information Statement supported in Junos 10.2 for SRX Series devices.

Description Assign an IP address to a logical interface.

Options *ipaddress*—Specify the IP address for the interface. The remaining statements are explained separately.

NOTE: You use family **inet** to assign an IPv4 address. You use family **inet6** to assign an IPv6 address. An interface can be configured with both an IPv4 and IPv6 address.

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

Related Documentation

- *Understanding Interfaces*

family inet6

Supported Platforms SRX Series, vSRX

Syntax

```
inet6 {
  accounting {
    destination-class-usage;
    source-class-usage {
      input;
      ouput;
    }
  }
  address source–address/prefix {
    eui-64;
    ndp address {
      (mac mac-address | multicast-mac multicast-mac-address);
      publish;
    }
    preferred;
    primary;
    vrrp-inet6-group group_id {
      (accept-data | no-accept-data);
      advertisements-threshold number;
      authentication-key value;
      authentication-type (md5 | simple);
      fast-interval milliseconds;
      inet6-advertise-interval milliseconds;
      (preempt <hold-time seconds>| no-preempt );
      priority value;
      track {
        interface interface-name {
          bandwidth-threshold value;
          priority-cost value;
        }
        priority-hold-time seconds;
        route route-address{
          routing-instance routing-instance;
        }
      }
      virtual-inet6-address [address];
      virtual-link-local-address address;
      vrrp-inherit-from {
        active-group value;
        active-interface interface-name;
      }
    }
    web-authentication {
      http;
      https;
      redirect-to-https;
    }
  }
  (dad-disable | no-dad-disable);
  dhcpv6-client {
    client-ia-type (ia-na | ia-pd);
```

```
    client-identifier duid-type (duid-ll | duid-llt | vendor);
    client-type (autoconfig | stateful);
    rapid-commit;
    req-option (dns-server | domain | fqdn | nis-domain | nis-server | ntp-server | sip-domain
      | sip-server |time-zone | vendor-spec);
    retransmission-attempt number;
    update-router-advertisement {
      interface interface-name;
    }
    update-server;
  }
  filter {
    group number;
    input filter-name;
    input-list [filter-name];
    output filter-name;
    output-list [filter-name];
  }
  mtu value;
  nd6-stale-time seconds;
  no-neighbor-learn;
  policer {
    input input-name;
    output output-name;
  }
  rpf-check {
    fail-filter filter-name;
    mode {
      loose;
    }
  }
  sampling {
    input;
    output;
  }
  unnumbered-address {
    interface-name;
    preferred-source-address preferred-source-address;
  }
}
```

Hierarchy Level [edit interfaces *interface* unit *unit*]

Release Information Statement supported in Junos 10.2 for SRX Series devices.

Description Assign an IPV6 address to a logical interface.

Options *ipaddress*—Specify the IP address for the interface. The remaining statements are explained separately.

NOTE: You use family **inet6** to assign an IPv6 address. You use family **inet** to assign an IPv4 address. An interface can be configured with both an IPv4 and IPv6 address.

Required Privilege Level

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

Related Documentation

- *Understanding Interfaces*

flow (Security Flow)

Supported Platforms SRX Series, vSRX

Syntax

```
flow {
  aging {
    early-ageout seconds;
    high-watermark percent;
    low-watermark percent;
  }
  allow-dns-reply;
  ethernet-switching {
    block-non-ip-all;
    bpdu-vlan-flooding;
    bypass-non-ip-unicast;
    no-packet-flooding {
      no-trace-route;
    }
  }
  force-ip-reassembly;
  ipsec-performance-acceleration;
  load distribution {
    session-affinity ipsec;
  }
  pending-sess-queue-length (high | moderate | normal);
  route-change-timeout seconds;
  syn-flood-protection-mode (syn-cookie | syn-proxy);
  tcp-mss {
    all-tcp mss value;
    gre-in {
      mss value;
    }
    gre-out {
      mss value;
    }
    ipsec-vpn {
      mss value;
    }
  }
  tcp-session {
    fin-invalidate-session;
    no-sequence-check;
    no-syn-check;
    no-syn-check-in-tunnel;
    rst-invalidate-session;
    rst-sequence-check;
    strict-syn-check;
    tcp-initial-timeout seconds;
    time-wait-state {
      (session-ageout | session-timeout seconds);
    }
  }
  traceoptions {
    file {
      filename;
```



```
            files number;
            match regular-expression;
            size maximum-file-size;
            (world-readable | no-world-readable);
        }
        flag flag;
        no-remote-trace;
        packet-filter filter-name {
            destination-port port-identifier;
            destination-prefix address;
            interface interface-name;
            protocol protocol-identifier;
            source-port port-identifier;
            source-prefix address;
        }
        rate-limit messages-per-second;
    }
}
```

Hierarchy Level [edit security]

Release Information Statement modified in Junos OS Release 9.5.

Description Determine how the device manages packet flow. The device can regulate packet flow in the following ways:

- Enable or disable DNS replies when there is no matching DNS request.
- Set the initial session-timeout values.

Options The remaining statements are explained separately. See CLI Explorer.

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

Related Documentation

- *Juniper Networks Devices Processing Overview*
- *Understanding Session Characteristics for SRX Series Services Gateways*
- *Understanding Flow in Logical Systems for SRX Series Devices*

forwarding-classes (CoS)

Supported Platforms SRX Series, vSRX

Syntax

```
forwarding-classes {
  class class-name {
    priority (high | low);
    queue-num number;
    spu-priority (high | low);
  }
  queue queue-number {
    class-name {
      priority (high | low);
    }
  }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced in Junos OS Release 8.5. Statement updated in Junos OS Release 11.4. The **spu-priority** option introduced in Junos OS Release 11.4R2.

Description Configure forwarding classes and assign queue numbers.

Options

- **class class-name**—Display the forwarding class name assigned to the internal queue number.

  NOTE: This option is supported only on SRX1500, SRX5400, SRX5600, and SRX5800.

  NOTE: AppQoS forwarding classes must be different from those defined for interface-based rewriters.

- **policing-priority**—Layer 2 policing. One forwarding class can be configured as **premium** and others are configured as **normal**.
- **priority**—Fabric priority value:
  - **high**—Forwarding class's fabric queuing has high priority.
  - **low**—Forwarding class's fabric queuing has low priority.
- **queue queue-number**—Specify the internal queue number to which a forwarding class is assigned.
- **spu-priority**—Services Processing Unit (SPU) priority queue, either **high** or **low**.

NOTE: The **spu-priority** option is only supported on SRX1500 devices and SRX5000 line devices.

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

Related Documentation
- *Example: Configuring AppQoS*

global-mac-table-aging-time (Protocols)

Supported Platforms SRX Series, vSRX

Syntax global-mac-table-aging-time *seconds*;

Hierarchy Level [edit protocols l2-learning]

Release Information Statement modified in Junos OS Release 9.5.

Description Configure the timeout interval for entries in the MAC table.

Default 300 seconds

Options *seconds*—Time elapsed before MAC table entries are timed out and entries are deleted from the table.

Range: 10 through 64,000 seconds

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

Related Documentation
- Example: Configuring VLANs on page 29

global-mac-limit (Protocols)

Supported Platforms SRX Series

Syntax

```
global-mac-limit limit {
  packet-action drop;
}
```

Hierarchy Level [edit protocols l2-learning]

Release Information Statement modified in Junos OS Release 9.5.

Description Limit the number of media access control (MAC) addresses learned from the logical interfaces on the router.

Default 131,071 MAC addresses

NOTE: **SRX300, SRX320, SRX340, and SRX345 devices support 16,383 addresses, and SRX1500 devices support 24,575 addresses.**

Options *limit*—Number of MAC addresses that can be learned on the device.

Range: 20 through 13,1071 addresses

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

- Example: Configuring VLANs on page 29

global-mode (Protocols)

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax global-mode (switching | transparent-bridge) ;

Hierarchy Level [edit protocols l2-learning]

Release Information Statement introduced in Junos OS Release 15.1X49-D40.

Description Specify the global mode for the SRX Series device as Layer 2 transparent bridge mode or switching mode. After changing the mode, you must reboot the device for the configuration to take effect.

Default transparent-bridge

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

Related Documentation

- l2-learning (Protocols) on page 302
- Ethernet Switching and Layer 2 Transparent Mode Overview on page 3

global-no-mac-learning (Protocols)

Supported Platforms SRX Series

Syntax global-no-mac-learning;

Hierarchy Level [edit protocols l2-learning]

Release Information Statement modified in Junos OS Release 9.5.

Description Disable MAC learning for the entire device.

Default MAC learning is enabled.

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

Related Documentation

- Example: Configuring VLANs on page 29

host-inbound-traffic

Supported Platforms SRX Series, vSRX

Syntax

```
host-inbound-traffic {
  protocols protocol-name {
    except;
  }
  system-services service-name {
    except;
  }
}
```

Hierarchy Level

[edit security zones functional-zone management],
[edit security zones functional-zone management interfaces *interface-name*],
[edit security zones security-zone *zone-name*],
[edit security zones security-zone *zone-name* interfaces *interface-name*]

Release Information Statement introduced in Junos OS Release 8.5.

Description Control the type of traffic that can reach the device from interfaces bound to the zone.

Options The remaining statements are explained separately. See CLI Explorer.

Required Privilege Level

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

Related Documentation

- *Understanding How to Control Inbound Traffic Based on Traffic Types*
- *Understanding How to Control Inbound Traffic Based on Protocols*

inet6 (Security Forwarding Options)

Supported Platforms SRX Series, vSRX

Syntax

```
inet6 {
  mode (drop | flow-based | packet-based);
}
```

Hierarchy Level [edit security forwarding-options family]

Release Information Statement introduced in Junos OS Release 8.5.

Description Enable packet-based or flow-based processing of IPv6 traffic. By default, the device drops IPv6 traffic.

NOTE: Packet-based processing is not supported on the following SRX Series devices: SRX1500, SRX5600, and SRX5800.

Options The **mode** statement is described separately.

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

Related Documentation

- family inet6 on page 286

interfaces (CoS)

Syntax

```
interfaces
  interface-name {
    input-scheduler-map map-name ;
    input-shaping-rate rate ;
    scheduler-map  map-name ;
    scheduler-map-chassis  map-name  ;
    shaping-rate rate ;
    unit  logical-unit-number  {
      adaptive-shaper  adaptive-shaper-name  ;
      classifiers {
        (dscp | dscp-ipv6 | exp | ieee-802.1 | inet-precedence)
        ( classifier-name  | default);
      }
      forwarding-class  class-name  ;
      fragmentation-map map-name ;
      input-scheduler-map map-name  ;
      input-shaping-rate (percent  percentage  |  rate  );
      input-traffic-control-profile  profiler-name  shared-instance  instance-name  ;
      loss-priority-maps {
        default;
        map-name ;
      }
      output-traffic-control-profile  profile-name  shared-instance  instance-name  ;
      rewrite-rules {
        dscp (  rewrite-name  | default);
        dscp-ipv6 (  rewrite-name  | default);
        exp (  rewrite-name  | default) protocol  protocol-types  ;
        frame-relay-de (  rewrite-name  | default);
        inet-precedence (  rewrite-name  | default);
      }
      scheduler-map map-name ;
      shaping-rate rate  ;
      virtual-channel-group group-name  ;
    }
  }
}
```

Hierarchy Level [edit class-of-service interface *interface-name* unit *number*]

Release Information Statement introduced in Junos OS Release 8.5.

Description Associate the class-of-service configuration elements with an interface.

Options interface *interface-name* unit *number*—The user-specified interface name and unit number.

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

Related Documentation
- *Class of Service Feature Guide for Security Devices*

interface (MVRP)

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax

```
interface (all | interface-name) {
  join-timer milliseconds;
  leave-timer milliseconds;
  leaveall-timer milliseconds;
  point-to-point;
  registration (forbidden | normal | restricted);
}
```

Hierarchy Level [edit protocols mvrp],
[edit routing-instances *routing-instance-name* protocols mvrp] (for virtual switch instance type)

Release Information Statement introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description Specify interfaces on which to configure Multiple VLAN Registration Protocol (MVRP).

Default By default, MVRP is disabled.

Options **all**—Configure MVRP on all interfaces on the SRX Series device.

interface-name—Configure MVRP on specific interfaces.

The remaining statements are explained separately.

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

Related Documentation

- *Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration*

interfaces (Security Zones)

Supported Platforms SRX Series, vSRX

Syntax

```
interfaces interface-name {
  host-inbound-traffic {
    protocols protocol-name {
      except;
    }
    system-services service-name {
      except;
    }
  }
}
```

Hierarchy Level [edit security zones functional-zone management],
[edit security zones security-zone *zone-name*]

Release Information Statement introduced in Junos OS Release 8.5.

Description Specify the set of interfaces that are part of the zone.

Options ***interface-name*** —Name of the interface.

The remaining statements are explained separately. See CLI Explorer.

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

Related Documentation

- *Understanding Security Zones*

interface (Switching Options)

Supported Platforms SRX Series, vSRX

Syntax

```
interface interface-name {
  encapsulation-type;
  ignore-encapsulation-mismatch;
  pseudowire-status-tlv;
  static-mac mac-address {
    vlan-id vlan-id;
  }
}
```

Hierarchy Level [edit vlans *vlans-name* switch-options]

Release Information Statement modified in Junos OS Release 9.5.

Description Specify the logical interfaces to include in the VLAN.

Options

- ***interface-name***—Name of a logical interface.
- ***encapsulation-type***—Encapsulation type for VPN.
- ***ignore-encapsulation-mismatch***—Allow different encapsulation types on local and remote devices.
- ***pseudowire-status-tlv***—Send pseudowire status.
- ***mac-address***—Static MAC address assigned to the logical interface.
- ***vlan-id***—VLAN identifier.

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

Related Documentation

- Understanding VLANs on page 27

join-timer (MVRP)

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax join-timer *milliseconds*;

Hierarchy Level [edit protocols mvrp interface (all | *interface-name*)],
[edit routing-instances *routing-instance-name* protocols mvrp] (for virtual switch instance type),
[edit routing-instances *routing-instance-name* protocols mvrp interface (all | *interface-name*)] (for virtual switch instance type)

Release Information Statement introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description For Multiple VLAN Registration Protocol (MVRP), configure the maximum interval interfaces must wait before sending MVRP protocol data units (PDUs).

Options ***milliseconds***—Interval that the interface must wait before sending MVRP PDUs (range from 100 milliseconds through 500 milliseconds). Maintain default timer settings unless there is a compelling reason to change the settings. Modifying timers to inappropriate values might cause an imbalance in the operation of MVRP.

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

Related Documentation
- *Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration*

l2-learning (Protocols)

Supported Platforms SRX Series

Syntax

```
l2-learning {
  global-mac-limit limit {
  packet-action-drop
  }
  global-mac-table-aging-time seconds;
  global-mode (switching | transparent-bridge) ;
  global-no-mac-learning;
}
```

Hierarchy Level [edit protocols]

Release Information Statement modified in Junos OS Release 9.5. Support for global mode added in Junos OS Release 15.1X49-D40.

Description Configure Layer 2 address learning and forwarding properties globally.

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

- global-mac-table-aging-time (Protocols) on page 292
- global-mac-limit (Protocols) on page 293
- global-no-mac-learning (Protocols) on page 294
- global-mode (Protocols) on page 294

leave-timer (MVRP)

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax leave-timer *milliseconds*;

Hierarchy Level [edit protocols mvrp interface (all | *interface-name*)],
[edit routing-instances *routing-instance-name* protocols mvrp] (for virtual switch instance type),
[edit routing-instances *routing-instance-name* protocols mvrp interface (all | *interface-name*)] (for virtual switch instance type)

Release Information Statement introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description For Multiple VLAN Registration Protocol (MVRP), configure the number of milliseconds the switch retains a VLAN in the Leave state before the VLAN is unregistered. If the interface receives a join message before this timer expires, the VLAN remains registered.

Default 1000 milliseconds

Options ***milliseconds***—Interval that the switch retains a VLAN in the Leave state before the VLAN is unregistered. At a minimum, set the **leave-timer** interval at twice the join-timer interval (range from 300 milliseconds through 1000 milliseconds). Maintain default timer settings unless there is a compelling reason to change the settings. Modifying timers to inappropriate values might cause an imbalance in the operation of MVRP.

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

Related Documentation
- *Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration*

leaveall-timer (MVRP)

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax leaveall-timer *milliseconds*;

Hierarchy Level [edit protocols mvrp interface (all | *interface-name*)],
[edit routing-instances *routing-instance-name* protocols mvrp] (for virtual switch instance type),
[edit routing-instances *routing-instance-name* protocols mvrp interface (all | *interface-name*)] (for virtual switch instance type)

Release Information Statement introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description For Multiple VLAN Registration Protocol (MVRP), configure the interval at which the LeaveAll state operates on the interface.

Default 60 seconds

Options ***seconds***—Interval between the sending of Leave All messages (range from 10 seconds through 60 seconds. Maintain default timer settings unless there is a compelling reason to change the settings. Modifying timers to inappropriate values might cause an imbalance in the operation of MVRP.

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

Related Documentation
- *Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration*

loss-priority (CoS Loss Priority)

Supported Platforms SRX Series, vSRX

Syntax loss-priority *level* code-points [*values*];

Hierarchy Level [edit class-of-service loss-priority-maps frame-relay-de *map-name*]

Release Information Statement introduced in Junos OS Release 9.2.

Description Map CoS values to a loss priority.

Options *level* can be one of the following:

- **high**—Packet has high loss priority.
- **medium-high**—Packet has medium-high loss priority.
- **medium-low**—Packet has medium-low loss priority.
- **low**—Packet has low loss priority.

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

Related Documentation

- *Understanding Interfaces*

match (Security Policies)

Supported Platforms SRX Series, vSRX

Syntax

```
match {
  application {
    [application];
    any;
  }
  destination-address {
    [address];
    any;
    any-ipv4;
    any-ipv6;
  }
  source-address {
    [address];
    any;
    any-ipv4;
    any-ipv6;
  }
  source-identity {
    [role-name];
    any;
    authenticated-user;
    unauthenticated-user;
    unknown-user;
  }
}
```

Hierarchy Level [edit security policies from-zone *zone-name* to-zone *zone-name* policy *policy-name*]

Release Information Statement introduced in Junos OS Release 8.5. Statement updated with the **source-identity** option in Junos OS Release 12.1.

Description Configure security policy match criteria.

Options The remaining statements are explained separately. See CLI Explorer.

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

Related Documentation

- *Security Policies Overview*

mvrp

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax

```
mvrp {
  bpdu-destination-mac-address provider-bridge-group;
  join-timer milliseconds;
  leave-timer milliseconds;
  leaveall-timer milliseconds;
  interface (all | interface-name) {
    join-timer milliseconds;
    leave-timer milliseconds;
    leaveall-timer milliseconds;
    point-to-point;
    registration (forbidden | normal | restricted);
  }
  no-attribute-length-in-pdu
  no-dynamic-vlan;
  traceoptions {
    file filename <files number > <size size> <no-stamp | world-readable |
      no-world-readable>;
    flag flag;
  }
}
```

Hierarchy Level [edit protocols],
[edit routing-instances *routing-instance-name* protocols] (for virtual switch instance type),

Release Information Statement introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description For Layer 2 networks, configure Multiple VLAN Registration Protocol (MVRP) to dynamically share VLAN information and dynamically configure needed VLANs. Maintaining VLAN configurations based on active VLANs reduces the amount of traffic traveling in the network, saving network resources. MVRP is configured on trunk interfaces.

The remaining statements are explained separately.

Default MVRP is disabled by default.

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

Related Documentation
- *Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration*

native-vlan-id (Interfaces)

Supported Platforms SRX Series, vSRX

Syntax native-vlan-id*vlan-id*;

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Configure VLAN identifier for untagged packets received on the physical interface of a trunk mode interface.

Options ***vlan-id***—Configure a VLAN identifier for untagged packets. Enter a number from 0 through 4094.

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

Related Documentation

- *Understanding Interfaces*

no-attribute-length-in-pdu

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax no-attribute-length-in-pdu;

Hierarchy Level [edit protocols mvrp]

Release Information Statement introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description Include an extra byte in protocol data units (PDUs) sent by Multiple VLAN Registration Protocol (MVRP). You can recognize an MVRP version compatibility issue by observing the switch running the ELS version of MVRP. Because a switch running the ELS version of MVRP cannot interpret an unmodified PDU from a switch running the non-ELS version of MVRP, the switch does not add VLANs from the non-ELS version of MVRP. When you execute the command **show mvrp statistics** in the ELS version of MVRP, the values for **Received Join Empty** and **Received Join In** incorrectly display as zero, even though the value for the **Received MVRP PDUs without error** has been increased. Another indication that MVRP is having a version compatibility issue is that unexpected VLAN activity, such as multiple VLAN creation, taking place on the switch running the ELS version of MVRP.

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

Related Documentation

- *Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration*

no-dynamic-vlan

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax no-dynamic-vlan;

Hierarchy Level [edit protocols mvrp],
[edit routing-instances *routing-instance-name* protocols mvrp] (for virtual switch instance type)

Release Information Statement introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description Disable the dynamic creation of VLANs using Multiple VLAN Registration Protocol (MVRP) for interfaces participating in MVRP.

Dynamic VLAN configuration can be enabled on an interface independent of MVRP. The MVRP dynamic VLAN configuration setting does not override the interface configuration dynamic VLAN configuration setting. If dynamic VLAN creation is disabled, no dynamic VLANs are created on the interfaces, including dynamic VLANs created using MVRP.

This option can be applied only globally; it cannot be applied per interface.

Default If MVRP is enabled, the dynamic creation of VLANs as a result of MVRP protocol exchange messages is enabled.

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

Related Documentation

- *Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration*

peer-selection-service

Supported Platforms SRX Series, vSRX

Syntax

```
peer-selection-service {
  command binary-file-path;
  disable;
  failover (alternate-media | other-routing-engine);
}
```

Hierarchy Level [edit system processes]

Release Information Statement introduced in Junos OS Release 8.5.

Description Enable the peer selection service process.

Options

- **command *binary-file-path***—Path to the binary process.
- **disable**—Disable the peer selection service process.
- **failover**—Configure the device to reboot if the software process fails four times within 30 seconds, and specify the software to use during the reboot.
  - **alternate-media**—Configure the device to switch to backup media that contains a version of the system if a software process fails repeatedly.
  - **other-routing-engine**—Instruct the secondary Routing Engine to take mastership if a software process fails. If this statement is configured for a process, and that process fails four times within 30 seconds, then the device reboots from the secondary Routing Engine.

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

Related Documentation

- Interfaces Feature Guide for Security Devices

pgcp-service

Supported Platforms SRX Series, vSRX

Syntax

```
pgcp-service {
  command binary-file-path;
  disable;
  failover (alternate-media | other-routing-engine);
}
```

Hierarchy Level [edit system processes]

Release Information Statement introduced in Junos OS Release 8.5.

Description Specify the Packet Gateway Control Protocol (PGCP) that is required for the border gateway function (BGF) feature.

Options

- **command** ***binary-file-path***—Path to the binary process.
- **disable**—Disable the Packet Gateway Control Protocol (PGCP) process.
- **failover**—Configure the device to reboot if the software process fails four times within 30 seconds, and specify the software to use during the reboot.
  - **alternate-media**—Configure the device to switch to backup media that contains a version of the system if a software process fails repeatedly.
  - **other-routing-engine**—Instruct the secondary Routing Engine to take mastership if a software process fails. If this statement is configured for a process, and that process fails four times within 30 seconds, the device reboots from the secondary Routing Engine.

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

Related Documentation

point-to-point (MVRP)

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax point-to-point;

Hierarchy Level [edit protocols mvrp interface (all | *interface-name*)],
[edit routing-instances *routing-instance-name* protocols mvrp interface (all | *interface-name*)]
(for virtual switch instance type)

Release Information Statement introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description (Optional) For Multiple VLAN Registration Protocol (MVRP) configurations, configure an interface to be recognized as a point-to-point connection. If specified, a point-to-point subset of the MRP state machine is used to provide a simpler and more efficient method to accelerate convergence on the network. Point-to-point must be enabled after enabling MVRP for the interface to be recognized as a point-to-point connection.

Default MVRP is disabled by default.

point-to-point is disabled by default.

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

Related Documentation

- join-timer on page 301
- leave-timer on page 303
- leaveall-timer on page 304
- registration on page 320
- *Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration*

policy (Security Policies)

Supported Platforms SRX Series, vSRX

Syntax

```
policy policy-name {
  description description;
  match {
    application {
      [application];
      any;
    }
    destination-address {
      [address];
      any;
      any-ipv4;
      any-ipv6;
    }
    source-address {
      [address];
      any;
      any-ipv4;
      any-ipv6;
    }
    source-identity {
      [role-name];
      any;
      authenticated-user;
      unauthenticated-user;
      unknown-user;
    }
  }
  scheduler-name scheduler-name;
  then {
    count {
      alarm {
        per-minute-threshold number;
        per-second-threshold number;
      }
    }
    deny;
    log {
      session-close;
      session-init;
    }
    permit {
      application-services {
        application-firewall {
          rule-set rule-set-name;
        }
        application-traffic-control {
          rule-set rule-set-name;
        }
        gprs-gtp-profile profile-name;
        gprs-sctp-profile profile-name;
        idp;
```



```
          redirect-wx | reverse-redirect-wx;
          ssl-proxy {
            profile-name profile-name;
          }
          uac-policy {
            captive-portal captive-portal;
          }
          utm-policy policy-name;
        }
        destination-address {
          drop-translated;
          drop-untranslated;
        }
        firewall-authentication {
          pass-through {
            access-profile profile-name;
            client-match user-or-group-name;
            web-redirect;
          }
          user-firewall {
            access-profile profile-name;
            domain domain-name
            ssl-termination-profile profile-name;
          }
          web-authentication {
            client-match user-or-group-name;
          }
        }
        services-offload;
        tcp-options {
          initial-tcp-mss mss-value;
          reverse-tcp-mss mss-value;
          sequence-check-required;
          syn-check-required;
        }
        tunnel {
          ipsec-group-vpn group-vpn;
          ipsec-vpn vpn-name;
          pair-policy pair-policy;
        }
      }
      reject;
    }
}
```

Hierarchy Level [edit security policies from-zone *zone-name* to-zone *zone-name*]

Release Information Statement introduced in Junos OS Release 8.5. The **services-offload** option added in Junos OS Release 11.4. Statement updated with the **source-identity** option and the **description** option added in Junos OS Release 12.1. Support for the **user-firewall** option added in Junos OS Release 12.1X45-D10. Support for the **initial-tcp-mss** and **reverse-tcp-mss** options added in Junos OS Release 12.3X48-D20.

Description Define a security policy.

Options ***policy-name***—Name of the security policy.

The remaining statements are explained separately. See CLI Explorer.

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

Related Documentation

- *Configuring SSL Proxy*
- *Security Policies Overview*

profile (Access)

Supported Platforms SRX Series, vSRX

Syntax

```
profile profile-name {
  accounting {
    accounting-stop-on-access-deny;
    accounting-stop-on-failure;
    coa-immediate-update;
    duplication;
    immediate-update;
    order [accounting-method];
    statistics (time | volume-time);
    update-interval minutes;
  }
  accounting-order [accounting-method];
  address-assignment pool pool-name;
  authentication-order [ldap | none | password | securid];
  authorization-order [jsrc];
  client client-name {
    chap-secret chap-secret;
    client-group [ group-names ];
    firewall-user {
      password password;
    }
    no-rfc2486;
    pap-password pap-password;
    x-auth ip-address;
  }
  client-name-filter {
    count number;
    domain-name domain-name;
    separator special-character;
  }
  ldap-options {
    assemble {
      common-name common-name;
    }
    base-distinguished-name base-distinguished-name;
    revert-interval seconds;
    search {
      admin-search {
        distinguished-name distinguished-name;
        password password;
      }
      search-filter search-filter-name;
    }
  }
  ldap-server server-address {
    port port-number;
    retry attempts;
    routing-instance routing-instance-name;
    source-address source-address;
    timeout seconds;
  }
```



```
  provisioning-order (gx-plus | jsrc);
  service {
    accounting-order {
      activation-protocol;
      radius;
    }
  }
  session-options {
    client-group [group-name];
    client-idle-timeout minutes;
    client-session-timeout minutes;
  }
}
```

Hierarchy Level [edit access]

Release Information Statement introduced in Junos OS Release 10.4.

Description Create a profile containing a set of attributes that define device management access.

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

Related Documentation

- *Understanding Interfaces*
- *Understanding User Authentication for Security Devices*
- Ethernet Switching and Layer 2 Transparent Mode Overview on page 3

recovery-timeout

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax recovery-timeout *seconds*;

Hierarchy Level [edit interfaces *interface-name* unit 0 family ethernet-switching]

Release Information Statement introduced in Junos OS Release 15.1X49-D70.

Description Configure an interface to be temporarily disabled when MAC limiting is in effect with the action **shutdown**. This enables the affected interface to recover automatically from the error condition after the specified period of time:

- If you configure MAC limiting with the **shutdown** option and you enable **recovery-timeout**, the interface is temporarily disabled when the MAC address limit is reached. The interface will recover automatically after the number of seconds specified.

NOTE: The **recovery-timeout** configuration does not apply to preexisting error conditions. It impacts only error conditions that are detected after the **recovery-timeout** statement is configured and committed. To clear a preexisting error condition and restore the interface to service, use the operational mode commands clear ethernet-switching recovery-timeout .

Default The interface does not automatically recover from an error condition.

Options *seconds*— Number of seconds that the interface remains in a disabled state due to a port error prior to automatic recovery.

Range: 10 through 3600

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

Related Documentation

- clear ethernet-switching recovery-timeout on page 336
- Understanding MAC Limiting on page 235
- Example: Configuring MAC Limiting on page 237
- Configuring Autorecovery From the Disabled State on Secure Interfaces (CLI Procedure) on page 239

redundancy-group (Interfaces)

Syntax **redundancy-group** ***number*** **;**

Hierarchy Level **[edit interfaces** ***interface-name*** **redundant-ether-options]**

Release Information Statement introduced in Junos OS Release 9.0.

Description Specify the redundancy group that a redundant Ethernet interface belongs to.

Options ***number***—Number of the redundancy group that the redundant interface belongs to. Failover properties of the interface are inherited from the redundancy group.

Range: 1 through 255

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

Related Documentation

- Interfaces Feature Guide for Security Devices

registration

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax registration (forbidden | normal | restricted);

Hierarchy Level [edit protocols mvrp interface (all | *interface-name*)],
[edit routing-instances *routing-instance-name* protocols mvrp interface (all | *interface-name*)]
(for virtual switch instance type),

Release Information Statement introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description For Multiple VLAN Registration Protocol (MVRP) configurations, configure the registration mode for the interface.

Default **normal**—The interface or interfaces accept MVRP messages and participate in MVRP.

Options **forbidden**—The interface or interfaces do not register and do not participate in MVRP.

restricted—The interface or interfaces ignore all MVRP JOIN messages received for VLANs that are not statically configured for MVRP on the interface.

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

Related Documentation

- join-timer on page 301
- leave-timer on page 303
- leaveall-timer on page 304
- registration on page 320

- *Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration*

secure-wire

Supported Platforms SRX Series

Syntax secure-wire *secure-wire-name* interface [*interface-name-1 interface-name-2*];

Hierarchy Level [edit security forwarding-options]

Release Information Statement introduced in Junos OS Release 12.3X48-D10.

Description Configure mapping of interfaces through which traffic is forwarded unchanged.

Options **secure secure-wire**—Specify a name for the secure wire interface mapping.

interface-name-1 interface-name-2—Specify a pair of peer logical interfaces that constitutes the secure wire mapping.

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

Related Documentation

security-zone

Supported Platforms SRX Series, vSRX

Syntax

```
security-zone zone-name {
  address-book {
    address address-name {
      ip-prefix {
        description text;
      }
      description text;
      dns-name domain-name {
        ipv4-only;
        ipv6-only;
      }
      range-address lower-limit to upper-limit;
      wildcard-address ipv4-address/wildcard-mask;
    }
    address-set address-set-name {
      address address-name;
      address-set address-set-name;
      description text;
    }
  }
  advance-policy-based-routing;
  application-tracking;
  description text;
  host-inbound-traffic {
    protocols protocol-name {
      except;
    }
    system-services service-name {
      except;
    }
  }
  interfaces interface-name {
    host-inbound-traffic {
      protocols protocol-name {
        except;
      }
      system-services service-name {
        except;
      }
    }
  }
  screen screen-name;
  tcp-rst;
}
```

Hierarchy Level [edit security zones]

Release Information Statement introduced in Junos OS Release 8.5. Support for wildcard addresses added in Junos OS Release 11.1. The **description** option added in Junos OS Release 12.1.

Description Define a security zone, which allows you to divide the network into different segments and apply different security options to each segment.

Options ***zone-name*** —Name of the security zone.

The remaining statements are explained separately. See CLI Explorer.

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

Related Documentation

- *Security Zones and Interfaces Overview*
- *Example: Configuring Application Firewall Rule Sets Within a Security Policy*

shaping-rate (CoS Interfaces)

Supported Platforms SRX Series, vSRX

Syntax shaping-rate *rate*;

Hierarchy Level [edit class-of-service interfaces *interface-name*],
[edit class-of-service interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 9.2.

Description For logical interfaces on which you configure packet scheduling, configure traffic shaping by specifying the amount of bandwidth to be allocated to the logical interface.

Logical and physical interface traffic shaping is mutually exclusive. This means you can include the **shaping-rate** statement at the **[edit class-of-service interfaces interface *interface-name*]** hierarchy level or the **[edit class-of-service interfaces interface *interface-name* unit *logical-unit-number*]** hierarchy level, but not both.

Alternatively, you can configure a shaping rate for a logical interface and oversubscribe the physical interface by including the **shaping-rate** statement at the **[edit class-of-service traffic-control-profiles]** hierarchy level. With this configuration approach, you can independently control the delay-buffer rate.

Default If you do not include this statement at the **[edit class-of-service interfaces interface *interface-name* unit *logical-unit-number*]** hierarchy level, the default logical interface bandwidth is the average of unused bandwidth for the number of logical interfaces that require default bandwidth treatment. If you do not include this statement at the **[edit class-of-service interfaces interface *interface-name*]** hierarchy level, the default physical interface bandwidth is the average of unused bandwidth for the number of physical interfaces that require default bandwidth treatment.

Options *rate*—Peak rate, in bits per second (bps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation **k** (1000), **m** (1,000,000), or **g** (1,000,000,000).

Range: For logical interfaces, 1000 through 32,000,000,000 bps.

For physical interfaces, 1000 through 160,000,000,000 bps.

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

Related Documentation
- Class of Service Feature Guide for Security Devices

source-address (Security Policies)

Supported Platforms SRX Series, vSRX

Syntax

```
source-address {
  [address];
  any;
  any-ipv4;
  any-ipv6;
}
```

Hierarchy Level [edit security policies from-zone *zone-name* to-zone *zone-name* policy *policy-name* match]

[edit security policies global policy *policy-name* match]

Release Information Statement introduced in Junos OS Release 8.5. Support for IPv6 addresses added in Junos OS Release 10.2. Support for IPv6 addresses in active/active chassis cluster configurations (in addition to the existing support of active/passive chassis cluster configurations) added in Junos OS Release 10.4. Support for wildcard addresses added in Junos OS Release 11.1.

Description Define the matching criteria. You can specify one or more IP addresses, address sets, or wildcard addresses. You can specify wildcards **any**, **any-ipv4**, or **any-ipv6**.

Options ***address***—IP addresses, address sets, or wildcard addresses (represented as A.B.C.D/wildcard-mask). You can configure multiple addresses or address prefixes separated by spaces and enclosed in square brackets.

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

Related Documentation

- *Security Policies Overview*
- *Understanding Security Policy Rules*
- *Understanding Security Policy Elements*

static-mac (VLANs)

Supported Platforms SRX Series, vSRX

Syntax

```
static-mac mac-address {
  vlan-id vlan-id;
}
```

Hierarchy Level [edit vlans*vlan--name* switch-options interface *interface-name*]

Release Information Statement modified in Junos OS Release 9.5.

Description Configure a static MAC address for a logical interface in a VLAN.

Options

- ***mac-address***—MAC address
- ***vlan-id***—VLAN identifier

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

Related Documentation

- Understanding VLANs on page 27

switch-options (VLANs)

Supported Platforms SRX Series, vSRX

Syntax

```
switch-options {
  interface interface-name {
    encapsulation-type;
    ignore-encapsulation-mismatch;
    pseudowire-status-tlv;
    static-mac mac-address {
      vlan-id vlan-id;
    }
  }
  mac-table-aging-time seconds;
  mac-table-size {
    number;
    packet-action drop;
  }
}
```

Hierarchy Level [edit vlans *vlans-name*]

Release Information Statement modified in Junos OS Release 9.5.

Description Configure Layer 2 learning and forwarding properties for a VLAN.

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

- Ethernet Switching and Layer 2 Transparent Mode Overview on page 3

system-services (Security Zones Interfaces)

Supported Platforms SRX Series, vSRX

Syntax

```
system-services service-name {
  except;
}
```

Hierarchy Level [edit security zones security-zone *zone-name* interfaces *interface-name* host-inbound-traffic]

Release Information Statement introduced in Junos OS Release 8.5.

Description Specify the types of traffic that can reach the device on a particular interface.

Options

- *service-name* —Service for which traffic is allowed. The following services are supported:
  - **all**—Enable all possible system services available on the Routing Engine (RE).
  - **any-service**—Enable services on entire port range.
  - **bootp**—Enable traffic destined to BOOTP and DHCP relay agents.
  - **dhcp**—Enable incoming DHCP requests.
  - **dhcpv6**—Enable incoming DHCP requests for IPv6.
  - **dns**—Enable incoming DNS services.
  - **finger**—Enable incoming finger traffic.
  - **ftp**—Enable incoming FTP traffic.
  - **http**—Enable incoming J-Web or clear-text Web authentication traffic.
  - **https**—Enable incoming J-Web or Web authentication traffic over Secure Sockets Layer (SSL).
  - **ident-reset**—Enable the access that has been blocked by an unacknowledged identification request.
  - **ike**—Enable Internet Key Exchange traffic.
  - **netconf SSH**—Enable incoming NetScreen Security Manager (NSM) traffic over SSH.
  - **ntp**—Enable incoming Network Time Protocol (NTP) traffic.
  - **ping**—Allow the device to respond to ICMP echo requests.
  - **r2cp**—Enable incoming Radio Router Control Protocol traffic.
  - **reverse-ssh**—Reverse SSH traffic.
  - **reverse-telnet**—Reverse Telnet traffic.
  - **rlogin**—Enable incoming **rlogin** (remote login) traffic.
  - **rpm**—Enable incoming real-time performance monitoring (RPM) traffic.
  - **rsh**—Enable incoming Remote Shell (**rsh**) traffic.

- **snmp**—Enable incoming SNMP traffic (UDP port 161).
- **snmp-trap**—Enable incoming SNMP traps (UDP port 162).
- **ssh**—Enable incoming SSH traffic.
- **telnet**—Enable incoming Telnet traffic.
- **tftp**—Enable TFTP services.
- **traceroute**—Enable incoming traceroute traffic (UDP port 33434).
- **xnm-clear-text**—Enable incoming Junos XML protocol traffic for all specified interfaces.
- **xnm-ssl**— Enable incoming Junos XML protocol-over-SSL traffic for all specified interfaces.

- **except**—(Optional) except can only be used if all has been defined.

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

Related Documentation
- *Security Zones and Interfaces Overview*
- *Supported System Services for Host Inbound Traffic*

unframed | no-unframed (Interfaces)

Supported Platforms SRX1500, SRX550M, vSRX

Syntax (unframed | no-unframed);

Hierarchy Level [edit interfaces *interface-name* t3-options]

Release Information Statement introduced in Junos OS Release 11.1.

Description Enable or disable framing for the T3 interface on a 1-Port Clear Channel DS3/E3 GPIM on an SRX Series device. By default, unframed mode is enabled. Select no-unframed to enable framing. Select unframed to return to the default mode.

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

Related Documentation
- *Example: Configuring a T3 Interface*

vlan-id (VLAN)

Supported Platforms EX Series, MX Series, SRX Series, vSRX

Syntax vlan-id (all | none | *number*);

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

Release Information Statement introduced in Junos OS Release 8.4.
Support for Layer 2 trunk ports added in Junos OS Release 9.2.
Support for SRX 5600, and SRX 5800 devices added in Junos OS Release 9.6.
Support for logical systems added in Junos OS Release 9.6.
Statement introduced in Junos OS Release 12.3R2 for EX Series switches.

Description 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 VIDs and the none option are not permitted.

Options *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.

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

Related Documentation

- Example: Configuring VLANs on page 29
- *Example: Configuring Interfaces and Routing Instances for a User Logical System*

vlan members (VLANs)

Supported Platforms SRX Series

Syntax vlan members [*vlan-id*];

Hierarchy Level [edit vlans *vlan-name*]

Release Information Statement modified in Junos OS Release 9.5.

Description Specify multiple VLAN identifiers to create a VLAN for each VLAN identifier.

Options ***vlan-id***—A list of valid VLAN identifiers. A VLAN is created for each VLAN identifier in the list.

NOTE: If you specify a VLAN identifier list, you cannot configure an IRB interface in the VLAN.

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

Related Documentation

- Example: Configuring VLANs on page 29

vlan-tagging (Interfaces)

Supported Platforms SRX Series, vSRX

Syntax vlan-tagging native-vlan-id *vlan-id*;

Hierarchy Level [edit interfaces *interface*]

Release Information Statement introduced in Junos OS Release 9.5.

Description Configure VLAN identifier for untagged packets received on the physical interface of a trunk mode interface.

Options **native-vlan-id**—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 Level **interface**—To view this statement in the configuration.
interface-control—To add this statement to the configuration.

Related Documentation

- *Configuring VLAN Tagging*

CHAPTER 24

Operational Commands

- show security flow status
- show security forward-options secure-wire
- show security policies
- show security zones
- show spanning-tree interface
- show vlans

clear error bpdu interface

Supported Platforms SRX1500, SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax **clear error bpdu interface (all | *interface-name*)**

Release Information Command introduced in Junos OS Release 15.1X49-D70.

Description Clear a bridge protocol data unit (BPDU) error condition caused by the detection of a possible bridging loop from Spanning Tree Protocol (STP) operation.

Required Privilege Level clear

Related Documentation

- Understanding BPDU Protection for STP, RSTP, and MSTP on page 145
- Understanding Root Protection for STP, RSTP, and MSTP on page 162
- **disable-timeout (Spanning Trees) on page 280**

clear ethernet-switching recovery-timeout

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax clear ethernet-switching recovery-timeout
<interface *interface-name*>

Release Information Command introduced in Junos OS Release 15.1X49-D70

Description Clear all MAC limiting errors from all the Ethernet switching interfaces on the device or from the specified interface, and restore the interfaces or the specified interface to service.

Options **interface *interface-name***—(Optional) Clear all MAC limiting errors from the specified interface and restore the interface to service.

Required Privilege Level clear

Related Documentation

- Understanding MAC Limiting on page 235
- Example: Configuring MAC Limiting on page 237
- Configuring Autorecovery From the Disabled State on Secure Interfaces (CLI Procedure) on page 239

clear mvrp statistics

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax

```
clear mvrp statistics
<interface interface-name>
<routing-instance routing-instance-name>
```

Release Information Statement introduced in Junos OS Release 15.1X49-D70.

Description Clear all Multiple VLAN Registration Protocol (MVRP) interface and routing instances statistics.

Options

- **interface**—Clear the MVRP interface statistics on the specified interface name.
- **routing-instances**— Clear the MVRP statistics on the specified routing instance. If you do not specify a routing instance name, statistics are cleared for the default routing instance.

Required Privilege Level clear

Related Documentation

- show mvrp on page 381

Output Fields This command produces no output.

clear oam ethernet connectivity-fault-management path-database

Supported Platforms SRX Series

Syntax clear oam ethernet connectivity-fault-management path-database maintenance-domain *md-name* maintenance-association *ma-name* host <*mac-addr*>

Release Information Statement introduced in Junos OS Release 12.1X44-D10.

Description Clear the relevant path information from the database for the specified remote host.

Options **host**—MAC address of remote host in xx:xx:xx:xx:xx:xx format.

maintenance-association —Name of the maintenance association.

maintenance-domain —Name of the maintenance domain.

Required Privilege Level clear

Related Documentation

- show oam ethernet connectivity-fault-management path-database on page 405

List of Sample Output clear oam ethernet connectivity-fault- management path-database on page 338

Sample Output

clear oam ethernet connectivity-fault- management path-database

```
user@host> clear oam ethernet connectivity-fault-management path-database
maintenance-domain private maintenance-association private-ma 00:00:5E:00:53:AA
Path database entries cleared for the remote-host
```

clear oam ethernet connectivity-fault-management statistics

Supported Platforms SRX Series

Syntax clear oam ethernet connectivity-fault-management statistics
interface
level

Release Information Statement introduced in Junos OS Release 12.1X44-D10.

Description Clear connectivity-fault-management (CFM) statistics.

Options **Interface**—Clear the statistics on an interface.

Level—The maintenance-domain level (0 through 7).

Required Privilege Level View

Related Documentation

- show oam ethernet connectivity-fault-management mep-statistics on page 400

List of Sample Output clear oam ethernet connectivity-fault- management statistics on page 339

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear oam ethernet connectivity-fault- management statistics

```
user@host> clear oam ethernet connectivity-fault-management statistics
Cleared statistics of all CFM sessions
```


clear security flow ip-action

Supported Platforms SRX Series, vSRX

Syntax **clear security flow ip-action** [*filter*]

Release Information Command introduced in Junos OS Release 10.4. Logical systems option introduced in Junos OS Release 11.2.

Description Clear IP-action entries, based on filtered options, for IP sessions running on the device.

Options *filter*—Filter the display based on the specified criteria.

The following filters display those sessions that match the criteria specified by the filter. Refer to the sample output for filtered output examples.

all | [*filter*]—All active sessions on the device.

destination-port ***destination-port***—Destination port number of the traffic. Range is 1 through 65,535.

destination-prefix ***destination-prefix***—Destination IP prefix or address.

family (inet | inet6) [*filter*]—IPv4 traffic or IPv6-NATPT traffic and filtered options.

logical-system ***logical-system-name*** **| all** [*filter*]—Specified logical system or all logical systems.

protocol ***protocol-name*** **|** ***protocol-number*** [*filter*]—Protocol name or number and filtered options.

- **ah** or **51**
- **egp** or **8**
- **esp** or **50**
- **gre** or **47**
- **icmp** or **1**
- **icmp6** or **58**
- **ipip** or **4**
- **ospf** or **89**
- **pim** or **103**
- **rsvp** or **46**
- **sctp** or **132**
- **tcp** or **6**
- **udp** or **17**

root-logical-system [*filter*]—Default logical system information and filtered options.

source-port ***source-port***—Source port number of the traffic. Range is 1 through 65,535.

source-prefix ***source-prefix***—Source IP prefix or address of the traffic.

Required Privilege Level clear

Related Documentation

- show security flow ip-action on page 414

List of Sample Output

clear security flow ip-action all on page 341
clear security flow ip-action destination-prefix on page 341
clear security flow ip-action family inet on page 341
clear security flow ip-action protocol udp on page 341

Output Fields When you enter this command, the system responds with the status of your request.

Sample Output

clear security flow ip-action all

```
user@host>clear security flow ip-action all
1008 ip-action entries cleared
```

clear security flow ip-action destination-prefix

```
user@host>clear security flow ip-action destination-prefix 192.0.2.5/24
87 ip-action entries cleared
```

clear security flow ip-action family inet

```
user@host>clear security flow ip-action family inet
2479 ip-action entries cleared
```

clear security flow ip-action protocol udp

```
user@host>clear security flow ip-action protocol udp
270 ip-action entries cleared
```

clear security flow session family

Supported Platforms SRX Series, vSRX

Syntax clear security flow session family (inet | inet6)

Release Information Command introduced in Junos OS Release 10.2.

Description Clear sessions that match the specified protocol family.

Options

- **inet**—Clear IPv4 sessions.
- **inet6**—Clear IPv6 sessions.

Required Privilege Level clear

Related Documentation

- show security flow session family on page 422

List of Sample Output clear security flow session family inet on page 342
clear security flow session family inet6 on page 342

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear security flow session family inet

```
user@host> clear security flow session family inet
1 active sessions cleared
```

clear security flow session family inet6

```
user@host> clear security flow session family inet6
1 active sessions cleared
```


show ethernet-switching mac-learning-log (View)

Supported Platforms SRX Series

Syntax **show ethernet-switching mac-learning-log**

Release Information Command introduced in Junos OS Release 9.5.

Description Displays the event log of learned MAC addresses.

Required Privilege Level view

Related Documentation

- show ethernet-switching table (View) on page 345

Output Fields Table 32 on page 343 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 32: 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-IDX	VLAN index. An internal value assigned by Junos OS for each VLAN.
MAC	Learned MAC address.
Deleted | Added	MAC address deleted or added to the MAC learning log.
Blocking	The forwarding state of the interface: • blocked—Traffic is not being forwarded on the interface. • unblocked—Traffic is forwarded on the interface.

Sample Output

show ethernet-switching mac-learning-log

```
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 table (View)

Supported Platforms SRX Series

Syntax **show ethernet-switching table (brief |detail |extensive) interface** ***interface-name***

Release Information Command introduced in Junos OS Release 9.5.

Description Displays the Ethernet switching table.

Options

- **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.

Required Privilege Level view

Related Documentation

- show ethernet-switching mac-learning-log (View) on page 343

Output Fields Table 33 on page 345 lists the output fields for the **show ethernet-switching table** command. Output fields are listed in the approximate order in which they appear.

Table 33: show ethernet-switching table Output Fields

Field Name	Field Description
VLAN	The name of a VLAN.
MAC address	The MAC address associated with the VLAN.
Type	The type of MAC address. Values are: • static—The MAC address is manually created. • learn—The MAC address is learned dynamically from a packet's source MAC address. • flood—The MAC address is unknown and flooded to all members.
Age	The time remaining before the entry ages out and is removed from the Ethernet switching table.
Interfaces	Interface associated with learned MAC addresses or All-members (flood entry).
Learned	For learned entries, the time which the entry was added to the Ethernet switching table.

Sample Output

show ethernet-switching table

```
user@host> show ethernet-switching table
Ethernet-switching table: 57 entries, 17 learned
VLAN MAC address Type Age Interfaces
```



```
F2 * Flood - All-members
F2 00:00:5E:00:53:AC Learn 0 ge-0/0/44.0
F2 00:00:5E:00:53:AD Static - Router
Linux * Flood - All-members
Linux 00:00:5E:00:53:AE Static - Router
Linux 00:00:5E:00:53:AF Learn 0 ge-0/0/47.0
T1 * Flood - All-members
T1 00:00:5E:00:53:AA Learn 0 ge-0/0/46.0
T1 00:00:5E:00:53:AB Static - Router
T1 00:00:5E:00:53:AC Learn 0 ge-0/0/46.0
T1 00:00:5E:00:53:AD Static - Router
T10 * Flood - All-members
T10 00:00:5E:00:53:AE Static - Router
T10 00:00:5E:00:53:AF Learn 0 ge-0/0/46.0
T10 00:00:5E:00:53:AG Static - Router
T111 * Flood - All-members
T111 00:00:5E:00:53:AH Learn 0 ge-0/0/15.0
T111 00:00:5E:00:53:AI Static - Router
T111 00:00:5E:00:53:AJ Learn 0 ge-0/0/15.0
T2 * Flood - All-members
T2 00:00:5E:00:53:AK Static - Router
T2 00:00:5E:00:53:AL Learn 0 ge-0/0/46.0
T2 00:00:5E:00:53:AM Static - Router
T3 * Flood - All-members
T3 00:00:5E:00:53:AN Static - Router
T3 00:00:5E:00:53:AO Learn 0 ge-0/0/46.0
T3 00:00:5E:00:53:AP Static - Router
T4 * Flood - All-members
T4 00:00:5E:00:53:AQ Static - Router
T4 00:00:5E:00:53:AR Learn 0 ge-0/0/46.0
[output truncated]
```

Sample Output

show ethernet-switching table brief

```
user@host> show ethernet-switching table brief
Ethernet-switching table: 57 entries, 17 learned
VLAN MAC address Type Age Interfaces
F2 * Flood - All-members
F2 00:00:5E:00:53:AC Learn 0 ge-0/0/44.0
F2 00:00:5E:00:53:AE Static - Router
Linux * Flood - All-members
Linux 00:00:5E:00:53:AA Static - Router
Linux 00:00:5E:00:53:AB Learn 0 ge-0/0/47.0
T1 * Flood - All-members
T1 00:00:5E:00:53:AC Learn 0 ge-0/0/46.0
T1 00:00:5E:00:53:AD Static - Router
T1 00:00:5E:00:53:AE Learn 0 ge-0/0/46.0
T1 00:00:5E:00:53:AF Static - Router
T10 * Flood - All-members
T10 00:00:5E:00:53:AG Static - Router
T10 00:00:5E:00:53:AH Learn 0 ge-0/0/46.0
T10 00:00:5E:00:53:AI Static - Router
T111 * Flood - All-members
T111 00:00:5E:00:53:AJ Learn 0 ge-0/0/15.0
T111 00:00:5E:00:53:AK Static - Router
T111 00:00:5E:00:53:AL Learn 0 ge-0/0/15.0
T2 * Flood - All-members
T2 00:00:5E:00:53:AM Static - Router
T2 00:00:5E:00:53:AN Learn 0 ge-0/0/46.0
```



```
T2 00:00:5E:00:53:AO Static - Router
T3 * Flood - All-members
T3 00:00:5E:00:53:AP Static - Router
T3 00:00:5E:00:53:AQ Learn 0 ge-0/0/46.0
T3 00:00:5E:00:53:AR Static - Router
T4 * Flood - All-members
T4 00:00:5E:00:53:AS Static - Router
T4 00:00:5E:00:53:AT Learn 0 ge-0/0/46.0
[output truncated]
```

Sample Output

show ethernet-switching table detail

```
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

```
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

```
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 interfaces (SRX Series)

Supported Platforms SRX Series, vSRX

Syntax

show interfaces {
  <brief | detail | extensive | terse>
  controller *interface-name*
  descriptions *interface-name*
  destination-class (all | *destination-class-name logical-interface-name*)
  diagnostics optics *interface-name*
  far-end-interval *interface-fpc/pic/port*
  filters *interface-name*
  flow-statistics *interface-name*
  interval *interface-name*
  load-balancing (detail | *interface-name*)
  mac-database mac-address *mac-address*
  mc-ae id *identifier* unit *number* revertive-info
  media *interface-name*
  policers *interface-name*
  queue both-ingress-egress egress forwarding-class *forwarding-class* ingress l2-statistics
  redundancy (detail | *interface-name*)
  routing brief detail summary *interface-name*
  routing-instance (all | *instance-name*)
  snmp-index *snmp-index*
  source-class (all | *destination-class-name logical-interface-name*)
  statistics *interface-name*
  switch-port *switch-port number*
  transport pm (all | optics | otn) (all | current | currentday | interval | previousday) (all |
    interface-name)
  zone *interface-name*
}

Release Information Command modified in Junos OS Release 9.5.

Description Display status information and statistics about interfaces on SRX Series appliance running Junos OS.

On SRX Series appliance, on configuring identical IPs on a single interface, you will not see a warning message; instead, you will see a syslog message.

Options

- **interface-name**—(Optional) Display standard information about the specified interface. Following is a list of typical interface names. Replace pim with the PIM slot and port with the port number.
  - **at-** ***pim/0/port***—ATM-over-ADSL or ATM-over-SHDSL interface.
  - **ce1-*pim/0/ port***—Channelized E1 interface.
  - **cl-0/0/8**—3G wireless modem interface for SRX320 devices.
  - **ct1-*pim/0/port***—Channelized T1 interface.
  - **dl0**—Dialer Interface for initiating ISDN and USB modem connections.
  - **e1-*pim/0/port***—E1 interface.

  - **e3-*pim/0/port***—E3 interface.
  - **fe-*pim/0/port***—Fast Ethernet interface.
  - **ge-*pim/0/port***—Gigabit Ethernet interface.
  - **se-*pim/0/port***—Serial interface.
  - **t1-*pim/0/port***—T1 (also called DS1) interface.
  - **t3-*pim/0/port***—T3 (also called DS3) interface.
  - **wx-*slot*/0/0**—WAN acceleration interface, for the WXC Integrated Services Module (ISM 200).

- **brief | detail | extensive | terse**—(Optional) Display the specified level of output.
- **controller**—(Optional) Show controller information.
- **descriptions**—(Optional) Display interface description strings.
- **destination-class**—(Optional) Show statistics for destination class.
- **diagnostics**—(Optional) Show interface diagnostics information.
- **far-end-interval**—(Optional) Show far end interval statistics.
- **filters**—(Optional) Show interface filters information.
- **flow-statistics**—(Optional) Show security flow counters and errors.
- **interval**—(Optional) Show interval statistics.
- **load-balancing**—(Optional) Show load-balancing status.
- **mac-database**—(Optional) Show media access control database information.
- **mc-ae**—(Optional) Show MC-AE configured interface information.
- **media**—(Optional) Display media information.
- **policers**—(Optional) Show interface policers information.
- **queue**—(Optional) Show queue statistics for this interface.
- **redundancy**—(Optional) Show redundancy status.
- **routing**—(Optional) Show routing status.
- **routing-instance**—(Optional) Name of routing instance.
- **snmp-index**—(Optional) SNMP index of interface.
- **source-class**—(Optional) Show statistics for source class.
- **statistics**—(Optional) Display statistics and detailed output.
- **switch-port**—(Optional) Front end port number (0..15).
- **transport**—(Optional) Show interface transport information.
- **zone**—(Optional) Interface's zone.

Required Privilege Level view

Related Documentation

List of Sample Output

Output Fields Table 34 on page 353 lists the output fields for the **show interfaces** command. Output fields are listed in the approximate order in which they appear.

Table 34: show interfaces Output Fields

Field Name	Field Description	Level of Output
Physical Interface		
Physical interface	Name of the physical interface.	All levels
Enabled	State of the interface.	All levels
Interface index	Index number of the physical interface, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP index number for the physical interface.	**detail extensive** none
Link-level type	Encapsulation being used on the physical interface.	All levels
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
MTU	Maximum transmission unit size on the physical interface.	All levels
Link mode	Link mode: Full-duplex or Half-duplex.	
Speed	Speed at which the interface is running.	All levels
BPDU error	Bridge protocol data unit (BPDU) error: Detected or None	
Loopback	Loopback status: **Enabled** or **Disabled**. If loopback is enabled, type of loopback: **Local** or **Remote**.	All levels
Source filtering	Source filtering status: **Enabled** or **Disabled**.	All levels
Flow control	Flow control status: **Enabled** or **Disabled**.	All levels
Auto-negotiation	(Gigabit Ethernet interfaces) Autonegotiation status: **Enabled** or **Disabled**.	All levels
Remote-fault	(Gigabit Ethernet interfaces) Remote fault status: • **Online**—Autonegotiation is manually configured as online. • **Offline**—Autonegotiation is manually configured as offline.	All levels
Device flags	Information about the physical device.	All levels
Interface flags	Information about the interface.	All levels
Link flags	Information about the physical link.	All levels
CoS queues	Number of CoS queues configured.	**detail extensive** none
Current address	Configured MAC address.	**detail extensive** none

Table 34: show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Last flapped	Date, time, and how long ago the interface went from down to up. The format is **Last flapped:** ***year-month-day hour*:*minute*:*second*:*timezone*** **(*hour*:*minute*:*second* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago).**	**detail extensive** none
Input Rate	Input rate in bits per second (bps) and packets per second (pps).	None
Output Rate	Output rate in bps and pps.	None
Active alarms and Active defects	Ethernet-specific defects that can prevent the interface from passing packets. When a defect persists for a certain amount of time, it is promoted to an alarm. These fields can contain the value **None** or **Link**. • **None**—There are no active defects or alarms. • **Link**—Interface has lost its link state, which usually means that the cable is unplugged, the far-end system has been turned off, or the PIC is malfunctioning.	**detail extensive** none
Statistics last cleared	Time when the statistics for the interface were last set to zero.	**detail extensive**
Traffic statistics	Number and rate of bytes and packets received and transmitted on the physical interface. • **Input bytes**—Number of bytes received on the interface. • **Output bytes**—Number of bytes transmitted on the interface. • **Input packets**—Number of packets received on the interface. • **Output packets**—Number of packets transmitted on the interface.	**detail extensive**

Table 34: show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Input errors	Input errors on the interface. • **Errors**—Sum of the incoming frame aborts and FCS errors. • **Drops**—Number of packets dropped by the input queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Framing errors**—Number of packets received with an invalid frame checksum (FCS). • **Runts**—Number of frames received that are smaller than the runt threshold. • **Policed discards**—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that Junos OS does not handle. • **L3 incompletes**—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. L3 incomplete errors can be ignored by configuring the **ignore-l3-incompletes** . • **L2 channel errors**—Number of times the software did not find a valid logical interface for an incoming frame. • **L2 mismatch timeouts**—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable. • **FIFO errors**—Number of FIFO errors in the receive direction that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning. • **Resource errors**—Sum of transmit drops.	**extensive**
Output errors	Output errors on the interface. • **Carrier transitions**—Number of times the interface has gone from **down** to **up**. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and then up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC or PIM is malfunctioning. • **Errors**—Sum of the outgoing frame aborts and FCS errors. • **Drops**—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism. • **Collisions**—Number of Ethernet collisions. The Gigabit Ethernet PIC supports only full-duplex operation, so for Gigabit Ethernet PICs, this number should always remain 0. If it is nonzero, there is a software bug. • **Aged packets**—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware. • **FIFO errors**—Number of FIFO errors in the send direction as reported by the ASIC on the PIC. If this value is ever nonzero, the PIC is probably malfunctioning. • **HS link CRC errors**—Number of errors on the high-speed links between the ASICs responsible for handling the interfaces. • **MTU errors**—Number of packets whose size exceeded the MTU of the interface. • **Resource errors**—Sum of transmit drops.	**extensive**

Table 34: show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Ingress queues	Total number of ingress queues supported on the specified interface.	**extensive**
Queue counters and queue number	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**

MAC statistics	**Receive** and **Transmit** statistics reported by the PIC's MAC subsystem, including the following:
	• **Total octets** and **total packets**—Total number of octets and packets.
	• **Unicast packets, Broadcast packets,** and **Multicast packets**—Number of unicast, broadcast, and multicast packets.
	• **CRC/Align errors**—Total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).
	• **FIFO error**—Number of FIFO errors that are reported by the ASIC on the PIC. If this value is ever nonzero, the PIC or a cable is probably malfunctioning.
	• **MAC control frames**—Number of MAC control frames.
	• **MAC pause frames**—Number of MAC control frames with **pause** operational code.
	• **Oversized frames**—There are two possible conditions regarding the number of oversized frames:
	  ◦ Packet length exceeds 1518 octets, or
	  ◦ Packet length exceeds MRU
	• **Jabber frames**—Number of frames that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either an FCS error or an alignment error. This definition of jabber is different from the definition in IEEE-802.3 section 8.2.1.5 (10BASE5) and section 10.3.1.4 (10BASE2). These documents define jabber as the condition in which any packet exceeds 20 ms. The allowed range to detect jabber is from 20 ms to 150 ms.
	• **Fragment frames**—Total number of packets that were less than 64 octets in length (excluding framing bits, but including FCS octets) and had either an FCS error or an alignment error. Fragment frames normally increment because both runts (which are normal occurrences caused by collisions) and noise hits are counted.
	• **VLAN tagged frames**—Number of frames that are VLAN tagged. The system uses the TPID of 0x8100 in the frame to determine whether a frame is tagged or not.
	• **Code violations**—Number of times an event caused the PHY to indicate "Data reception error" or "invalid data symbol error."
		extensive

Table 34: show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Filter statistics	**Receive** and **Transmit** statistics reported by the PIC's MAC address filter subsystem. The filtering is done by the content-addressable memory (CAM) on the PIC. The filter examines a packet's source and destination MAC addresses to determine whether the packet should enter the system or be rejected. • **Input packet count**—Number of packets received from the MAC hardware that the filter processed. • **Input packet rejects**—Number of packets that the filter rejected because of either the source MAC address or the destination MAC address. • **Input DA rejects**—Number of packets that the filter rejected because the destination MAC address of the packet is not on the accept list. It is normal for this value to increment. When it increments very quickly and no traffic is entering the device from the far-end system, either there is a bad ARP entry on the far-end system, or multicast routing is not on and the far-end system is sending many multicast packets to the local device (which the router is rejecting). • **Input SA rejects**—Number of packets that the filter rejected because the source MAC address of the packet is not on the accept list. The value in this field should increment only if source MAC address filtering has been enabled. If filtering is enabled, if the value increments quickly, and if the system is not receiving traffic that it should from the far-end system, it means that the user-configured source MAC addresses for this interface are incorrect. • **Output packet count**—Number of packets that the filter has given to the MAC hardware. • **Output packet pad count**—Number of packets the filter padded to the minimum Ethernet size (60 bytes) before giving the packet to the MAC hardware. Usually, padding is done only on small ARP packets, but some very small IP packets can also require padding. If this value increments rapidly, either the system is trying to find an ARP entry for a far-end system that does not exist or it is misconfigured. • **Output packet error count**—Number of packets with an indicated error that the filter was given to transmit. These packets are usually aged packets or are the result of a bandwidth problem on the FPC hardware. On a normal system, the value of this field should not increment. • **CAM destination filters, CAM source filters**—Number of entries in the CAM dedicated to destination and source MAC address filters. There can only be up to 64 source entries. If source filtering is disabled, which is the default, the values for these fields should be 0.	**extensive**

Autonegotiation information	Information about link autonegotiation.
	
	• **Negotiation status:**
	  ◦ **Incomplete**—Ethernet interface has the speed or link mode configured.
	  ◦ **No autonegotiation**—Remote Ethernet interface has the speed or link mode configured, or does not perform autonegotiation.
	  ◦ **Complete**—Ethernet interface is connected to a device that performs autonegotiation and the autonegotiation process is successful.
		extensive

Packet Forwarding Engine configuration	Information about the configuration of the Packet Forwarding Engine: • **Destination slot**—FPC slot number.	**extensive**

Table 34: show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CoS information	Information about the CoS queue for the physical interface. • **CoS transmit queue**—Queue number and its associated user-configured forwarding class name. • **Bandwidth %**—Percentage of bandwidth allocated to the queue. • **Bandwidth bps**—Bandwidth allocated to the queue (in bps). • **Buffer %**—Percentage of buffer space allocated to the queue. • **Buffer usec**—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time. • **Priority**—Queue priority: **low** or **high**. • **Limit**—Displayed if rate limiting is configured for the queue. Possible values are **none** and **exact**. If **exact** is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If **none** is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.	**extensive**
Interface transmit statistics	Status of the **interface-transmit-statistics** configuration: Enabled or Disabled.	**detail extensive**
Queue counters (Egress)	CoS queue number and its associated user-configured forwarding class name. • **Queued packets**—Number of queued packets. • **Transmitted packets**—Number of transmitted packets. • **Dropped packets**—Number of packets dropped by the ASIC's RED mechanism.	**detail extensive**
Logical Interface		
Logical interface	Name of the logical interface.	All levels
Index	Index number of the logical interface, which reflects its initialization sequence.	**detail extensive** none
SNMP ifIndex	SNMP interface index number for the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Flags	Information about the logical interface.	All levels
Encapsulation	Encapsulation on the logical interface.	All levels
Traffic statistics	Number and rate of bytes and packets received and transmitted on the specified interface set. • **Input bytes, Output bytes**—Number of bytes received and transmitted on the interface set. The value in this field also includes the Layer 2 overhead bytes for ingress or egress traffic on Ethernet interfaces if you enable accounting of Layer 2 overhead at the PIC level or the logical interface level. • **Input packets, Output packets**—Number of packets received and transmitted on the interface set.	**detail extensive**

Table 34: show interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Local statistics	Number and rate of bytes and packets destined to the device.	**extensive**
Transit statistics	Number and rate of bytes and packets transiting the switch. NOTE: For Gigabit Ethernet intelligent queuing 2 (IQ2) interfaces, the logical interface egress statistics might not accurately reflect the traffic on the wire when output shaping is applied. Traffic management output shaping might drop packets after they are tallied by the **Output bytes** and **Output packets** interface counters. However, correct values display for both of these egress statistics when per-unit scheduling is enabled for the Gigabit Ethernet IQ2 physical interface, or when a single logical interface is actively using a shared scheduler.	**extensive**
Security	Security zones that interface belongs to.	**extensive**
Flow Input statistics	Statistics on packets received by flow module.	**extensive**
Flow Output statistics	Statistics on packets sent by flow module.	**extensive**
Flow error statistics (Packets dropped due to)	Statistics on errors in the flow module.	**extensive**
Protocol	Protocol family.	**detail extensive** none
MTU	Maximum transmission unit size on the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**
Route Table	Route table in which the logical interface address is located. For example, **0** refers to the routing table inet.0.	**detail extensive** none
Flags	Information about protocol family flags. .	**detail extensive**
Addresses, Flags	Information about the address flags..	**detail extensive** none
Destination	IP address of the remote side of the connection.	**detail extensive** none
Local	IP address of the logical interface.	**detail extensive** none
Broadcast	Broadcast address of the logical interface.	**detail extensive** none
Generation	Unique number for use by Juniper Networks technical support only.	**detail extensive**

Sample Output

show interfaces Gigabit Ethernet

`user@host>` **show interfaces ge-0/0/1**

```
Physical interface: ge-0/0/1, Enabled, Physical link is Down
  Interface index: 135, SNMP ifIndex: 510
  Link-level type: Ethernet, MTU: 1514, Link-mode: Full-duplex, Speed: 1000mbps,

  BPDU Error: None, MAC-REWRITE Error: None, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
  Remote fault: Online
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Current address: 00:1f:12:e4:b1:01, Hardware address: 00:1f:12:e4:b1:01
  Last flapped   : 2015-05-12 08:36:59 UTC (1w1d 22:42 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Active alarms  : LINK
  Active defects : LINK
  Interface transmit statistics: Disabled

  Logical interface ge-0/0/1.0 (Index 71) (SNMP ifIndex 514)
    Flags: Device-Down SNMP-Traps 0x0 Encapsulation: ENET2
    Input packets : 0
    Output packets: 0
    Security: Zone: public
    Protocol inet, MTU: 1500
      Flags: Sendbcast-pkt-to-re
      Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
        Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255
```

Sample Output

show interfaces brief (Gigabit Ethernet)

```
user@host> show interfaces ge-3/0/2 brief
Physical interface: ge-3/0/2, Enabled, Physical link is Up
  Link-level type: 52, MTU: 1522, Speed: 1000mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
  Remote fault: Online
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None

  Logical interface ge-3/0/2.0
    Flags: SNMP-Traps 0x4000
    VLAN-Tag [ 0x8100.512 0x8100.513 ] In(pop-swap 0x8100.530) Out(swap-push
    0x8100.512 0x8100.513)
    Encapsulation: VLAN-CCC
    ccc

  Logical interface ge-3/0/2.32767
    Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x0000.0 ]  Encapsulation: ENET2
```

Sample Output

show interfaces detail (Gigabit Ethernet)

```
user@host> show interfaces ge-0/0/1 detail
Physical interface: ge-0/0/1, Enabled, Physical link is Down
  Interface index: 135, SNMP ifIndex: 510, Generation: 138
  Link-level type: Ethernet, MTU: 1514, Link-mode: Full-duplex, Speed: 1000mbps,
 BPDU Error: None, MAC-REWRITE Error: None, Loopback: Disabled, Source filtering:
```



```
Disabled,
 Flow control: Enabled, Auto-negotiation: Enabled, Remote fault: Online
 Device flags   : Present Running Down
 Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
 Link flags     : None
 CoS queues     : 8 supported, 8 maximum usable queues
 Hold-times     : Up 0 ms, Down 0 ms
 Current address: 00:1f:12:e4:b1:01, Hardware address: 00:1f:12:e4:b1:01
 Last flapped   : 2015-05-12 08:36:59 UTC (1w2d 00:00 ago)
 Statistics last cleared: Never
 Traffic statistics:
  Input  bytes  :                   0                    0 bps
  Output bytes  :                   0                    0 bps
  Input  packets:                   0                    0 pps
  Output packets:                   0                    0 pps
 Egress queues: 8 supported, 4 in use
 Queue counters:       Queued packets  Transmitted packets      Dropped packets

   0 best-effort                   0                    0                    0

   1 expedited-fo                  0                    0                    0

   2 assured-forw                  0                    0                    0

   3 network-cont                  0                    0                    0

 Queue number:         Mapped forwarding classes
   0                   best-effort
   1                   expedited-forwarding
   2                   assured-forwarding
   3                   network-control
 Active alarms  : LINK
 Active defects : LINK
 Interface transmit statistics: Disabled

 Logical interface ge-0/0/1.0 (Index 71) (SNMP ifIndex 514) (Generation 136)
   Flags: Device-Down SNMP-Traps 0x0 Encapsulation: ENET2
   Traffic statistics:
    Input  bytes  :                   0
    Output bytes  :                   0
    Input  packets:                   0
    Output packets:                   0
   Local statistics:
    Input  bytes  :                   0
    Output bytes  :                   0
    Input  packets:                   0
    Output packets:                   0
   Transit statistics:
    Input  bytes  :                   0                    0 bps
    Output bytes  :                   0                    0 bps
    Input  packets:                   0                    0 pps
    Output packets:                   0                    0 pps
   Security: Zone: public
   Flow Statistics :
   Flow Input statistics :
     Self packets :                     0
     ICMP packets :                     0
     VPN packets :                      0
     Multicast packets :                0
     Bytes permitted by policy :        0
     Connections established :          0
```



```
  Flow Output statistics:
    Multicast packets :                0
    Bytes permitted by policy :        0
  Flow error statistics (Packets dropped due to):
    Address spoofing:                  0
    Authentication failed:             0
    Incoming NAT errors:               0
    Invalid zone received packet:      0
    Multiple user authentications:     0
    Multiple incoming NAT:             0
    No parent for a gate:              0
    No one interested in self packets: 0
    No minor session:                  0
    No more sessions:                  0
    No NAT gate:                       0
    No route present:                  0
    No SA for incoming SPI:            0
    No tunnel found:                   0
    No session for a gate:             0
    No zone or NULL zone binding       0
    Policy denied:                     0
    Security association not active:   0
    TCP sequence number out of window: 0
    Syn-attack protection:             0
    User authentication errors:        0
  Protocol inet, MTU: 1500, Generation: 150, Route table: 0
    Flags: Sendbcast-pkt-to-re
    Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
      Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255, Generation:
150
```

Sample Output

show interfaces extensive (Gigabit Ethernet)

```
user@host> show interfaces ge-0/0/1.0 extensive
Physical interface: ge-0/0/1, Enabled, Physical link is Down
  Interface index: 135, SNMP ifIndex: 510, Generation: 138
  Link-level type: Ethernet, MTU: 1514, Link-mode: Full-duplex, Speed: 1000mbps,

  BPDU Error: None, MAC-REWRITE Error: None, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
  Remote fault: Online
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 00:1f:12:e4:b1:01, Hardware address: 00:1f:12:e4:b1:01
  Last flapped   : 2015-05-12 08:36:59 UTC (1w1d 22:57 ago)
  Statistics last cleared: Never
  Traffic statistics:
   Input  bytes  :                    0                    0 bps
   Output bytes  :                    0                    0 bps
   Input  packets:                    0                    0 pps
   Output packets:                    0                    0 pps
  Input errors:
    Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0,
    L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
    FIFO errors: 0, Resource errors: 0
  Output errors:
```

```
    Carrier transitions: 0, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,

    FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
  Egress queues: 8 supported, 4 in use
  Queue counters:       Queued packets  Transmitted packets      Dropped packets

    0 best-effort                    0                    0                    0

    1 expedited-fo                   0                    0                    0

    2 assured-forw                   0                    0                    0

    3 network-cont                   0                    0                    0

  Queue number:         Mapped forwarding classes
    0                   best-effort
    1                   expedited-forwarding
    2                   assured-forwarding
    3                   network-control
  Active alarms  : LINK
  Active defects : LINK
  MAC statistics:                      Receive         Transmit
    Total octets                             0                0
    Total packets                            0                0
    Unicast packets                          0                0
    Broadcast packets                        0                0
    Multicast packets                        0                0
    CRC/Align errors                         0                0
    FIFO errors                              0                0
    MAC control frames                       0                0
    MAC pause frames                         0                0
    Oversized frames                         0
    Jabber frames                            0
    Fragment frames                          0
    VLAN tagged frames                       0
    Code violations                          0
  Filter statistics:
    Input packet count                       0
    Input packet rejects                     0
    Input DA rejects                         0
    Input SA rejects                         0
    Output packet count                                       0
    Output packet pad count                                   0
    Output packet error count                                 0
    CAM destination filters: 2, CAM source filters: 0
  Autonegotiation information:
    Negotiation status: Incomplete
  Packet Forwarding Engine configuration:
    Destination slot: 0
  CoS information:
    Direction : Output
    CoS transmit queue               Bandwidth               Buffer Priority
Limit
                              %            bps     %           usec
    0 best-effort            95      950000000    95              0       low
none
    3 network-control         5       50000000     5              0       low
none
  Interface transmit statistics: Disabled

  Logical interface ge-0/0/1.0 (Index 71) (SNMP ifIndex 514) (Generation 136)
```

```
Flags: Device-Down SNMP-Traps 0x0 Encapsulation: ENET2
Traffic statistics:
 Input  bytes  :                  0
 Output bytes  :                  0
 Input  packets:                  0
 Output packets:                  0
Local statistics:
 Input  bytes  :                  0
 Output bytes  :                  0
 Input  packets:                  0
 Output packets:                  0
Transit statistics:
 Input  bytes  :                  0                    0 bps
 Output bytes  :                  0                    0 bps
 Input  packets:                  0                    0 pps
 Output packets:                  0                    0 pps
Security: Zone: public
Flow Statistics :
Flow Input statistics :
  Self packets :                   0
  ICMP packets :                   0
  VPN packets :                    0
  Multicast packets :              0
  Bytes permitted by policy :      0
  Connections established :        0
Flow Output statistics:
  Multicast packets :              0
  Bytes permitted by policy :      0
Flow error statistics (Packets dropped due to):
  Address spoofing:                0
  Authentication failed:           0
  Incoming NAT errors:             0
  Invalid zone received packet:    0
  Multiple user authentications:   0
  Multiple incoming NAT:           0
  No parent for a gate:            0
  No one interested in self packets: 0
  No minor session:                0
  No more sessions:                0
  No NAT gate:                     0
  No route present:                0
  No SA for incoming SPI:          0
  No tunnel found:                 0
  No session for a gate:           0
  No zone or NULL zone binding     0
  Policy denied:                   0
  Security association not active:   0
  TCP sequence number out of window: 0
  Syn-attack protection:           0
  User authentication errors:      0
Protocol inet, MTU: 1500, Generation: 150, Route table: 0
  Flags: Sendbcast-pkt-to-re
  Addresses, Flags: Dest-route-down Is-Preferred Is-Primary
    Destination: 1.1.1/24, Local: 1.1.1.1, Broadcast: 1.1.1.255,
    Generation: 150
```


Sample Output

show interfaces terse

```
user@host> show interfaces terse
    Interface               Admin Link Proto    Local                 Remote
    ge-0/0/0                up    up
    ge-0/0/0.0              up    up   inet     10.209.4.61/18
    gr-0/0/0                up    up
    ip-0/0/0                up    up
    st0                     up    up
    st0.1                   up    ready inet
    ls-0/0/0                up    up
    lt-0/0/0                up    up
    mt-0/0/0                up    up
    pd-0/0/0                up    up
    pe-0/0/0                up    up
    e3-1/0/0                up    up
    t3-2/0/0                up    up
    e1-3/0/0                up    up
    se-4/0/0                up    down
    t1-5/0/0                up    up
    br-6/0/0                up    up
    dc-6/0/0                up    up
    dc-6/0/0.32767          up    up
    bc-6/0/0:1              down  up
    bc-6/0/0:1.0            up    down
    dl0                     up    up
    dl0.0                   up    up   inet
    dsc                     up    up
    gre                     up    up
    ipip                    up    up
    lo0                     up    up
    lo0.16385               up    up   inet     10.0.0.1            --> 0/0
                                                10.0.0.16           --> 0/0
    lsi                     up    up
    mtun                    up    up
    pimd                    up    up
    pime                    up    up
    pp0                     up    up
```

Sample Output

show interfaces controller (Channelized E1 IQ with Logical E1)

```
user@host> show interfaces controller ce1-1/2/6

Controller                                                             Admin Link
ce1-1/2/6                                                              up    up
e1-1/2/6                                                               up    up
```

show interfaces controller (Channelized E1 IQ with Logical DS0)

```
user@host> show interfaces controller ce1-1/2/3

Controller                                                             Admin Link
ce1-1/2/3                                                              up    up

ds-1/2/3:1                                                             up    up

ds-1/2/3:2                                                             up    up
```


Sample Output

show interfaces descriptions

```
user@host> show interfaces descriptions
 Interface       Admin Link Description
 so-1/0/0        up    up   M20-3#1
 so-2/0/0        up    up   GSR-12#1
 ge-3/0/0        up    up   SMB-OSPF_Area300
 so-3/3/0        up    up   GSR-13#1
 so-3/3/1        up    up   GSR-13#2
 ge-4/0/0        up    up   T320-7#1
 ge-5/0/0        up    up   T320-7#2
 so-7/1/0        up    up   M160-6#1
 ge-8/0/0        up    up   T320-7#3
 ge-9/0/0        up    up   T320-7#4
 so-10/0/0       up    up   M160-6#2
 so-13/0/0       up    up   M20-3#2
 so-14/0/0       up    up   GSR-12#2
 ge-15/0/0       up    up   SMB-OSPF_Area100
 ge-15/0/1       up    up   GSR-13#3
```

Sample Output

show interfaces destination-class all

```
user@host> show interfaces destination-class all
Logical interface so-4/0/0.0
                                               Packets                 Bytes
      Destination class                (packet-per-second)     (bits-per-second)
                         gold                            0                     0
                                  (                      0) (                  0)
                       silver                            0                     0
                                  (                      0) (                  0)
  Logical interface so-0/1/3.0
                                               Packets                 Bytes
      Destination class                (packet-per-second)     (bits-per-second)
                         gold                            0                     0
                                  (                      0) (                  0)
                       silver                            0                     0
                                  (                      0) (                  0)
```

Sample Output

show interfaces diagnostics optics

```
user@host> show interfaces diagnostics optics ge-2/0/0
Physical interface: ge-2/0/0
    Laser bias current                        :  7.408 mA
    Laser output power                        :  0.3500 mW / -4.56 dBm
    Module temperature                        :  23 degrees C / 73 degrees F
    Module voltage                            :  3.3450 V
    Receiver signal average optical power     :  0.0002 mW / -36.99 dBm
    Laser bias current high alarm             :  Off
    Laser bias current low alarm              :  Off
    Laser bias current high warning           :  Off
    Laser bias current low warning            :  Off
    Laser output power high alarm             :  Off
    Laser output power low alarm              :  Off
    Laser output power high warning           :  Off
    Laser output power low warning            :  Off
```



```
Module temperature high alarm             :  Off
Module temperature low alarm              :  Off
Module temperature high warning           :  Off
Module temperature low warning            :  Off
Module voltage high alarm                 :  Off
Module voltage low alarm                  :  Off
Module voltage high warning               :  Off
Module voltage low warning                :  Off
Laser rx power high alarm                 :  Off
Laser rx power low alarm                  :  On
Laser rx power high warning               :  Off
Laser rx power low warning                :  On
Laser bias current high alarm threshold   :  17.000 mA
Laser bias current low alarm threshold    :  1.000 mA
Laser bias current high warning threshold :  14.000 mA
Laser bias current low warning threshold  :  2.000 mA
Laser output power high alarm threshold   :  0.6310 mW / -2.00 dBm
Laser output power low alarm threshold    :  0.0670 mW / -11.74 dBm
Laser output power high warning threshold :  0.6310 mW / -2.00 dBm
Laser output power low warning threshold  :  0.0790 mW / -11.02 dBm
Module temperature high alarm threshold   :  95 degrees C / 203 degrees F
Module temperature low alarm threshold    :  -25 degrees C / -13 degrees F
Module temperature high warning threshold :  90 degrees C / 194 degrees F
Module temperature low warning threshold  :  -20 degrees C / -4 degrees F
Module voltage high alarm threshold       :  3.900 V
Module voltage low alarm threshold        :  2.700 V
Module voltage high warning threshold     :  3.700 V
Module voltage low warning threshold      :  2.900 V
Laser rx power high alarm threshold       :  1.2590 mW / 1.00 dBm
Laser rx power low alarm threshold        :  0.0100 mW / -20.00 dBm
Laser rx power high warning threshold     :  0.7940 mW / -1.00 dBm
Laser rx power low warning threshold      :  0.0158 mW / -18.01 dBm
```

Sample Output

show interfaces far-end-interval coc12-5/2/0

```
user@host> show interfaces far-end-interval coc12-5/2/0
Physical interface: coc12-5/2/0, SNMP ifIndex: 121
  05:30-current:
    ES-L: 1, SES-L: 1, UAS-L: 0
  05:15-05:30:
    ES-L: 0, SES-L: 0, UAS-L: 0
  05:00-05:15:
    ES-L: 0, SES-L: 0, UAS-L: 0
  04:45-05:00:
    ES-L: 0, SES-L: 0, UAS-L: 0
  04:30-04:45:
    ES-L: 0, SES-L: 0, UAS-L: 0
  04:15-04:30:
    ES-L: 0, SES-L: 0, UAS-L: 0
  04:00-04:15:
...
```

show interfaces far-end-interval coc1-5/2/1:1

```
user@host> run show interfaces far-end-interval coc1-5/2/1:1
 Physical interface: coc1-5/2/1:1, SNMP ifIndex: 342
  05:30-current:
    ES-L: 1, SES-L: 1, UAS-L: 0, ES-P: 0, SES-P: 0, UAS-P: 0
```



```
  05:15-05:30:
    ES-L: 0, SES-L: 0, UAS-L: 0, ES-P: 0, SES-P: 0, UAS-P: 0
  05:00-05:15:
    ES-L: 0, SES-L: 0, UAS-L: 0, ES-P: 0, SES-P: 0, UAS-P: 0
  04:45-05:00:
    ES-L: 0, SES-L: 0, UAS-L: 0, ES-P: 0, SES-P: 0, UAS-P: 0
  04:30-04:45:
    ES-L: 0, SES-L: 0, UAS-L: 0, ES-P: 0, SES-P: 0, UAS-P: 0
  04:15-04:30:
    ES-L: 0, SES-L: 0, UAS-L: 0, ES-P: 0, SES-P: 0, UAS-P: 0
  04:00-04:15:
```

Sample Output

show interfaces filters

```
user@host> show interfaces filters
Interface       Admin Link Proto Input Filter         Output Filter
ge-0/0/0        up    up
ge-0/0/0.0      up    up   inet
                           iso
ge-5/0/0        up    up
ge-5/0/0.0      up    up   any                        f-any
                           inet                       f-inet
                           multiservice
gr-0/3/0        up    up
ip-0/3/0        up    up
mt-0/3/0        up    up
pd-0/3/0        up    up
pe-0/3/0        up    up
vt-0/3/0        up    up
at-1/0/0        up    up
at-1/0/0.0      up    up   inet
                           iso
at-1/1/0        up    down
at-1/1/0.0      up    down inet
                           iso
....
```

Sample Output

show interfaces flow-statistics (Gigabit Ethernet)

```
user@host> show interfaces flow-statistics ge-0/0/1.0
  Logical interface ge-0/0/1.0 (Index 70) (SNMP ifIndex 49)
    Flags: SNMP-Traps Encapsulation: ENET2
    Input packets : 5161
    Output packets: 83
    Security: Zone: zone2
    Allowed host-inbound traffic : bootp bfd bgp  dns dvmrp  ldp msdp nhrp ospf
pgm
    pim rip router-discovery rsvp sap vrrp dhcp finger ftp tftp ident-reset http
 https ike
   netconf ping rlogin rpm rsh snmp snmp-trap ssh telnet traceroute xnm-clear-text
 xnm-ssl
    lsping
    Flow Statistics :
    Flow Input statistics :
      Self packets :                     0
      ICMP packets :                     0
      VPN packets :                      2564
```

```
      Bytes permitted by policy :        3478
      Connections established :          1
    Flow Output statistics:
      Multicast packets :                0
      Bytes permitted by policy :        16994
    Flow error statistics (Packets dropped due to):
      Address spoofing:                  0
      Authentication failed:             0
      Incoming NAT errors:               0
      Invalid zone received packet:      0
      Multiple user authentications:     0
      Multiple incoming NAT:             0
      No parent for a gate:              0
      No one interested in self packets: 0
      No minor session:                  0
      No more sessions:                  0
      No NAT gate:                       0
      No route present:                  0
      No SA for incoming SPI:            0
      No tunnel found:                   0
      No session for a gate:             0
      No zone or NULL zone binding       0
      Policy denied:                     0
      Security association not active:   0
      TCP sequence number out of window: 0
      Syn-attack protection:             0
      User authentication errors:        0
    Protocol inet, MTU: 1500
      Flags: None
      Addresses, Flags: Is-Preferred Is-Primary
        Destination:  203.0.113.1/24, Local: 203.0.113.2, Broadcast: 2.2.2.255
```

Sample Output

show interfaces interval (Channelized OC12)

```
user@host> show interfaces interval t3-0/3/0:0
Physical interface: t3-0/3/0:0, SNMP ifIndex: 23
  17:43-current:
    LCV: 0, PCV: 0, CCV: 0, LES: 0, PES: 0, PSES: 0, CES: 0, CSES: 0,
    SEFS: 0, UAS: 0
  17:28-17:43:
    LCV: 0, PCV: 0, CCV: 0, LES: 0, PES: 0, PSES: 0, CES: 0, CSES: 0,
    SEFS: 0, UAS: 0
  17:13-17:28:
    LCV: 0, PCV: 0, CCV: 0, LES: 0, PES: 0, PSES: 0, CES: 0, CSES: 0,
    SEFS: 0, UAS: 0
  16:58-17:13:
    LCV: 0, PCV: 0, CCV: 0, LES: 0, PES: 0, PSES: 0, CES: 0, CSES: 0,
    SEFS: 0, UAS: 0
  16:43-16:58:
    LCV: 0, PCV: 0, CCV: 0, LES: 0, PES: 0, PSES: 0, CES: 0, CSES: 0,
...
Interval Total:
    LCV: 230, PCV: 1145859, CCV: 455470, LES: 0, PES: 230, PSES: 230,
    CES: 230, CSES: 230, SEFS: 230, UAS: 238
```

show interfaces interval (E3)

```
user@host> show interfaces interval e3-0/3/0
```

```
Physical interface: e3-0/3/0, SNMP ifIndex: 23
  17:43-current:
    LCV: 0, PCV: 0, CCV: 0, LES: 0, PES: 0, PSES: 0, CES: 0, CSES: 0,
    SEFS: 0, UAS: 0
  17:28-17:43:
    LCV: 0, PCV: 0, CCV: 0, LES: 0, PES: 0, PSES: 0, CES: 0, CSES: 0,
    SEFS: 0, UAS: 0
  17:13-17:28:
    LCV: 0, PCV: 0, CCV: 0, LES: 0, PES: 0, PSES: 0, CES: 0, CSES: 0,
    SEFS: 0, UAS: 0
  16:58-17:13:
    LCV: 0, PCV: 0, CCV: 0, LES: 0, PES: 0, PSES: 0, CES: 0, CSES: 0,
    SEFS: 0, UAS: 0
  16:43-16:58:
    LCV: 0, PCV: 0, CCV: 0, LES: 0, PES: 0, PSES: 0, CES: 0, CSES: 0,
....
Interval Total:
    LCV: 230, PCV: 1145859, CCV: 455470, LES: 0, PES: 230, PSES: 230,
    CES: 230, CSES: 230, SEFS: 230, UAS: 238
```

show interfaces interval (SONET/SDH)

```
user@host> show interfaces interval so-0/1/0
Physical interface: so-0/1/0, SNMP ifIndex: 19
  20:02-current:
    ES-S: 0, SES-S: 0, SEFS-S: 0, ES-L: 0, SES-L: 0, UAS-L: 0, ES-P: 0,
    SES-P: 0, UAS-P: 0
  19:47-20:02:
    ES-S: 267, SES-S: 267, SEFS-S: 267, ES-L: 267, SES-L: 267, UAS-L: 267,
    ES-P: 267, SES-P: 267, UAS-P: 267
  19:32-19:47:
    ES-S: 56, SES-S: 56, SEFS-S: 56, ES-L: 56, SES-L: 56, UAS-L: 46, ES-P: 56,
    SES-P: 56, UAS-P: 46
  19:17-19:32:
    ES-S: 0, SES-S: 0, SEFS-S: 0, ES-L: 0, SES-L: 0, UAS-L: 0, ES-P: 0,
    SES-P: 0, UAS-P: 0
  19:02-19:17:
.....
```

Sample Output

show interfaces load-balancing

```
user@host> show interfaces load-balancing
Interface   State            Last change   Member count
ams0        Up               1d 00:50      2
ams1        Up               00:00:59      2
```

show interfaces load-balancing detail

```
user@host>show interfaces load-balancing detail
Load-balancing interfaces detail
Interface        : ams0
  State          : Up
  Last change    : 1d 00:51
  Member count   : 2
  Members        :
      Interface    Weight   State
      mams-2/0/0    10        Active
      mams-2/1/0    10        Active
```


Sample Output

show interfaces mac-database (All MAC Addresses on a Port)

```
user@host> show interfaces mac-database xe-0/3/3
Physical interface: xe-0/3/3, Enabled, Physical link is Up
  Interface index: 372, SNMP ifIndex: 788
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps, Loopback:
None, Source filtering: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None

  Logical interface xe-0/3/3.0 (Index 364) (SNMP ifIndex 829)
    Flags: SNMP-Traps 0x4004000 Encapsulation: ENET2
  MAC address         Input frames     Input bytes  Output frames    Output bytes
  00:00:00:00:00:00              1              56              0               0
  00:00:c0:01:01:02        7023810       323095260              0               0
  00:00:c0:01:01:03        7023810       323095260              0               0
  00:00:c0:01:01:04        7023810       323095260              0               0
  00:00:c0:01:01:05        7023810       323095260              0               0
  00:00:c0:01:01:06        7023810       323095260              0               0
  00:00:c0:01:01:07        7023810       323095260              0               0
  00:00:c0:01:01:08        7023809       323095214              0               0
  00:00:c0:01:01:09        7023809       323095214              0               0
  00:00:c0:01:01:0a        7023809       323095214              0               0
  00:00:c0:01:01:0b        7023809       323095214              0               0
  00:00:c8:01:01:02       30424784      1399540064       37448598      1722635508
  00:00:c8:01:01:03       30424784      1399540064       37448598      1722635508
  00:00:c8:01:01:04       30424716      1399536936       37448523      1722632058
  00:00:c8:01:01:05       30424789      1399540294       37448598      1722635508
  00:00:c8:01:01:06       30424788      1399540248       37448597      1722635462
  00:00:c8:01:01:07       30424783      1399540018       37448597      1722635462
  00:00:c8:01:01:08       30424783      1399540018       37448596      1722635416
  00:00:c8:01:01:09        8836796       406492616        8836795       406492570
  00:00:c8:01:01:0a       30424712      1399536752       37448521      1722631966
  00:00:c8:01:01:0b       30424715      1399536890       37448523      1722632058
  Number of MAC addresses : 21
```

show interfaces mac-database (All MAC Addresses on a Service)

```
user@host> show interfaces mac-database xe-0/3/3
Logical interface xe-0/3/3.0 (Index 364) (SNMP ifIndex 829)
    Flags: SNMP-Traps 0x4004000 Encapsulation: ENET2
  MAC address         Input frames     Input bytes  Output frames    Output bytes
  00:00:00:00:00:00              1              56              0               0
  00:00:c0:01:01:02        7023810       323095260              0               0
  00:00:c0:01:01:03        7023810       323095260              0               0
  00:00:c0:01:01:04        7023810       323095260              0               0
  00:00:c0:01:01:05        7023810       323095260              0               0
  00:00:c0:01:01:06        7023810       323095260              0               0
  00:00:c0:01:01:07        7023810       323095260              0               0
  00:00:c0:01:01:08        7023809       323095214              0               0
  00:00:c0:01:01:09        7023809       323095214              0               0
  00:00:c0:01:01:0a        7023809       323095214              0               0
  00:00:c0:01:01:0b        7023809       323095214              0               0
  00:00:c8:01:01:02       31016568      1426762128       38040381      1749857526
```

```
00:00:c8:01:01:03       31016568     1426762128       38040382      1749857572
00:00:c8:01:01:04       31016499     1426758954       38040306      1749854076
00:00:c8:01:01:05       31016573     1426762358       38040381      1749857526
00:00:c8:01:01:06       31016573     1426762358       38040381      1749857526
00:00:c8:01:01:07       31016567     1426762082       38040380      1749857480
00:00:c8:01:01:08       31016567     1426762082       38040379      1749857434
00:00:c8:01:01:09        9428580      433714680        9428580       433714680
00:00:c8:01:01:0a       31016496     1426758816       38040304      1749853984
00:00:c8:01:01:0b       31016498     1426758908       38040307      1749854122
```

show interfaces mac-database mac-address

```
user@host> show interfaces mac-database xe-0/3/3 mac-address  00:00:c8:01:01:09
Physical interface: xe-0/3/3, Enabled, Physical link is Up
  Interface index: 372, SNMP ifIndex: 788
  Link-level type: Ethernet, MTU: 1514, LAN-PHY mode, Speed: 10Gbps, Loopback:
None, Source filtering: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  Link flags     : None

  Logical interface xe-0/3/3.0 (Index 364) (SNMP ifIndex 829)
    Flags: SNMP-Traps 0x4004000 Encapsulation: ENET2
  MAC address: 00:00:c8:01:01:09, Type: Configured,
    Input bytes     : 202324652
    Output bytes    : 202324560
    Input frames    : 4398362
    Output frames   : 4398360
  Policer statistics:
  Policer type      Discarded frames    Discarded bytes
  Output aggregate           3992386          183649756
```

Sample Output

show interfaces mc-ae

```
user@host> show interfaces mc-ae ae0 unit 512
  Member Links   : ae0
  Local Status   : active
  Peer Status    : active
  Logical Interface         : ae0.512
  Core Facing Interface : Label Ethernet Interface
  ICL-PL         : Label Ethernet Interface
```

show interfaces media (SONET/SDH)

The following example displays the output fields unique to the **show interfaces media** command for a SONET interface (with no level of output specified):

```
user@host> show interfaces media so-4/1/2
Physical interface: so-4/1/2, Enabled, Physical link is Up
  Interface index: 168, SNMP ifIndex: 495
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC48,
  Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running
  Interface flags: Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 1783 (00:00:00 ago), Output: 1786 (00:00:08 ago)
  LCP state: Opened
```

```
  NCP state: inet: Not-configured, inet6: Not-configured, iso: Not-configured,
  mpls: Not-configured
  CHAP state: Not-configured
  CoS queues     : 8 supported
  Last flapped   : 2005-06-15 12:14:59 PDT (04:31:29 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SONET alarms   : None
  SONET defects  : None
  SONET errors:
     BIP-B1: 121, BIP-B2: 916, REI-L: 0, BIP-B3: 137, REI-P: 16747, BIP-BIP2: 0
  Received path trace: routerb so-1/1/2
  Transmitted path trace: routera so-4/1/2
```

Sample Output

show interfaces policers

```
user@host> show interfaces policers
Interface       Admin Link Proto Input Policer         Output Policer
ge-0/0/0        up    up
ge-0/0/0.0      up    up   inet
                           iso
gr-0/3/0        up    up
ip-0/3/0        up    up
mt-0/3/0        up    up
pd-0/3/0        up    up
pe-0/3/0        up    up
...
so-2/0/0        up    up
so-2/0/0.0      up    up   inet  so-2/0/0.0-in-policer so-2/0/0.0-out-policer
                           iso
so-2/1/0        up    down
...
```

show interfaces policers interface-name

```
user@host> show interfaces policers so-2/1/0
Interface       Admin Link Proto Input Policer         Output Policer
so-2/1/0        up    down
so-2/1/0.0      up    down inet  so-2/1/0.0-in-policer so-2/1/0.0-out-policer
                           iso
                           inet6
```

Sample Output

show interfaces queue

The following truncated example shows the CoS queue sizes for queues 0, 1, and 3. Queue 1 has a queue buffer size (guaranteed allocated memory) of 9192 bytes.

```
user@host> show interfaces queue
Physical interface: ge-0/0/0, Enabled, Physical link is Up
  Interface index: 134, SNMP ifIndex: 509
Forwarding classes: 8 supported, 8 in use
Egress queues: 8 supported, 8 in use
Queue: 0, Forwarding classes: class0
  Queued:
    Packets              :                    0                     0 pps
    Bytes                :                    0                     0 bps
```

```
  Transmitted:
    Packets              :              0                 0 pps
    Bytes                :              0                 0 bps
    Tail-dropped packets :              0                 0 pps
    RL-dropped packets   :              0                 0 pps
    RL-dropped bytes     :              0                 0 bps
    RED-dropped packets  :              0                 0 pps
     Low                 :              0                 0 pps
     Medium-low          :              0                 0 pps
     Medium-high         :              0                 0 pps
     High                :              0                 0 pps
    RED-dropped bytes    :              0                 0 bps
     Low                 :              0                 0 bps
     Medium-low          :              0                 0 bps
     Medium-high         :              0                 0 bps
     High                :              0                 0 bps
  Queue Buffer Usage:
    Reserved buffer      :      118750000 bytes
  Queue-depth bytes      :
    Current              :              0
..
..
Queue: 1, Forwarding classes: class1
..
..
 Queue Buffer Usage:
    Reserved buffer      :           9192 bytes
  Queue-depth bytes      :
    Current              :              0
..
..
Queue: 3, Forwarding classes: class3
  Queued:
..
..
Queue Buffer Usage:
    Reserved buffer      :        6250000 bytes
  Queue-depth bytes      :
    Current              :              0
..
..
```

Sample Output

show interfaces redundancy

```
user@host> show interfaces redundancy
Interface  State         Last change  Primary   Secondary  Current status
rsp0       Not present                sp-1/0/0  sp-0/2/0   both down
rsp1       On secondary  1d 23:56     sp-1/2/0  sp-0/3/0   primary down
rsp2       On primary    10:10:27     sp-1/3/0  sp-0/2/0   secondary down
rlsq0      On primary    00:06:24     lsq-0/3/0 lsq-1/0/0  both up
```

show interfaces redundancy (Aggregated Ethernet)

```
user@host> show interfaces redundancy
Interface  State          Last change  Primary     Secondary    Current status
rlsq0      On secondary    00:56:12     lsq-4/0/0   lsq-3/0/0    both up

ae0
ae1
```

```
ae2
ae3
ae4
```

show interfaces redundancy detail

```
user@host> show interfaces redundancy detail
Interface         : rlsq0
  State           : On primary
  Last change     : 00:45:47
  Primary         : lsq-0/2/0
  Secondary       : lsq-1/2/0
  Current status  : both up
  Mode            : hot-standby

Interface         : rlsq0:0
  State           : On primary
  Last change     : 00:45:46
  Primary         : lsq-0/2/0:0
  Secondary       : lsq-1/2/0:0
  Current status  : both up
  Mode            : warm-standby
```

Sample Output

show interfaces routing brief

```
user@host> show interfaces routing brief
Interface         State Addresses
so-5/0/3.0        Down  ISO    enabled
so-5/0/2.0        Up    MPLS   enabled
                        ISO    enabled
                        INET   192.168.2.120
                        INET   enabled
so-5/0/1.0        Up    MPLS   enabled
                        ISO    enabled
                        INET   192.168.2.130
                        INET   enabled
at-1/0/0.3        Up    CCC    enabled
at-1/0/0.2        Up    CCC    enabled
at-1/0/0.0        Up    ISO    enabled
                        INET   192.168.90.10
                        INET   enabled
lo0.0             Up    ISO    47.0005.80ff.f800.0000.0108.0001.1921.6800.5061.00
                        ISO    enabled
                        INET   127.0.0.1
fxp1.0            Up
fxp0.0            Up    INET   192.168.6.90
```

show interfaces routing detail

```
user@host> show interfaces routing detail
so-5/0/3.0
  Index: 15, Refcount: 2, State: Up <Broadcast PointToPoint Multicast> Change:<>

  Metric: 0, Up/down transitions: 0, Full-duplex
  Link layer: HDLC serial line Encapsulation: PPP Bandwidth: 155Mbps
  ISO address (null)
    State: <Broadcast PointToPoint Multicast> Change: <>
    Preference: 0 (120 down), Metric: 0, MTU: 4470 bytes
so-5/0/2.0
```

```
  Index: 14, Refcount: 7, State: <Up Broadcast PointToPoint Multicast> Change:<>

  Metric: 0, Up/down transitions: 0, Full-duplex
  Link layer: HDLC serial line Encapsulation: PPP Bandwidth: 155Mbps
  MPLS address (null)
    State: <Up Broadcast PointToPoint Multicast> Change: <>
    Preference: 0 (120 down), Metric: 0, MTU: 4458 bytes
  ISO address (null)
    State: <Up Broadcast PointToPoint Multicast> Change: <>
    Preference: 0 (120 down), Metric: 0, MTU: 4470 bytes
  INET address 192.168.2.120
    State: <Up Broadcast PointToPoint Multicast Localup> Change: <>
    Preference: 0 (120 down), Metric: 0, MTU: 4470 bytes
    Local address: 192.168.2.120
    Destination: 192.168.2.110/32
  INET address (null)
    State: <Up Broadcast PointToPoint Multicast> Change: <>
    Preference: 0 (120 down), Metric: 0, MTU: 4470 bytes
...
```

Sample Output

show interfaces routing-instance all

```
user@host> show interfaces terse routing-instance all
Interface     Admin    Link    Proto     Local              Remote Instance
at-0/0/1      up       up      inet      10.0.0.1/24
ge-0/0/0.0    up       up      inet       192.168.4.28/24          sample-a
at-0/1/0.0    up       up      inet6      fe80::a:0:0:4/64         sample-b
so-0/0/0.0    up       up      inet      10.0.0.1/32
```

Sample Output

show interfaces snmp-index

```
user@host> show interfaces snmp-index 33
Physical interface: so-2/1/1, Enabled, Physical link is Down
  Interface index: 149, SNMP ifIndex: 33
  Link-level type: PPP, MTU: 4474, Clocking: Internal, SONET mode, Speed: OC48,
  Loopback: None, FCS: 16, Payload scrambler: Enabled
  Device flags   : Present Running Down
  Interface flags: Hardware-Down Point-To-Point SNMP-Traps 16384
  Link flags     : Keepalives
  CoS queues     : 8 supported
  Last flapped   : 2005-06-15 11:45:57 PDT (05:38:43 ago)
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  SONET alarms   : LOL, PLL, LOS
  SONET defects  : LOL, PLL, LOF, LOS, SEF, AIS-L, AIS-P
```

Sample Output

show interfaces source-class all

```
user@host> show interfaces source-class all
Logical interface so-0/1/0.0
                                                Packets                Bytes
      Source class                  (packet-per-second)    (bits-per-second)
                             gold               1928095            161959980
                                  (                 889)  (           597762)
                           bronze                     0                    0
```

```
                              (                  0) (                0)
                       silver                    0                   0
                              (                  0) (                0)
  Logical interface so-0/1/3.0
                                              Packets               Bytes
      Source class                   (packet-per-second)   (bits-per-second)
                         gold                    0                   0
                              (                  0) (                0)
                       bronze                    0                   0
                              (                  0) (                0)
                       silver               116113             9753492
                              (                939) (           631616)
```

Sample Output

show interfaces statistics (Fast Ethernet)

```
user@host> show interfaces fe-1/3/1 statistics
Physical interface: fe-1/3/1, Enabled, Physical link is Up
  Interface index: 144, SNMP ifIndex: 1042
  Description: ford fe-1/3/1
  Link-level type: Ethernet, MTU: 1514, Speed: 100mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled
  Device flags   : Present Running
  Interface flags: SNMP-Traps Internal: 0x4000
  CoS queues     : 4 supported, 4 maximum usable queues
  Current address: 00:90:69:93:04:dc, Hardware address: 00:90:69:93:04:dc
  Last flapped   : 2006-04-18 03:08:59 PDT (00:01:24 ago)
  Statistics last cleared: Never
  Input rate     : 0 bps (0 pps)
  Output rate    : 0 bps (0 pps)
  Input errors: 0, Output errors: 0
  Active alarms  : None
  Active defects : None
  Logical interface fe-1/3/1.0 (Index 69) (SNMP ifIndex 50)
    Flags: SNMP-Traps Encapsulation: ENET2
    Protocol inet, MTU: 1500
      Flags: Is-Primary, DCU, SCU-in
                                              Packets               Bytes
      Destination class              (packet-per-second)   (bits-per-second)
                      silver1                    0                   0
                              (                  0) (                0)
                      silver2                    0                   0
                              (                  0) (                0)
                      silver3                    0                   0
                              (                  0) (                0)
      Addresses, Flags: Is-Default Is-Preferred Is-Primary
        Destination: 10.27.245/24, Local: 10.27.245.2,
        Broadcast: 10.27.245.255
    Protocol iso, MTU: 1497
      Flags: Is-Primary
```

Sample Output

show interfaces switch-port

```
user@host# show interfaces ge-slot/0/0 switch-port port-number
Port 0, Physical link is Up
        Speed: 100mbps, Auto-negotiation: Enabled
   Statistics:                         Receive         Transmit
          Total bytes                      28437086         21792250
```

```
          Total packets                     409145          88008
          Unicast packets                     9987          83817
          Multicast packets                 145002              0
          Broadcast packets                 254156           4191
          Multiple collisions                   23             10
          FIFO/CRC/Align errors                  0              0
          MAC pause frames                       0              0
          Oversized frames                       0
          Runt frames                            0
          Jabber frames                          0
          Fragment frames                        0
          Discarded frames                       0
        Autonegotiation information:
          Negotiation status: Complete
          Link partner:
              Link mode: Full-duplex, Flow control: None, Remote fault: OK, Link
 partner Speed: 100 Mbps
          Local resolution:
              Flow control: None, Remote fault: Link OK
```

Sample Output

show interfaces transport pm

```
user@host> show interfaces transport pm all current et-0/1/0
Physical interface: et-0/1/0, SNMP ifIndex 515
  14:45-current          Elapse time:900 Seconds
  Near End       Suspect Flag:False            Reason:None
    PM                   COUNT          THRESHOLD       TCA-ENABLED     TCA-RAISED

  OTU-BBE                 0                800              No              No
  OTU-ES                  0                135              No              No
  OTU-SES                 0                90               No              No
  OTU-UAS                 427              90               No              No
  Far End        Suspect Flag:True             Reason:Unknown
    PM                   COUNT          THRESHOLD       TCA-ENABLED     TCA-RAISED

  OTU-BBE                 0                800              No              No
  OTU-ES                  0                135              No              No
  OTU-SES                 0                90               No              No
  OTU-UAS                 0                90               No              No
  Near End       Suspect Flag:False            Reason:None
    PM                   COUNT          THRESHOLD       TCA-ENABLED     TCA-RAISED

  ODU-BBE                 0                800              No              No
  ODU-ES                  0                135              No              No
  ODU-SES                 0                90               No              No
  ODU-UAS                 427              90               No              No
  Far End        Suspect Flag:True             Reason:Unknown
    PM                   COUNT          THRESHOLD       TCA-ENABLED     TCA-RAISED

  ODU-BBE                 0                800              No              No
  ODU-ES                  0                135              No              No
  ODU-SES                 0                90               No              No
  ODU-UAS                 0                90               No              No
  FEC            Suspect Flag:False            Reason:None
    PM                   COUNT          THRESHOLD       TCA-ENABLED     TCA-RAISED

  FEC-CorrectedErr          2008544300      0                NA              NA
  FEC-UncorrectedWords      0               0                NA              NA
  BER            Suspect Flag:False            Reason:None
```



```
  PM                  MIN       MAX       AVG       THRESHOLD      TCA-ENABLED
   TCA-RAISED
 BER                  3.6e-5    5.8e-5    3.6e-5     10.0e-3        No
        Yes
Physical interface: et-0/1/0, SNMP ifIndex 515
 14:45-current
 Suspect Flag:True             Reason:Object Disabled
  PM                              CURRENT   MIN       MAX      AVG       THRESHOLD
    TCA-ENABLED       TCA-RAISED
                                                                            (MIN)
(MAX)    (MIN)  (MAX)       (MIN)  (MAX)
 Lane chromatic dispersion        0        0         0         0         0
 0        NA     NA          NA     NA
 Lane differential group delay    0        0         0         0         0
 0        NA     NA          NA     NA
   q Value                         120      120       120       120       0
  0        NA     NA          NA     NA
 SNR                               28       28        29        28        0
 0        NA     NA          NA     NA
 Tx output power(0.01dBm)         -5000    -5000     -5000     -5000     -300
-100      No     No          No     No
 Rx input power(0.01dBm)          -3642    -3665     -3626     -3637     -1800
-500      No     No          No     No
 Module temperature(Celsius)       46       46        46        46       -5
 75       No     No          No     No
 Tx laser bias current(0.1mA)     0        0         0         0         0
 0        NA     NA          NA     NA
 Rx laser bias current(0.1mA)     1270     1270      1270      1270      0
 0        NA     NA          NA     NA
 Carrier frequency offset(MHz)    -186     -186      -186      -186      -5000
 5000     No     No          No     No
```

Sample Output

show security zones

```
user@host> show security zones
Functional zone: management
   Description: This is the management zone.
   Policy configurable: No
   Interfaces bound: 1
   Interfaces:
     ge-0/0/0.0
Security zone: Host
   Description: This is the host zone.
   Send reset for non-SYN session TCP packets: Off
   Policy configurable: Yes
   Interfaces bound: 1
   Interfaces:
     fxp0.0
Security zone: abc
   Description: This is the abc zone.
   Send reset for non-SYN session TCP packets: Off
   Policy configurable: Yes
   Interfaces bound: 1
   Interfaces:
     ge-0/0/1.0
Security zone: def
   Description: This is the def zone.
   Send reset for non-SYN session TCP packets: Off
   Policy configurable: Yes
```



```
Interfaces bound: 1
Interfaces:
  ge-0/0/2.0
```


show mvrp

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax show mvrp

Release Information Command introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description Display Multiple VLAN Registration Protocol (MVRP) configuration information.

Required Privilege Level view

Related Documentation

- show mvrp applicant-state on page 383
- show mvrp dynamic-vlan-memberships on page 385
- show mvrp interface on page 386
- show mvrp registration-state on page 387
- show mvrp statistics on page 389

List of Sample Output show mvrp on page 381

Output Fields Table 35 on page 381 lists the output fields for the **show mvrp** command. Output fields are listed in the approximate order in which they appear.

Table 35: show mvrp Output Fields

Field Name	Field Description
MVRP dynamic VLAN creation	Displays whether global MVRP dynamic VLAN creation is **Enabled** or **Disabled**.
MVRP BPDU MAC address	Displays the multicast media access control (MAC) address for MVRP. If configured, the provider MVRP multicast MAC address is used; otherwise, the customer MVRP multicast MAC address is used.
MVRP timers (ms)	Displays MVRP timer information: • **Interface**—The interface on which MVRP is configured. • **Join**—The maximum number of milliseconds the interfaces must wait before sending VLAN advertisements. • **Leave**—The number of milliseconds an interface must wait after receiving a Leave message to remove the interface from the VLAN specified in the message. • **LeaveAll**— The interval at which LeaveAll messages are sent on interfaces. LeaveAll messages maintain current MVRP VLAN membership information in the network.

Sample Output

show mvrp

```
user@host> show mvrp
```

```
MVRP configuration for routing instance 'default-switch'
MVRP dynamic VLAN creation : Enabled
MVRP BPDU MAC address      : Customer bridge group (00-00-5E-00-53-00)
MVRP timers (ms)
  Interface       Join   Leave  LeaveAll
  ge-0/0/1        200     800     60
```


show mvrp applicant-state

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax show mvrp applicant-state

Release Information Command introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description Display Multiple VLAN Registration Protocol (MVRP) applicant state information.

Required Privilege Level view

Related Documentation

- show mvrp on page 381
- show mvrp interface on page 386
- show mvrp registration-state on page 387
- show mvrp statistics on page 389

List of Sample Output show mvrp applicant-state on page 384

Output Fields Table 36 on page 383 lists the output fields for the **show mvrp applicant-state** command. Output fields are listed in the approximate order in which they appear.

Table 36: show mvrp applicant-state Output Fields

Field Name	Field Description
VLAN Id	Displays the VLAN ID number.
Interface	Displays the interface number associated with the VLAN ID.
State	Displays one of the following MVRP registrar states: • VO— Very anxious observer. • VP —Very anxious passive. • VA —Very anxious new. • AN —Anxious new. • AA —Anxious active. • QA —Quiet active. • LA —Leaving active. • AO —Anxious observer. • QO —Quiet observer. • LO —Leaving observer. • AP —Anxious passive. • QA —Quiet passive.

Sample Output

show mvrp applicant-state

```
user@host> show mvrp applicant-state
MVRP applicant state for routing instance 'default-switch'
 (VO) Very anxious observer, (VP) Very anxious passive, (VA) Very anxious new,
 (AN) Anxious new, (AA) Anxious active, (QA) Quiet active, (LA) Leaving active,
 (AO) Anxious observer, (QO) Quiet observer, (LO) Leaving observer,
 (AP) Anxious passive, (QP) Quiet passive

VLAN Id     Interface          State
    1       ge-0/0/1          Idle (VO)
    30      ge-0/0/1          Idle (VO)
    40      ge-0/0/1          Idle (VO)
    50      ge-0/0/1          Idle (VO)
    100     ge-0/0/1          Idle (VO)
```

show mvrp dynamic-vlan-memberships

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax show mvrp dynamic-vlan-memberships

Release Information Command introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description Display all VLANs that have been created dynamically using Multiple VLAN Registration Protocol (MVRP) on the SRX Series device.

Required Privilege Level clear

Related Documentation

- show mvrp on page 381
- show mvrp applicant-state on page 383
- show mvrp interface on page 386
- show mvrp registration-state on page 387
- show mvrp statistics on page 389

List of Sample Output show mvrp dynamic-vlan-memberships on page 385

Output Fields Table 37 on page 385 lists the output fields for the **show mvrp dynamic-vlan-memberships** command. Output fields are listed in the approximate order in which they appear.

Table 37: show mvrp dynamic-vlan-memberships Output Fields

Field Name	Field Description
VLAN Id	The VLAN ID of the dynamically created VLAN.
Interfaces	The interface or interfaces that are bound to the dynamically created VLAN.

Sample Output

show mvrp dynamic-vlan-memberships

```
user@host> show mvrp dynamic-vlan-memberships
MVRP dynamic vlans for routing instance 'default-switch'
 (s) static vlan, (f) fixed registration

VLAN Id            Interfaces
    1  (s)
    30 (s)
    40 (s)        ge-0/0/1
    50 (s)        ge-0/0/1
   100 (s)        ge-0/0/1 (f)
```

show mvrp interface

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax show mvrp interface

Release Information Command introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description Display Multiple VLAN Registration Protocol (MVRP) interface-specific information.

Required Privilege Level view

Related Documentation

- show mvrp on page 381
- show mvrp applicant-state on page 383
- show mvrp dynamic-vlan-memberships on page 385
- show mvrp registration-state on page 387
- show mvrp statistics on page 389

List of Sample Output show mvrp interface on page 386

Output Fields Table 38 on page 386 lists the output fields for the **show mvrp interface** command. Output fields are listed in the approximate order in which they appear.

Table 38: show mvrp interface Output Fields

Field Name	Field Description
Interface	Interface on which MVRP is configured.
Status	Status of the MVRP: **Enabled** or **Disabled**.
Registration Mode	Registration for the interface: **Fixed**, **Forbidden**, or **Normal**.
Applicant Mode	Applicant mode.

Sample Output

show mvrp interface

```
user@host> show mvrp interface
MVRP interface information for routing instance 'default-switch'

Interface        Status      Registration      Applicant
                 Mode        Mode              Mode
ge-0/0/1         Enabled     Normal            Normal
```

show mvrp registration-state

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax show mvrp registration-state

Release Information Command introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description Display Multiple VLAN Registration Protocol (MVRP) registration state information.

Required Privilege Level view

Related Documentation

- show mvrp on page 381
- show mvrp dynamic-vlan-memberships on page 385
- show mvrp interface on page 386
- show mvrp statistics on page 389

List of Sample Output show mvrp registration-state on page 387

Output Fields Table 39 on page 387 lists the output fields for the **show mvrp registration-state** command. Output fields are listed in the approximate order in which they appear.

Table 39: show mvrp registration-state Output Fields

Field Name	Field Description
VLAN Id	Displays the VLAN ID number.
Interface	Displays the interface number associated with the VLAN ID.
Registrar State	Displays whether the registrar state is Registered or Empty.
Forced State	Displays whether the forced state is Registered or Empty.
Managed State	Displays one of the following states: • **fixed**—VLANs always stay in a registered state and are declared as such on all other forwarding ports. • **normal** —VLANs participate in the MVRP protocol and honor incoming join requests normally. • **forbidden** —VLANs ignore the incoming join requests and always stay in an unregistered state.
STP State	Displays whether the Spanning Tree Protocol (STP) is Blocking or Forwarding.

Sample Output

show mvrp registration-state

```
user@host> show mvrp registration-state
```

```
MVRP registration state for routing instance 'default-switch'

VLAN Id   Interface   Registrar   Forced      Managed    STP
                      State       State       State      State
    1     ge-0/0/1    Empty       Empty       Normal     Forwarding
   30     ge-0/0/1    Empty       Empty       Normal     Forwarding
   40     ge-0/0/1    Registered  Registered  Normal     Forwarding
   50     ge-0/0/1    Registered  Registered  Normal     Forwarding
  100     ge-0/0/1    Empty       Registered  Fixed      Forwarding
```


show mvrp statistics

Supported Platforms SRX300, SRX320, SRX340, SRX345, SRX550M

Syntax show mvrp statistics

Release Information Command introduced in Junos OS Release 15.1X49-D70 for SRX Series devices.

Description Display Multiple VLAN Registration Protocol (MVRP) statistics in the form of Multiple Registration Protocol data unit (MRPDU) messages.

Required Privilege Level view

Related Documentation

- show mvrp on page 381
- show mvrp applicant-state on page 383
- show mvrp dynamic-vlan-memberships on page 385
- show mvrp interface on page 386
- show mvrp registration-state on page 387

List of Sample Output show mvrp statistics on page 389

Output Fields Table 40 on page 389 lists the output fields for the **show mvrp statistics** command. Output fields are listed in the approximate order in which they appear.

Table 40: show mvrp statistics Output Fields

Field Name	Field Description
Interface name	Interface for which MVRP statistics are displayed.
VLAN IDs registered	Number of VLAN IDs registered.
Sent MVRP PDUs	Number of MRPDU messages transmitted from the SRX device.
Received MVRP PDUs without error	Number of MRPDU messages received on the SRX device.
Received MVRP PDUs with error	Number of invalid MRPDU messages received on the SRX device.

Sample Output

show mvrp statistics

```
user@host> show mvrp statistics
MVRP statistics for routing instance 'default-switch'

Interface name                 : ge-0/0/1
VLAN IDs registered            : 2
```



```
Sent MVRP PDUs                  : 41
Received MVRP PDUs without error: 28
Received MVRP PDUs with error   : 0
Transmitted Join Empty          : 0
Transmitted Leave All           : 20
Received Join In                : 0
Transmitted Join In             : 0
Transmitted Empty               : 114
Transmitted Leave               : 0
Transmitted In                  : 10
Transmitted New                 : 0
Received Leave All              : 1
Received Leave                  : 0
Received In                     : 0
Received Empty                  : 67
Received Join Empty             : 24
Received New                    : 0
```


show oam ethernet connectivity-fault-management adjacencies

Supported Platforms SRX Series

Syntax show oam ethernet connectivity-fault-management adjacencies <interface-name>

Release Information Statement introduced in Junos OS Release 12.1X44-D10.

Description Display connectivity-fault-management (CFM) adjacencies.

Options **interface-name**—Dispaly the name of the interface.

Required Privilege Level view

Related Documentation

- clear oam ethernet connectivity-fault-management path-database on page 338
- clear oam ethernet connectivity-fault-management statistics on page 339

List of Sample Output show oam ethernet connectivity-fault- management adjacencies on page 391

Output Fields Table 41 on page 391 lists the output fields for the **show oam ethernet connectivity-fault-management adjacencies** command. Output fields are listed in the approximate order in which they appear

Table 41: show oam ethernet connectivity-fault-management adjacencies Output Fields

Field Name	Field Description
Mep-id	Maintenance association end point (MEP) identifier.
Interface	Interface identifier.
State	Indicates whether the connectivity check protocol is up.
Timer to Expire	Indicates the expiration time.

Sample Output

show oam ethernet connectivity-fault- management adjacencies

```
user@host> show oam ethernet connectivity-fault-management adjacencies
Mep-id     Interface         State        Timer to Expire
         101     ge-0/0/4.0         ok                   29
```

show oam ethernet connectivity-fault-management forwarding-state

Supported Platforms SRX Series

Syntax
show oam ethernet connectivity-fault-management forwarding-state
<interface>
<instance>

Release Information Statement introduced in Junos OS Release 12.1X44-D10.

Description Display the Ethernet OAM forwarding state for received packets.

Options **<interface>**—Display the Ethernet OAM state for a forwarding instance.

<instance>—Display the Ethernet OAM state for an interface.

Required Privilege Level view

Related Documentation
- clear oam ethernet connectivity-fault-management path-database on page 338
- clear oam ethernet connectivity-fault-management statistics on page 339

List of Sample Output show oam ethernet connectivity-fault- management forwarding-state on page 392

Output Fields Table 42 on page 392 lists the output fields for the **show oam ethernet connectivity-fault-management forwarding-state** command. Output fields are listed in the approximate order in which they appear.

Table 42: show oam ethernet connectivity-fault-management forwarding-state Output Fields

Field Name	Field Description
Interface name	Interface identifier.
Level	Maintenance domain level.
Direction	MEP direction configured.
Filter action	Filter action for messages at the maintenance domain level.
Nexthop type	Next-hop type.
Nexthop index	Next-hop index number.

Sample Output

show oam ethernet connectivity-fault- management forwarding-state

```
user@host> show oam ethernet connectivity-fault-management forwarding-state interface
Interface name: ge-0/0/1.0 vlan:100
Instance name: INSTANCE_0 bd_vlan_100
```



```
Maintenance domain forwarding state:

Level    Direction      Filter action     Nexthop      Nexthop
                                          type         index
0                       Drop              Discard
1                       Drop              Discard
2                       Drop              Discard
3                       Drop              Discard
4                       Drop              Discard
5                       Drop              Discard
6                       Drop              Discard
7        down           Receive           Receive
```

show oam ethernet connectivity-fault-management interfaces

Supported Platforms SRX Series

Syntax show oam ethernet connectivity-fault-management interfaces
<interface name>

Release Information Statement introduced in Junos OS Release 12.1X44-D10.

Description Display Ethernet OAM information for the specified interface.

Options **<interface name>**—Display connectivity fault management (CFM) information for the specified interface.

Required Privilege Level view

Related Documentation

- clear oam ethernet connectivity-fault-management path-database on page 338
- clear oam ethernet connectivity-fault-management statistics on page 339

List of Sample Output show oam ethernet connectivity-fault- management interfaces on page 394

Output Fields Table 43 on page 394 lists the output fields for the **show oam ethernet connectivity-fault-management interfaces** command. Output fields are listed in the approximate order in which they appear.

Table 43: show oam ethernet connectivity-fault-management interfaces Output Fields

Field Name	Field Description
Interfaces	Interface identifier.
Link	The local link status is Up, down, or oam-down.
Status	The status is active or inactive.
Level	Maintenance domain level configured.
MEP Identifier	Maintenance association end point (MEP) identifier.
Neighbors	Number of MEP neighbors.

Sample Output

show oam ethernet connectivity-fault- management interfaces

```
user@host> show oam ethernet connectivity-fault-management interfaces
Interfaces      Link      Status      Level      MEP          Neighbours
                                                  Identifier
```

```
ge-0/0/1.0      Up        Active      7             1000            0
```

show oam ethernet connectivity-fault-management mep-database

Supported Platforms SRX Series

Syntax show oam ethernet connectivity-fault-management mep-database

Release Information Statement introduced in Junos OS Release 12.1X44-D10.

Description Display Ethernet OAM maintenance association endpoint (MEP) database information.

Options **<local-mep>**—Identifier for the local MEP (1 through 8191).

maintenance-association —Name of the maintenance association.

maintenance-domain —Name of the maintenance domain.

remote-mep —Identifier for the remote MEP (1 through 8191).

Required Privilege Level View

Related Documentation

- clear oam ethernet connectivity-fault-management path-database on page 338
- clear oam ethernet connectivity-fault-management statistics on page 339

List of Sample Output show oam ethernet connectivity-fault- management mep-database on page 398

Output Fields Table 44 on page 396 lists the output fields for the **show oam ethernet connectivity-fault-management mep-database** command. Output fields are listed in the approximate order in which they appear.

Table 44: show oam ethernet connectivity-fault-management mep-database Output Fields

Field Name	Field Description
Maintenance domain name	Maintenance domain name.
Format (Maintenance domain)	Maintenance domain name format configured.
Level	Maintenance domain level configured.
Maintenance association name	Maintenance association name.
Format (Maintenance association)	Maintenance association name format configured.
Continuity-check status	Continuity check status.
Interval	Continuity check message (CCM) interval.
MEP identifier	Maintenance association end point (MEP) identifier.
Direction	MEP direction configured.

Table 44: show oam ethernet connectivity-fault-management mep-database Output Fields *(continued)*

Field Name	Field Description
MAC address	MAC address configured for the MEP.
Auto-discovery	Indicates whether automatic discovery is enabled or disabled.
Priority	Priority used for CCMs and Link Trace Messages (LTMs) transmitted by the MEP.
Interface name	Interface identifier.
Interface status	Local interface status.
Link status	Local link status.
Remote MEP not receiving CCM	Indicates that the remote MEP is not receiving CCMs.
Erroneous CCM received	Indicates that erroneous CCMs have been received.
Cross-connect CCM received	Indicates that cross-connect CCMs have been received.
RDI sent by some MEP	Indicates that the remote defect indication (RDI) bit is set in messages that have been received. The absence of the RDI bit in a CCM indicates that the transmitting MEP is receiving CCMs from all configured MEPs.
CCMs sent	Number of CCMs transmitted.
CCMs received out of sequence	Number of CCMs received out of sequence.
LBMs sent	Number of loopback messages (LBMs) sent.
Valid in-order LBRs received	Number of loopback response (LBRs) messages received that were valid messages and in sequence.
Valid out-of-order LBRs received	Number of LBRs received that were valid messages and not in sequence.
LBRs received with corrupted data	Number of LBRs received that were corrupted.
LBRs sent	Number of LBRs transmitted.
LTMs sent	Link Trace Messages (LTMs) transmitted.
LTMs received	LTMs received.
LTRs sent	Link Trace Replies (LTRs) transmitted.
LTRs received	LTRs received.
Sequence number of next LTM request	Sequence number of the next LTM request to be transmitted.

Table 44: show oam ethernet connectivity-fault-management mep-database Output Fields *(continued)*

Field Name	Field Description
1DMs sent	If the MEP is an initiator for a one-way ETH-DM session, then this is the number of one-way delay measurement (1DM) PDU frames sent to the peer MEP in this session. For all other cases, this field displays 0.
Valid 1DMs received	If the MEP is a receiver for a one-way ETH-DM session, then this is the number of valid 1DM frames received. For all other cases, this field displays 0.
Invalid 1DMs received	If the MEP is a receiver for a one-way ETH-DM session, then this is the number of invalid 1DM frames received. For all other cases, this field displays 0.
DMMs sent	If the MEP is an initiator for a two-way ETH-DM session, then this is the number of Delay Measurement Message (DMM) PDU frames sent to the peer MEP in this session. For all other cases, this field displays 0.
DMRs sent	If the MEP is a responder for a ETH-DM session, then this is the number of Delay Measurement Reply (DMR) frames sent. For all other cases, this field displays 0.
Valid DMRs received	If the MEP is an initiator for a two-way ETH-DM session, then this is the number of valid DMRs received. For all other cases, this field displays 0.
Invalid DMRs received	If the MEP is an initiator for a two-way ETH-DM session, then this is the number of invalid DMRs received. For all other cases, this field displays 0.

Sample Output

show oam ethernet connectivity-fault- management mep-database

```
user@host> show oam ethernet connectivity-fault-management mep-database
maintenance-domain Customer1
Maintenance domain name: Customer1, Format: string, Level: 7
  Maintenance association name: Track_vlan_100, Format: string
  Continuity-check status: enabled, Interval: 1s
  MEP identifier: 1000, Direction: down, MAC address: 00:00:5E:00:53:00
  Auto-discovery: disabled, Priority: 0
  Interface name: ge-0/0/1.0, Interface status: Active, Link status: Up
  Defects:
    Remote MEP not receiving CCM                    : no
    Erroneous CCM received                          : no
    Cross-connect CCM received                      : no
    RDI sent by some MEP                            : no
```



```
Statistics:
  CCMs sent                                  : 170114
  CCMs received out of sequence              : 0
  LBMs sent                                  : 0
  Valid in-order LBRs received               : 0
  Valid out-of-order LBRs received           : 0
  LBRs received with corrupted data          : 0
  LBRs sent                                  : 0
  LTMs sent                                  : 0
  LTMs received                              : 1
  LTRs sent                                  : 1
  LTRs received                              : 0
  Sequence number of next LTM request        : 0
  1DMs sent                                  : 0
  Valid 1DMs received                        : 0
  Invalid 1DMs received                      : 0
  DMMs sent                                  : 0
  DMRs sent                                  : 0
  Valid DMRs received                        : 0
  Invalid DMRs received                      : 0
```


show oam ethernet connectivity-fault-management mep-statistics

Supported Platforms SRX Series

Syntax

```
show oam ethernet connectivity-fault-management mep-statistics
count
local-mep
maintenance-association
maintenance-domain
remote-mep
```

Release Information Statement introduced in Junos OS Release 12.1X44-D10.

Description Display Ethernet OAM maintenance endpoint statistics.

NOTE: The delay measurement statistics are not valid for SRX Series devices, which support only the IEEE 802.1ag standard.

Options

count —Number of statistics per maintenance association endpoint (1 through 100).

local-mep —Identifier for local maintenance endpoint (1 through 8191).

maintenance-association—Name of maintenance association.

maintenance-domain—Name of maintenance domain.

remote-mep —Identifier for remote maintenance endpoint (1 through 8191).

Required Privilege Level view

Related Documentation

- clear oam ethernet connectivity-fault-management path-database on page 338
- clear oam ethernet connectivity-fault-management statistics on page 339

List of Sample Output show oam ethernet connectivity-fault- management mep-statistics on page 402

Output Fields Table 45 on page 400 lists the output fields for the **show oam ethernet connectivity-fault-management mep-statistics** command. Output fields are listed in the approximate order in which they appear.

Table 45: show oam ethernet connectivity-fault-management mep-statistics Output Fields

Field Name	Field Description
MEP identifier	Maintenance association end point (MEP) identifier.
CCMs sent	Number of CCMs transmitted.
CCMs received out of sequence	Number of CCMs received out of sequence.

Table 45: show oam ethernet connectivity-fault-management mep-statistics Output Fields *(continued)*

Field Name	Field Description
LBMs sent	Number of loopback messages (LBMs) sent.
Valid in-order LBRs received	Number of loopback response (LBR) messages received that were valid messages and in sequence.
Valid out-of-order LBRs received	Number of LBRs received that were valid messages and not in sequence.
LBRs received with corrupted data	Number of LBRs received that were corrupted.
LBRs sent	Number of LBRs transmitted.
LTMs sent	Link Trace Messages (LTMs) transmitted.
LTMs received	Link Trace Messages received.
LTRs sent	Link Trace Relpies (LTRs) transmitted.
LTRs received	Link Trace responses received.
Sequence number of next LTM request	Sequence number of the next Link Trace Message request to be transmitted.
1DMs sent	If the MEP is an initiator in a one-way ETH-DM session, then this is the number of one-way delay measurement (1DM) PDU frames sent to the peer MEP in this session. For all other cases, this field displays 0.
Valid 1DMs received	If the MEP is a receiver for a one-way ETH-DM session, then this is the number of valid 1DM frames received. For all other cases, this field displays 0.
Invalid 1DMs received	If the MEP is a receiver for a one-way ETH-DM session, then this is the number of invalid 1DM frames received. For all other cases, this field displays 0.
DMMs sent	If the MEP is an initiator for a two-way ETH-DM session, then this is the number of Delay Measurement Message (DMM) PDU frames sent to the peer MEP in this session. For all other cases, this field displays 0.
DMRs sent	If the MEP is a responder for a ETH-DM session, then this is the number of Delay Measurement Reply (DMR) frames sent. For all other cases, this field displays 0.
Valid DMRs received	If the MEP is an initiator for a two-way ETH-DM session, then this is the number of valid DMRs received. For all other cases, this field displays 0.

Table 45: show oam ethernet connectivity-fault-management mep-statistics Output Fields *(continued)*

Field Name	Field Description
Invalid DMRs received	If the MEP is an initiator for a two-way ETH-DM session, then this is the number of invalid DMRs received. For all other cases, this field displays 0.

Sample Output

show oam ethernet connectivity-fault- management mep-statistics

```
user@host> show oam ethernet connectivity-fault-management mep-statistics
maintenance-domain private maintenance-association private-ma remote-mep 100
MEP identifier: 101, MAC address: 00:00:5E:00:53:00
  CCMs sent                                      : 83
  CCMs received out of sequence                  : 0
  LBMs sent                                      : 0
  Valid in-order LBRs received                   : 0
  Valid out-of-order LBRs received               : 0
  LBRs received with corrupted data              : 0
  LBRs sent                                      : 0
  LTMs sent                                      : 0
  LTMs received                                  : 0
  LTRs sent                                      : 0
  LTRs received                                  : 0
  Sequence number of next LTM request            : 0
  1DMs sent                                      : 0
  Valid 1DMs received                            : 0
  Invalid 1DMs received                          : 0
  DMMs sent                                      : 0
  DMRs sent                                      : 0
  Valid DMRs received                            : 0
  Invalid DMRs received                          : 0
```

show oam ethernet connectivity-fault-management mip

Supported Platforms SRX Series

Syntax

```
show oam ethernet connectivity-fault-management mip
interface-name
vlan
```

Release Information Statement introduced in Junos OS Release 12.1X44-D10.

Description Display MIP information.

Options

bridge-domain—Display information for a particular bridge domain.

instance-name—Display information for a particular routing instance.

interface-name—Display information about the specified logical interface.

vlan—Display information about the specified VLAN (1 through 4094).

Required Privilege Level view

Related Documentation

- clear oam ethernet connectivity-fault-management path-database on page 338
- clear oam ethernet connectivity-fault-management statistics on page 339

List of Sample Output show oam ethernet connectivity-fault- management mip on page 403

Output Fields Table 46 on page 403 lists the output fields for the **show oam ethernet connectivity-fault-management mip** command. Output fields are listed in the approximate order in which they appear.

Table 46: show oam ethernet connectivity-fault-management mip Output Fields

Field Name	Field Description
Default Maintenance-domain	The default maintenance domain name.
Interface	Interface identifier.
Level	Maintenance domain level configured.

Sample Output

show oam ethernet connectivity-fault- management mip

```
user@host> show oam ethernet connectivity-fault-management mip vlan 100
default maintenance-domain mhf    : default

  Interface       Level
  ge-0/0/1.0          5
  ge-0/0/4.0          5
```

show oam ethernet connectivity-fault-management path-database

Supported Platforms SRX Series

Syntax

```
show oam ethernet connectivity-fault-management path-database
<host>
maintenance-association
maintenance-domain
```

Release Information Statement introduced in Junos OS Release 12.1X44-D10.

Description Display the Link Trace path database for a remote host.

Options **<host>**—MAC address of the remote host in xx:xx:xx:xx:xx:xx format.

maintenance-association —Name of the maintenance association.

maintenance-domain —Name of the maintenance domain.

Required Privilege Level view

Related Documentation

- clear oam ethernet connectivity-fault-management path-database on page 338
- clear oam ethernet connectivity-fault-management statistics on page 339

List of Sample Output show oam ethernet connectivity-fault- management path-database on page 406

Output Fields Table 47 on page 405 lists the output fields for the **show oam ethernet connectivity-fault-management path-database** command. Output fields are listed in the approximate order in which they appear.

Table 47: show oam ethernet connectivity-fault-management path-database Output Fields

Field Name	Field Description
Interface	Interface Identifier.
Maintenance Domain	Maintenance domain name.
Maintenance Association	Maintenance association name.
Level	Maintenance domain level configured for the maintenance domain.
Hop	Sequential hop count of the Link Trace path.
TTL	Number of hops remaining in the Link Trace message (LTM). The time to live (TTL) is decremented at each hop.
Source MAC Address	MAC address of the 802.1ag maintenance association intermediate point (MIP) that is forwarding the LTM.

Table 47: show oam ethernet connectivity-fault-management path-database Output Fields *(continued)*

Field Name	Field Description
Next-hop MAC Address	MAC address of the 802.1ag node that is the next hop in the LTM path.
Transaction Identifier	Identifier maintained by the MEP. Each LTM uses a transaction identifier. The transaction identifier is maintained globally across all maintenance domains. Use the transaction identifier to match an incoming Link Trace Reply (LTR) with a previously sent LTM.

Sample Output

show oam ethernet connectivity-fault- management path-database

```
user@host> show oam ethernet connectivity-fault-management path-database
Interface : ge-0/0/4
      Maintenance Domain: private, Level: 5
      Maintenance Association: private-ma, Local Mep: 100

    Hop   TTL    Source MAC address        Next-hop MAC address
    Transaction Identifier:0
    1      63     00:00:5E:00:53:AA        00:00:5E:00:53:AB
    2      62     00:00:5E:00:53:AC         00:00:5E:00:53:AD
    Transaction Identifier:1
    1      63     00:00:5E:00:53:AE         00:00:5E:00:53:AF
    2      62     00:00:5E:00:53:AG         00:00:5E:00:53:AH
    Transaction Identifier:2
    1      63     00:00:5E:00:53:AI         00:00:5E:00:53:AJ
    2      62     00:00:5E:00:53:AK         00:00:5E:00:53:AL
    Transaction Identifier:3
    1      63     00:00:5E:00:53:AM         00:00:5E:00:53:AN
    2      62     00:00:5E:00:53:AO         00:00:5E:00:53:AP
```

show oam ethernet link-fault-management

Supported Platforms SRX Series

Syntax

show oam ethernet link-fault-management
<brief | detail>
<*interface-name*>

Release Information Statement for SRX Series devices introduced in Junos OS Release 9.5.

Description Display Operation, Administration, and Maintenance (OAM) link fault management (LFM) information for Ethernet interfaces.

Options

brief | detail—(Optional) Display the specified level of output.

interface-name—(Optional) Display link fault management information for the specified Ethernet interface only.

Required Privilege Level view

Related Documentation

- **clear oam ethernet connectivity-fault-management path-database on page 338**
- **clear oam ethernet connectivity-fault-management statistics on page 339**
- Understanding Ethernet OAM Link Fault Management for SRX Series Services Gateways on page 265
- Example: Configuring Ethernet OAM Link Fault Management on page 267

List of Sample Output

show oam ethernet link-fault-management brief on page 411
show oam ethernet link-fault-management detail on page 411

Output Fields Table 48 on page 407 lists the output fields for the **show oam ethernet link-fault-management** command. Output fields are listed in the approximate order in which they appear.

Table 48: show oam ethernet link-fault-management Output Fields

Field Name	Field Description	Level of Output
Status	Status of the established link. • **Fail**—A link fault condition exists. • **Running**—A link fault condition does not exist.	All levels
Discovery state	State of the discovery mechanism: • **Passive Wait** • **Send Any** • **Send Local Remote** • **Send Local Remote Ok**	All levels

Table 48: show oam ethernet link-fault-management Output Fields *(continued)*

Field Name	Field Description	Level of Output
Peer address	Address of the OAM peer.	All levels
Flags	Information about the interface. • **Remote-Stable**—Indicates remote OAM client acknowledgment of, and satisfaction with, local OAM state information. **False** indicates that remote DTE has either not seen or is unsatisfied with local state information. **True** indicates that remote DTE has seen and is satisfied with local state information. • **Local-Stable**—Indicates local OAM client acknowledgment of, and satisfaction with, remote OAM state information. **False** indicates that local DTE either has not seen or is unsatisfied with remote state information. **True** indicates that local DTE has seen and is satisfied with remote state information. • **Remote-State-Valid**—Indicates the OAM client has received remote state information found within local information TLVs (type, length, values) of received Information OAM PDUs. **False** indicates that the OAM client has not seen remote state information. **True** indicates that the OAM client has seen remote state information.	All levels
Remote loopback status	An OAM entity can put its remote peer into loopback mode using the Loopback control OAM PDU. In loopback mode, every frame received is transmitted back on the same port (except for OAM PDUs, which are needed to maintain the OAM session).	All levels
Remote entity information	Remote entity information. • **Remote MUX action**—Indicates the state of the multiplexer functions of the OAM sublayer. Device is forwarding non-OAM PDUs to the lower sublayer or discarding non-OAM PDUs. • **Remote parser action**—Indicates the state of the parser function of the OAM sublayer. Device is forwarding non-OAM PDUs to the higher sublayer, looping back non-OAM PDUs to the lower sublayer, or discarding non-OAM PDUs. • **Discovery mode**—Indicates whether discovery mode is active or inactive. • **Unidirectional mode**—Indicates the ability to operate a link in unidirectional mode for diagnostic purposes. • **Remote loopback mode**—Indicates whether remote loopback is supported or not supported. • **Link events**—Indicates whether interpreting link events is supported or not supported on the remote peer. • **Variable requests**—Indicates whether variable requests are supported or not supported. The Variable Request OAM PDU, is used to request one or more MIB variables from the remote peer.	All levels
OAM Receive Statistics		
Information	Number of information PDUs received.	**detail**
Event	Number of loopback control PDUs received.	**detail**
Variable request	Number of variable request PDUs received.	**detail**
Variable response	Number of variable response PDUs received.	**detail**

Table 48: show oam ethernet link-fault-management Output Fields *(continued)*

Field Name	Field Description	Level of Output
Loopback control	Number of loopback control PDUs received.	**detail**
Organization specific	Number of vendor organization specific PDUs received.	**detail**
OAM Transmit Statistics		
Information	Number of information PDUs transmitted.	**detail**
Event	Number of event notification PDUs transmitted.	**detail**
Variable request	Number of variable request PDUs transmitted.	**detail**
Variable response	Number of variable response PDUs transmitted.	**detail**
Loopback control	Number of loopback control PDUs transmitted.	**detail**
Organization specific	Number of vendor organization specific PDUs transmitted.	**detail**
OAM Received Symbol Error Event information		
Events	Number of symbol error event TLVs that have been received after the OAM sublayer was reset.	**detail**
Window	Symbol error event window in the received PDU. The protocol default value is the number of symbols that can be received in one second on the underlying physical layer.	**detail**
Threshold	Number of errored symbols in the period required for the event to be generated.	**detail**
Errors in period	Number of symbol errors in the period reported in the received event PDU.	**detail**
Total errors	Number of errored symbols that have been reported in received event TLVs after the OAM sublayer was reset. Symbol errors are coding symbol errors.	**detail**
OAM Received Frame Error Event Information		
Events	Number of errored frame event TLVs that have been received after the OAM sublayer was reset.	**detail**
Window	Duration of the window in terms of the number of 100 ms period intervals.	**detail**
Threshold	Number of detected errored frames required for the event to be generated.	**detail**
Errors in period	Number of detected errored frames in the period.	**detail**

Table 48: show oam ethernet link-fault-management Output Fields *(continued)*

Field Name	Field Description	Level of Output
Total errors	Number of errored frames that have been reported in received event TLVs after the OAM sublayer was reset. A frame error is any frame error on the underlying physical layer.	**detail**
OAM Received Frame Period Error Event Information		
Events	Number of frame seconds errors event TLVs that have been received after the OAM sublayer was reset.	**detail**
Window	Duration of the frame seconds window.	**detail**
Threshold	Number of frame seconds errors in the period.	**detail**
Errors in period	Number of frame seconds errors in the period.	**detail**
Total errors	Number of frame seconds errors that have been reported in received event TLVs after the OAM sublayer was reset.	**detail**
OAM Transmitted Symbol Error Event Information		
Events	Number of symbol error event TLVs that have been transmitted after the OAM sublayer was reset.	**detail**
Window	The symbol error event window in the transmitted PDU.	**detail**
Threshold	Number of errored symbols in the period required for the event to be generated.	**detail**
Errors in period	Number of symbol errors in the period reported in the transmitted event PDU.	**detail**
Total errors	Number of errored symbols reported in event TLVs that have been transmitted after the OAM sublayer was reset.	**detail**
OAM Transmitted Frame Error Event Information		
Events	Number of errored frame event TLVs that have been transmitted after the OAM sublayer was reset.	**detail**
Window	Duration of the window in terms of the number of 100-ms period intervals.	**detail**
Threshold	Number of detected errored frames required for the event to be generated.	**detail**
Errors in period	Number of detected errored frames in the period.	**detail**
Total errors	Number of errored frames that have been detected after the OAM sublayer was reset.	**detail**

Sample Output

show oam ethernet link-fault-management brief

```
user@host> show oam ethernet link-fault-management brief
Interface: ge-0/0/1
  Status: Running, Discovery state: Send Any
  Peer address: 2001:bd8:00:31
  Flags:Remote-Stable Remote-State-Valid Local-Stable 0x50
  Remote loopback status: Disabled on local port, Enabled on peer port
  Remote entity information:
    Remote MUX action: discarding, Remote parser action: loopback
    Discovery mode: active, Unidirectional mode: unsupported
    Remote loopback mode: supported, Link events: supported
    Variable requests: unsupported
```

show oam ethernet link-fault-management detail

```
user@host> show oam ethernet link-fault-management detail
  Interface: ge-0/0/1
    Status: Running, Discovery state: Send Any
    Peer address: 2001:bd8:00:31
    Flags:Remote-Stable Remote-State-Valid Local-Stable 0x50
    OAM receive statistics:
      Information: 186365, Event: 0, Variable request: 0, Variable response: 0
      Loopback control: 0, Organization specific: 0
    OAM transmit statistics:
      Information: 186347, Event: 0, Variable request: 0, Variable response: 0
      Loopback control: 0, Organization specific: 0
    OAM received symbol error event information:
      Events: 0, Window: 0, Threshold: 0
      Errors in period: 0, Total errors: 0
    OAM received frame error event information:
      Events: 0, Window: 0, Threshold: 0
      Errors in period: 0, Total errors: 0
    OAM received frame period error event information:
      Events: 0, Window: 0, Threshold: 0
      Errors in period: 0, Total errors: 0
    OAM transmitted symbol error event information:
      Events: 0, Window: 0, Threshold: 1
      Errors in period: 0, Total errors: 0
    OAM transmitted frame error event information:
      Events: 0, Window: 0, Threshold: 1
      Errors in period: 0, Total errors: 0
    Remote entity information:
      Remote MUX action: forwarding, Remote parser action: forwarding
      Discovery mode: active, Unidirectional mode: unsupported
      Remote loopback mode: supported, Link events: supported
      Variable requests: unsupported
```

show security flow gate family

Supported Platforms SRX Series, vSRX

Syntax show security flow gate family (inet | inet6)

Release Information Command introduced in Junos OS Release 10.4.

Description Display filtered summary of information about existing gates, types of gates, and the maximum allowed number of gates.

Options

- inet—Displays IPv4 information.
- inet6—Displays IPv6 gate information.

Required Privilege Level view

Related Documentation

- *show security flow gate*

Output Fields Table 49 on page 412 lists the output fields for the **show security flow gate family** command. Output fields are listed in the approximate order in which they appear.

Table 49: show security flow gate family Output Fields

Field Name	Field Description
Valid gates	Number of valid gates.
Pending gates	Number of pending gates.
Invalidated gates	Number of invalid gates.
Gates in other states	Number of gates in other states.
Total gates	Total number of gates.

Sample Output

```
user@host> show security flow gate family inet6
Hole: 2001:13::8-0-0->2001:12::8-33135-33135

  Translated: ::/0->::/0

  Protocol: tcp

  Application: FTP ALG/79

  Age: 24 seconds

  Flags: 0x8080
```

```
  Zone: zserver

  Reference count: 1

  Resource: 1-2-2


Valid gates: 1

Pending gates: 0

Invalidated gates: 0

Gates in other states: 0

Total gates: 1
```

user@host> **show security flow gate family inet6 destination-prefix 2001:12::8 or source-prefix**

```
Hole: 2001:13::8-0-0->2001:12::8-33135-33135

  Translated: ::/0->::/0

  Protocol: tcp

  Application: FTP ALG/79

  Age: 26 seconds

  Flags: 0x8080

  Zone: zserver

  Reference count: 1

  Resource: 1-2-2


Valid gates: 1

Pending gates: 0

Invalidated gates: 0

Gates in other states: 0

Total gates: 1
```

show security flow ip-action

Supported Platforms SRX Series, vSRX

Syntax show security flow ip-action [<filter>] [summary family (inet | inet6)]

Release Information Command introduced in Junos OS Release 10.1. Logical systems option added in Junos OS Release 11.2 . Summary option introduced in Junos OS Release 12.1.

Description Display the current IP-action settings, based on filtered options, for IP sessions running on the device.

Options

- *filter*—Filter the display based on the specified criteria.

  The following filters display those sessions that match the criteria specified by the filter. Refer to the sample output for filtered output examples.

  all | [*filter*]—All active sessions on the device.

  destination-port ***destination-port***—Destination port number of the traffic. Range is 1 through 65,535.

  destination-prefix ***destination-prefix***—Destination IP prefix or address.

  family (inet | inet6) [*filter*]—IPv4 traffic or IPv6-NATPT traffic and filtered options.

  logical-system ***logical-system-name*** **| all** [*filter*]—Specified logical system or all logical systems.

  protocol ***protocol-name*** **|** ***protocol-number*** [*filter*]—Protocol name or number and filtered options.

  - **ah** or **51**
  - **egp** or **8**
  - **esp** or **50**
  - **gre** or **47**
  - **icmp** or **1**
  - **icmp6** or **58**
  - **ipip** or **4**
  - **ospf** or **89**
  - **pim** or **103**
  - **rsvp** or **46**
  - **sctp** or **132**
  - **tcp** or **6**
  - **udp** or **17**

  root-logical-system [*filter*]—Default logical system information and filtered options.

source-port ***source-port***—Source port number of the traffic. Range is 1 through 65,535.

source-prefix ***source-prefix***—Source IP prefix or address of the traffic.

- **summary** —Summary information about IP-action entries.

  family—Display summary of IP-action entries by family. This option is used to filter the output.

  - **inet**—Display summary of IPv4 entries.
  - **inet6**—Display summary of IPv6 entries.

Required Privilege Level

view

Related Documentation

- *Juniper Networks Devices Processing Overview*
- clear security flow ip-action on page 340
- *clear security flow session destination-port*

List of Sample Output

show security flow ip-action on page 416
show security flow ip-action destination-port on page 417
show security flow ip-action destination-prefix on page 418
show security flow ip-action family inet protocol on page 418
show security flow ip-action family inet logical-system all on page 419
show security flow ip-action source-prefix on page 420
show security flow ip-action summary on page 421
show security flow ip-action summary family inet on page 421
show security flow ip-action summary family inet6 on page 421

Output Fields

Table 50 on page 415 lists the output fields for the **show security flow ip-action** command. Output fields are listed in the approximate order in which they appear.

Table 50: show security flow ip-action Output Fields

Field Name	Field Description
Src-Addr	Source address of outbound IP traffic.
Src-Port	Source port number of outbound IP traffic.
Dst-Addr	Destination address of inbound IP traffic.
Dst-Port/Proto	Destination port number and protocol type of inbound IP traffic.
Timeout (sec)	Configured timeouts and time remaining for an IP session.
Zone	Security zone associated with an IP session.
Action	Configured action type, for example, block, close, and notify.
State	The active mode and passive mode describe the states of the **ip-action** entry.

Table 50: show security flow ip-action Output Fields *(continued)*

Field Name	Field Description
IPv4 action count	The total number of IPv4 entries.
IPv6 action count	The total number of IPv6 entries.

Sample Output

show security flow ip-action

```
user@host> show security flow ip-action
Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action        State
 203.0.113.1       *       203.0.113.4         21/tcp         293/300      *
      close         Passive
 IPv4 action count: 1 on FPC0.PIC1

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action        State
203.0.113.1         *      203.0.113.4          21/tcp         293/300      *
  close         Passive
 IPv4 action count: 1 on FPC0.PIC2

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action        State
203.0.113.1         *      203.0.113.4          21/tcp         293/300      *
  close         Passive
 IPv4 action count: 1 on FPC0.PIC3

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action        State
203.0.113.1         *       203.0.113.4          21/tcp         293/300      *
  close         Passive
 IPv4 action count: 1 on FPC1.PIC0

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action        State
203.0.113.1         *      203.0.113.4          21/tcp         293/300       *
    close         Passive
 IPv4 action count: 1 on FPC1.PIC1

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action        State
203.0.113.1         *    203.0.113.4          21/tcp         292/300      *
   close         Passive
 IPv4 action count: 1 on FPC1.PIC2

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action        State
 203.0.113.1        *     203.0.113.4           21/tcp         292/300      *
   close         Active
 IPv4 action count: 1 on FPC1.PIC3
 IPv4 action count: Active mode 1 on all PICs
 IPv6 action count: 0 on FPC0.PIC1
 IPv6 action count: 0 on FPC0.PIC2
 IPv6 action count: 0 on FPC0.PIC3
 IPv6 action count: 0 on FPC1.PIC0
```



```
 IPv6 action count: 0 on FPC1.PIC1
 IPv6 action count: 0 on FPC1.PIC2
 IPv6 action count: 0 on FPC1.PIC3
 IPv6 action count: Active mode 0 on all PICs
```

show security flow ip-action destination-port

user@host> **show security flow ip-action destination-port 21**

```
Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *        203.0.113.4         21/tcp         274/300      *
  close        Passive
 IPv4 action count: 1 on FPC0.PIC1

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *        203.0.113.4         21/tcp         274/300      *
 close        Passive
 IPv4 action count: 1 on FPC0.PIC2

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *        203.0.113.4         21/tcp         274/300      *
  close        Passive
 IPv4 action count: 1 on FPC0.PIC3

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *        203.0.113.4        21/tcp         274/300      *
  close        Passive
 IPv4 action count: 1 on FPC1.PIC0

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *        203.0.113.4         21/tcp         274/300      *
  close        Passive
 IPv4 action count: 1 on FPC1.PIC1

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1        *        203.0.113.4         21/tcp         274/300      *
  close        Passive
 IPv4 action count: 1 on FPC1.PIC2

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *        203.0.113.4         21/tcp         273/300      *
  close        Active
 IPv4 action count: 1 on FPC1.PIC3
 IPv4 action count: Active mode 1 on all PICs
 IPv6 action count: 0 on FPC0.PIC1
 IPv6 action count: 0 on FPC0.PIC2
 IPv6 action count: 0 on FPC0.PIC3
 IPv6 action count: 0 on FPC1.PIC0
 IPv6 action count: 0 on FPC1.PIC1
 IPv6 action count: 0 on FPC1.PIC2
 IPv6 action count: 0 on FPC1.PIC3
 IPv6 action count: Active mode 0 on all PICs
```

show security flow ip-action destination-prefix

```
user@host> show security flow ip-action destination-prefix 203.0.113.4/8

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *         203.0.113.4         21/tcp         245/300      *
 close        Passive
 IPv4 action count: 1 on FPC0.PIC1

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1        *         203.0.113.4         21/tcp         245/300      *
  close        Passive
 IPv4 action count: 1 on FPC0.PIC2

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *         203.0.113.4         21/tcp         245/300      *
 close        Passive
 IPv4 action count: 1 on FPC0.PIC3

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
192.0.2.3         *         203.0.113.4         21/tcp         245/300      *
 close        Passive
 IPv4 action count: 1 on FPC1.PIC0

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
192.0.2.3         *         203.0.113.4         21/tcp         245/300      *
 close        Passive
 IPv4 action count: 1 on FPC1.PIC1

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1        *         203.0.113.4         21/tcp         245/300      *
  close        Passive
 IPv4 action count: 1 on FPC1.PIC2

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *         203.0.113.4         21/tcp         245/300      *
 close        Active
 IPv4 action count: 1 on FPC1.PIC3
 IPv4 action count: Active mode 1 on all PICs
```

show security flow ip-action family inet protocol

```
user@host> show security flow ip-action family inet protocoludp
Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *         203.0.113.4         69/udp         287/300      *
        close        Passive
 IPv4 action count: 1 on FPC0.PIC1

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *         203.0.113.4         69/udp         287/300     *
  close        Passive
 IPv4 action count: 1 on FPC0.PIC2
```

```
Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *        203.0.113.4         69/udp         287/300      *
    close        Passive
 IPv4 action count: 1 on FPC0.PIC3

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *        203.0.113.4         69/udp         287/300      *
     close        Active
 IPv4 action count: 1 on FPC1.PIC0

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *        203.0.113.4         69/udp         287/300      *
     close        Passive
 IPv4 action count: 1 on FPC1.PIC1

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1        *        203.0.113.4         69/udp         287/300      *
    close        Passive
 IPv4 action count: 1 on FPC1.PIC2

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State
203.0.113.1         *        203.0.113.4         69/udp         287/300      *
    close        Passive
 IPv4 action count: 1 on FPC1.PIC3
 IPv4 action count: Active mode 1 on all PICs
```

show security flow ip-action family inet logical-system all

```
user@host>  show security flow ip-action family inet logical-system all

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State              Logical-System
203.0.113.1         *        203.0.113.4         69/udp         267/300      *
        close        Passive            root-logical-system
 IPv4 action count: 1 on FPC0.PIC1

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State              Logical-System
203.0.113.1         *        203.0.113.4         69/udp         267/300      *
 close        Passive            root-logical-system
 IPv4 action count: 1 on FPC0.PIC2

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State              Logical-System
203.0.113.1         *       203.0.113.4         69/udp         267/300      *
  close        Passive            root-logical-system
 IPv4 action count: 1 on FPC0.PIC3

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
Action       State              Logical-System
203.0.113.1         *        203.0.113.4         69/udp         267/300      *
  close        Active             root-logical-system
 IPv4 action count: 1 on FPC1.PIC0

Src-Addr        Src-Port Dst-Addr        Dst-Port/Proto Timeout(sec) Zone
```

```
Action        State             Logical-System
203.0.113.1         *        203.0.113.4        69/udp        267/300      *
  close         Passive            root-logical-system
 IPv4 action count: 1 on FPC1.PIC1

Src-Addr        Src-Port Dst-Addr       Dst-Port/Proto Timeout(sec) Zone
Action        State             Logical-System
203.0.113.1         *        203.0.113.4       69/udp        266/300      *
  close         Passive            root-logical-system
 IPv4 action count: 1 on FPC1.PIC2

Src-Addr        Src-Port Dst-Addr       Dst-Port/Proto Timeout(sec) Zone
Action        State             Logical-System
203.0.113.1         *        203.0.113.4       69/udp        266/300      *
  close         Passive            root-logical-system
 IPv4 action count: 1 on FPC1.PIC3
 IPv4 action count: Active mode 1 on all PICs
```

show security flow ip-action source-prefix

```
user@host> show security flow ip-action source-prefix 192.0.2.3/8

Src-Addr        Src-Port Dst-Addr       Dst-Port/Proto Timeout(sec) Zone
Action        State
203.0.113.1         *        192.0.2.4        69/udp        244/300      *
  close         Passive
 IPv4 action count: 1 on FPC0.PIC1

Src-Addr        Src-Port Dst-Addr       Dst-Port/Proto Timeout(sec) Zone
Action        State
203.0.113.1         *        192.0.2.4        69/udp        244/300      *
   close         Passive
 IPv4 action count: 1 on FPC0.PIC2

Src-Addr        Src-Port Dst-Addr       Dst-Port/Proto Timeout(sec) Zone
Action        State
203.0.113.1         *        192.0.2.4       69/udp        244/300      *
    close         Passive
 IPv4 action count: 1 on FPC0.PIC3

Src-Addr        Src-Port Dst-Addr       Dst-Port/Proto Timeout(sec) Zone
Action        State
203.0.113.1         *        192.0.2.4        69/udp        244/300      *
     close         Active
 IPv4 action count: 1 on FPC1.PIC0

Src-Addr        Src-Port Dst-Addr       Dst-Port/Proto Timeout(sec) Zone
Action        State
203.0.113.1         *        192.0.2.4        69/udp        244/300      *
    close         Passive
 IPv4 action count: 1 on FPC1.PIC1

Src-Addr        Src-Port Dst-Addr       Dst-Port/Proto Timeout(sec) Zone
Action        State
203.0.113.1         *        192.0.2.4        69/udp        244/300      *
     close         Passiveo
 IPv4 action count: 1 on FPC1.PIC2

Src-Addr        Src-Port Dst-Addr       Dst-Port/Proto Timeout(sec) Zone
Action        State
203.0.113.1         *        192.0.2.4        69/udp        244/300      *
```

```
    close        Passive
IPv4 action count: 1 on FPC1.PIC3
IPv4 action count: Active mode 1 on all PICs
```

show security flow ip-action summary

user@host> **show security flow ip-action summary**

```
IPv4 action count: 1 on FPC0.PIC1
IPv4 action count: 1 on FPC0.PIC2
IPv4 action count: 1 on FPC0.PIC3
IPv4 action count: 1 on FPC1.PIC0
IPv4 action count: 1 on FPC1.PIC1
IPv4 action count: 1 on FPC1.PIC2
IPv4 action count: 1 on FPC1.PIC3
IPv4 action count: Active mode 1 on all PICs
IPv6 action count: 0 on FPC0.PIC1
IPv6 action count: 0 on FPC0.PIC2
IPv6 action count: 0 on FPC0.PIC3
IPv6 action count: 0 on FPC1.PIC0
IPv6 action count: 0 on FPC1.PIC1
IPv6 action count: 0 on FPC1.PIC2
IPv6 action count: 0 on FPC1.PIC3
IPv6 action count: Active mode 0 on all PICs
```

show security flow ip-action summary family inet

user@host> **show security flow ip-action summary inet**

```
IPv4 action count: 1 on FPC0.PIC1
IPv4 action count: 1 on FPC0.PIC2
IPv4 action count: 1 on FPC0.PIC3
IPv4 action count: 1 on FPC1.PIC0
IPv4 action count: 1 on FPC1.PIC1
IPv4 action count: 1 on FPC1.PIC2
IPv4 action count: 1 on FPC1.PIC3
IPv4 action count: Active mode 1 on all PICs
```

show security flow ip-action summary family inet6

user@host> **show security flow ip-action summary family inet6**

```
IPv6 action count: 1 on FPC0.PIC1
IPv6 action count: 1 on FPC0.PIC2
IPv6 action count: 1 on FPC0.PIC3
IPv6 action count: 1 on FPC1.PIC0
IPv6 action count: 1 on FPC1.PIC1
IPv6 action count: 1 on FPC1.PIC2
IPv6 action count: 1 on FPC1.PIC3
IPv6 action count: Active mode 1 on all PICs
```

show security flow session family

Supported Platforms SRX Series, vSRX

Syntax show security flow session family (inet | inet6)
[brief | extensive | summary]

Release Information Command introduced in Junos OS Release 10.2.

Description Display filtered summary of information about existing sessions, including types of sessions, active and failed sessions, and the maximum allowed number of sessions.

Options

- **inet**—Display details summary of IPv4 sessions.
- **inet6**—Display details summary of IPv6 sessions.
- brief | extensive | summary–Display the specified level of output.

Required Privilege Level view

Related Documentation

- *Juniper Networks Devices Processing Overview*
- clear security flow session family on page 342

List of Sample Output

show security flow session family inet on page 423
show security flow session family inet brief on page 424
show security flow session family inet extensive on page 424
show security flow session family inet summary on page 426

Output Fields Table 51 on page 422 lists the output fields for the **show security flow session family** command. Output fields are listed in the approximate order in which they appear.

Table 51: show security flow session family Output Fields

Field Name	Field Description
Session ID	Number that identifies the session. Use this ID to get more information about the session.
Policy name	Policy that permitted the traffic.
Timeout	Idle timeout after which the session expires.
In	Incoming flow (source and destination IP addresses, application protocol, interface, session token, route, gateway, tunnel, port sequence, FIN sequence, FIN state, packets and bytes).
Out	Reverse flow (source and destination IP addresses, application protocol, interface, session token, route, gateway, tunnel, port sequence, FIN sequence, FIN state, packets and bytes).
Total sessions	Total number of sessions.

Table 51: show security flow session family Output Fields *(continued)*

Field Name	Field Description
Status	Session status.
Flag	Internal flag depicting the state of the session, used for debugging purposes.
Policy name	Name and ID of the policy that the first packet of the session matched.
Source NAT pool	The name of the source pool where NAT is used.
Application	Name of the application.
Maximum timeout	Maximum session timeout.
Current timeout	Remaining time for the session unless traffic exists in the session.
Session State	Session state.
Start time	Time when the session was created, offset from the system start time.
Unicast-sessions	Number of unicast sessions.
Multicast-sessions	Number of multicast sessions.
Failed-sessions	Number of failed sessions.
Sessions-in-use	Number of sessions in use. • Valid sessions • Pending sessions • Invalidated sessions • Sessions in other states
Maximum-sessions	Number of maximum sessions.

Sample Output

show security flow session family inet

```
root> show security flow session family inet
Flow Sessions on FPC10 PIC1:
Total sessions: 0

Flow Sessions on FPC10 PIC2:

Session ID: 420000107, Policy name: default-policy-00/2, Timeout: 4, Valid
  In: 203.0.113.0/3 --> 203.0.113.5/24;icmp, If: ge-7/1/0.0, Pkts: 1, Bytes: 84,
 CP Session ID: 420000202
  Out: 203.0.113.4/24 --> 203.0.113.6/24;icmp, If: .local..0, Pkts: 1, Bytes: 84,
 CP Session ID: 420000202
Total sessions: 1
```



```
Flow Sessions on FPC10 PIC3:

Session ID: 430000115, Policy name: default-policy-00/2, Timeout: 2, Valid
  In: 203.0.113.0/4 --> 203.0.113.5/24;icmp, If: ge-7/1/0.0, Pkts: 1, Bytes: 84,
 CP Session ID: 430000110
  Out: 203.0.113.5/24 --> 203.0.113.6/24;icmp, If: .local..0, Pkts: 1, Bytes: 84,
 CP Session ID: 430000110

Session ID: 430000117, Policy name: default-policy-00/2, Timeout: 4, Valid
  In: 203.0.113.0/4 --> 203.0.113.5/24;icmp, If: ge-7/1/0.0, Pkts: 1, Bytes: 84,
 CP Session ID: 430000111
  Out: 203.0.113.5/24 --> 203.0.113.6/24;icmp, If: .local..0, Pkts: 1, Bytes: 84,
 CP Session ID: 430000111
Total sessions: 2
```

show security flow session family inet brief

```
root> show security flow session family inet brief
Flow Sessions on FPC10 PIC1:
Total sessions: 0

Flow Sessions on FPC10 PIC2:

Session ID: 420000115, Policy name: default-policy-00/2, Timeout: 2, Valid
  In: 203.0.113.0/3 --> 203.0.113.5/24;icmp, If: ge-7/1/0.0, Pkts: 1, Bytes: 84,
 CP Session ID: 420000206
  Out: 203.0.113.4/24 --> 203.0.113.6/24;icmp, If: .local..0, Pkts: 1, Bytes: 84,
 CP Session ID: 420000206

Session ID: 420000117, Policy name: default-policy-00/2, Timeout: 2, Valid
  In: 203.0.113.0/4 --> 203.0.113.5/24;icmp, If: ge-7/1/0.0, Pkts: 1, Bytes: 84,
 CP Session ID: 420000207
  Out: 203.0.113.5/24 --> 203.0.113.6/24;icmp, If: .local..0, Pkts: 1, Bytes: 84,
 CP Session ID: 420000207
Total sessions: 2

Flow Sessions on FPC10 PIC3:

Session ID: 430000119, Policy name: default-policy-00/2, Timeout: 2, Valid
  In: 203.0.113.0/4 --> 203.0.113.5/24;icmp, If: ge-7/1/0.0, Pkts: 1, Bytes: 84,
 CP Session ID: 430000112
  Out: 203.0.113.5/24 --> 203.0.113.6/24;icmp, If: .local..0, Pkts: 1, Bytes: 84,
 CP Session ID: 430000112
Total sessions: 1
```

show security flow session family inet extensive

```
root> show security flow session family inet extensive
Flow Sessions on FPC10 PIC1:

Session ID: 410000111, Status: Normal
Flags: 0x80400040/0x0/0x2800023
Policy name: default-policy-00/2
Source NAT pool: Null
Dynamic application: junos:UNKNOWN,
Encryption:  Unknown
Application traffic control rule-set: INVALID, Rule: INVALID
Maximum timeout: 4, Current timeout: 4
Session State: Valid
Start time: 76455, Duration: 0
```



```
   In: 203.0.113.0/24 --> 203.0.113.1/24;icmp,
    Interface: ge-7/1/0.0,
    Session token: 0x6, Flag: 0xc0000021
    Route: 0xa0010, Gateway: 203.0.113.10, Tunnel: 0
    Port sequence: 0, FIN sequence: 0,
    FIN state: 0,
    Pkts: 1, Bytes: 84
    CP Session ID: 410000242
   Out: 203.0.113.1/24 --> 203.0.113.10/4;icmp,
    Interface: .local..0,
    Session token: 0x2, Flag: 0x40000030
    Route: 0xfffb0006, Gateway: 203.0.113.1, Tunnel: 0
    Port sequence: 0, FIN sequence: 0,
    FIN state: 0,
    Pkts: 1, Bytes: 84
    CP Session ID: 410000242
Total sessions: 1

Flow Sessions on FPC10 PIC2:

Session ID: 420000123, Status: Normal
Flags: 0x80400040/0x0/0x2800023
Policy name: default-policy-00/2
Source NAT pool: Null
Dynamic application: junos:UNKNOWN,
Encryption:  Unknown
Application traffic control rule-set: INVALID, Rule: INVALID
Maximum timeout: 4, Current timeout: 2
Session State: Valid
Start time: 76454, Duration: 2
   In: 203.0.113.10/24 --> 203.0.113.11/24;icmp,
    Interface: ge-7/1/0.0,
    Session token: 0x6, Flag: 0xc0000021
    Route: 0xa0010, Gateway: 20010, Tunnel: 0
    Port sequence: 0, FIN sequence: 0,
    FIN state: 0,
    Pkts: 1, Bytes: 84
    CP Session ID: 420000210
   Out: 203.0.113.11/24 --> 203.0.113.12/24;icmp,
    Interface: .local..0,
    Session token: 0x2, Flag: 0x40000030
    Route: 0xfffb0006, Gateway: 203.0.113.1, Tunnel: 0
    Port sequence: 0, FIN sequence: 0,
    FIN state: 0,
    Pkts: 1, Bytes: 84
    CP Session ID: 420000210
Total sessions: 1

Flow Sessions on FPC10 PIC3:

Session ID: 430000131, Status: Normal
Flags: 0x80400040/0x0/0x2800023
Policy name: default-policy-00/2
Source NAT pool: Null
Dynamic application: junos:UNKNOWN,
Encryption:  Unknown
Application traffic control rule-set: INVALID, Rule: INVALID
Maximum timeout: 4, Current timeout: 4
Session State: Valid
Start time: 76421, Duration: 1
   In: 203.0.113.10/24 --> 203.0.113.11/24;icmp,
```

```
    Interface: ge-7/1/0.0,
    Session token: 0x6, Flag: 0xc0000021
    Route: 0xa0010, Gateway: 203.0.113.10, Tunnel: 0
    Port sequence: 0, FIN sequence: 0,
    FIN state: 0,
    Pkts: 1, Bytes: 84
    CP Session ID: 430000118
   Out: 203.0.113.12/24 --> 203.0.113.13/24;icmp,
    Interface: .local..0,
    Session token: 0x2, Flag: 0x40000030
    Route: 0xfffb0006, Gateway: 203.0.113.1, Tunnel: 0
    Port sequence: 0, FIN sequence: 0,
    FIN state: 0,
    Pkts: 1, Bytes: 84
    CP Session ID: 430000118
Total sessions: 1
```

show security flow session family inet summary

```
root> show security flow session family inet summary
Flow Sessions on FPC10 PIC1:

Valid sessions: 2
Pending sessions: 0
Invalidated sessions: 2
Sessions in other states: 0
Total sessions: 4

Flow Sessions on FPC10 PIC2:

Valid sessions: 2
Pending sessions: 0
Invalidated sessions: 2
Sessions in other states: 0
Total sessions: 4

Flow Sessions on FPC10 PIC3:

Valid sessions: 2
Pending sessions: 0
Invalidated sessions: 2
Sessions in other states: 0
Total sessions: 4
```


show security flow statistics

Supported Platforms SRX Series, vSRX

Syntax **show security flow statistics**

Release Information Command introduced in Junos OS Release 10.2.

Description Display security flow statistics on a specific SPU. A flow is a stream of related packets that meet the same matching criteria and share the same characteristics.

A packet undergoes flow-based processing after packet-based filters and some screens have been applied to it. All flow-based processing for a single flow occurs on a single System Processing Unit (SPU). An SPU processes the packets of a flow according to the security features and other services configured for the session. Flow-based packet processing treats related packets, or a stream of packets, in the same way. Packet treatment depends on characteristics that were established for the first packet of the packet stream.

The **show security flow statistics** command displays information for individual SPUs. For each SPU, it shows the number of active sessions on the SPU, the number of packets processed and forwarded, the number of packets dropped, and the number of packet fragments received in a flow on the SPU.

There are many conditions that can cause a packet to be dropped. Here are some of them:

- A screen module detects IP spoofing
- The IPSec Encapsulating Security Payload (ESP) or the Authentication Header (AH) authentication failed. For example, incoming NAT errors could cause this to happen.
- A packet matches more than one security policy that specifies user authentication. (Sometimes packets are looped through the system more than once. Each time a packet passes through the system, that packet must be permitted by a policy.)
- A time constraint setting expires. For example, multicast streams with a packet interval of more than 60 seconds would experience premature aging-out of flow sessions. (In most cases, you can configure higher time-out value to prevent packet drop.)

Packet fragmentation can occur for a number of reasons, and, in some cases, it can be controlled through a configuration setting. Every link has a maximum transmission unit (MTU) size that specifies the size of the largest packet that the link can transmit. A larger MTU size means that fewer packets are required to transmit a certain amount of data. However, for a packet to successfully traverse the path from the source node to the destination node, the MTU size of the source node interface must be no larger than that of the smallest MTU size of all nodes on the path between the source and destination. This value is referred to as the path maximum transmission unit (path MTU).

When a packet is larger that the MTU size, a link might fragment it or drop it.

- For IPv4, if a node within the path between a source node and a destination node receives a packet that is larger than its MTU size, it can fragment the packet and transmit the resulting smaller packets.
- For IPv6, an intermediate node cannot fragment a packet. If a packet is larger than a link's MTU size, it is likely that the link will drop it. However, the source node (the node that sent the packet) can fragment a packet, and this is done to accommodate a path MTU size-adjustment requirement. Nodes along the path of a packet cannot fragment the packet to transmit it.

Required Privilege Level view

Related Documentation

- *Juniper Networks Devices Processing Overview*

List of Sample Output

show security flow statistics on page 428
show security flow statistics (for hash-based datapath forwarding using SRX5K-MPC3-40G10G (IOC3) and SRX5K-MPC3-100G10G (IOC3) on page 429

Output Fields Table 52 on page 428 lists the output fields for the **show security flow statistics** command. Output fields are listed in the approximate order in which they appear.

Table 52: show security flow statistics Output Fields

Field Name	Field Description
Current sessions	Number of active sessions on the SPU.
Packets forwarded	Number of packets received in a security flow of a specific SPU. The packets are processed and forwarded on that SPU.
Packets dropped	Number of packets dropped in a flow on a specific SPU. The packets are received in the flow. However, during processing, the system discovered sanity check errors, security violations, or other conditions that caused the packet to be dropped. See the description for some of the conditions and events that can cause a packet to be dropped.
Fragment packets	Number of fragment packets received in a flow on the SPU. See the description for information on packet fragments.

Sample Output

show security flow statistics

```
root> show security flow statistics
Flow Statistics of FPC4 PIC1:
    Current sessions: 63
```

```
    Packets forwarded: 3001
    Packets dropped: 1281
    Fragment packets: 0

  Flow Statistics of FPC5 PIC0:
    Current sessions: 22
    Packets forwarded: 859
    Packets dropped: 0
    Fragment packets: 0

  Flow Statistics of FPC5 PIC1:
    Current sessions: 22
    Packets forwarded: 858
    Packets dropped: 0
    Fragment packets: 0

  Flow Statistics Summary:
    System total valid sessions: 107
    Packets forwarded: 4718
    Packets dropped: 1281
    Fragment packets: 0
```

show security flow statistics (for hash-based datapath forwarding using SRX5K-MPC3-40G10G (IOC3) and SRX5K-MPC3-100G10G (IOC3)

Starting with Junos OS Release 15.1X49-D10, SRX5K-MPC3-100G10G (IOC3) and SRX5K-MPC3-40G10G (IOC3) are introduced for SRX5400, SRX5600, and SRX5800 devices that perform hash-based datapath packet forwarding to interconnect with all existing IOC and SPC cards using the XL chip (packet-processing chip). The IOC3 XL chip uses a hash-based method to distribute ingress traffic to a pool of SPUs by default.

```
root> show security flow statistics
Flow Statistics of FPC0 PIC1:
    Current sessions: 0
    Packets forwarded: 0
    Packets dropped: 0
    Fragment packets: 0

  Flow Statistics of FPC0 PIC2:
    Current sessions: 0
    Packets forwarded: 0
    Packets dropped: 0
    Fragment packets: 0

  Flow Statistics of FPC0 PIC3:
    Current sessions: 0
    Packets forwarded: 0
    Packets dropped: 0
    Fragment packets: 0

  Flow Statistics Summary:
    System total valid sessions: 0
    Packets forwarded: 0
    Packets dropped: 0
    Fragment packets: 0
```

show security flow status

Supported Platforms SRX Series, vSRX

Syntax **show security flow status**

Release Information Command introduced in Junos OS Release 10.2; session distribution mode option added in Junos OS Release 12.1X44-D10; enhanced route scaling mode option added in Junos OS Release 12.1X45-D10. GTP-U distribution option added in Junos OS Release 15.1X49-D40.

Starting with Junos OS Release 15.1X49-D10, SRX5K-MPC3-100G10G (IOC3) and SRX5K-MPC3-40G10G (IOC3) are introduced for SRX5400, SRX5600, and SRX5800 devices that perform hash-based data path packet forwarding to interconnect with all existing IOC and SPC cards using the XL chip (packet-processing chip).

The IOC3 XL chip uses a hash-based method to distribute ingress traffic to a pool of SPUs by default. Selection of hash keys depends on application protocols.

Description Display the flow processing modes and logging status.

Required Privilege Level view

Release History Table

Release	Description
Junos Release 15.1X49-D10	Starting with Junos OS Release 15.1X49-D10, SRX5K-MPC3-100G10G (IOC3) and SRX5K-MPC3-40G10G (IOC3) are introduced for SRX5400, SRX5600, and SRX5800 devices that perform hash-based data path packet forwarding to interconnect with all existing IOC and SPC cards using the XL chip (packet-processing chip).

Related Documentation

- *Juniper Networks Devices Processing Overview*

List of Sample Output

show security flow status on page 431
show security flow status (IPsec Performance Acceleration) on page 431
show security flow status (for hash-based datapath forwarding using SRX5K-MPC3-40G10G (IOC3) and SRX5K-MPC3-100G10G (IOC3) on page 432

Output Fields Table 53 on page 431 lists the output fields for the **show security flow status** command. Output fields are listed in the approximate order in which they appear.

Table 53: show security flow status Output Fields

Field Name	Field Description
Flow forwarding mode	Flow processing mode. • Inet forwarding mode • Inet6 forwarding mode • MPLS forwarding mode • ISO forwarding mode • Session distribution mode • Enhanced route scaling mode
Flow trace status	Flow logging status. • Flow tracing status • Flow tracing options
flow session distribution	SPU load distribution mode. • RR-based • Hash-based GTP-U distribution • Enabled
Flow packet ordering	packet-ordering mode. • Hardware • Software
Flow ipsec performance acceleration	IPsec VPN performance acceleration status.

Sample Output

show security flow status

```
root> show security flow status
Flow forwarding mode:
Inet forwarding mode: flow based
Inet6 forwarding mode: flow based
MPLS forwarding mode: drop
ISO forwarding mode: drop
Enhanced route scaling mode: Enabled (reboot needed to disable)
Flow trace status
Flow tracing status: on
Flow tracing options: all
Flow session distribution
Distribution mode: Hash-based
GTP-U distribution: Enabled
Flow packet ordering
Ordering mode: Software (reboot needed to change to software)
```

show security flow status (IPsec Performance Acceleration)

```
root> show security flow status
```

```
Flow forwarding mode:
    Inet forwarding mode: flow based
    Inet6 forwarding mode: drop
    MPLS forwarding mode: drop
    ISO forwarding mode: drop
Flow trace status
    Flow tracing status: off
Flow session distribution
    Distribution mode: RR-based
    GTP-U distribution: Enabled Flow packet ordering
Ordering mode: Software (reboot needed to change to software)
Flow ipsec performance acceleration: on
```

show security flow status (for hash-based datapath forwarding using SRX5K-MPC3-40G10G (IOC3) and SRX5K-MPC3-100G10G (IOC3)

```
root> show security flow status
node0:
--------------------------------------------------------------------------
  Flow forwarding mode:
    Inet forwarding mode: flow based
    Inet6 forwarding mode: drop
    MPLS forwarding mode: drop
    ISO forwarding mode: drop
  Flow trace status
    Flow tracing status: off
  Flow session distribution
    Distribution mode: Hash-based
    GTP-U distribution: Enabled
  Flow ipsec performance acceleration: off
  Flow packet ordering
    Ordering mode: Hardware

node1:
--------------------------------------------------------------------------
  Flow forwarding mode:
    Inet forwarding mode: flow based
    Inet6 forwarding mode: drop
    MPLS forwarding mode: drop
    ISO forwarding mode: drop
  Flow trace status
    Flow tracing status: off
  Flow session distribution
    Distribution mode: Hash-based
    GTP-U distribution: Enabled
  Flow ipsec performance acceleration: off
  Flow packet ordering
    Ordering mode: Hardware
```


show security forward-options secure-wire

Supported Platforms SRX Series, vSRX

Syntax show security forward-options secure-wire <*secure-wire-name*>

Release Information Command introduced in Junos OS Release 12.3X48-D10.

Description Display information about secure wire mappings.

Options

- none—Display information about all configured secure wire mappings.
- *secure-wire-name*—(Optional) Display information about the specified secure wire mapping.

Required Privilege Level view

Related Documentation

- Understanding Secure Wire on page 71

List of Sample Output

show security forward-options secure-wire on page 433
show security forward-options secure-wire pw1 on page 434

Output Fields Table 54 on page 433 lists the output fields for the **show security forward-options secure-wire** command. Output fields are listed in the approximate order in which they appear.

Table 54: show security forward-options secure-wire Output Fields

Field Name	Field Description
Secure wire	Name of the secure wire mapping.
Interface	One of the peer interfaces in the secure wire mapping.
Link	Operational status of the interface link.
Interface	The second peer interface in the secure wire mapping.
Link	Operational status of the interface link.

Sample Output

show security forward-options secure-wire

```
user@host> show security forward-options secure-wire
Secure wire                                   Interface       Link    Interface       Link

pw1                                           ge-11/1/0.0     up      ge-11/1/1.0     up
pw2                                           ge-11/0/0.0     up      ge-11/0/1.0     up
pw3                                           ge-11/1/2.0     down    ge-11/1/3.0     down
Total secure wires: 3
```

Sample Output

show security forward-options secure-wire pw1

```
user@host> show security forward-options secure-wire pw1
Secure wire                           Interface       Link    Interface       Link

pw1                                   ge-11/1/0.0     up      ge-11/1/1.0     up
```


show security policies

Supported Platforms SRX Series, vSRX

Syntax

show security policies
none
<detail>
policy-name *policy-name*
<global>

Release Information Command modified in Junos OS Release 9.2. Support for IPv6 addresses added in Junos OS Release 10.2. Support for wildcard addresses added in Junos OS Release 11.1. Support for global policy added in Junos OS Release 11.4. Support for services offloading added in Junos OS Release 11.4. Support for source-identities added in Junos OS Release 12.1. The **Description** output field added in Junos OS Release 12.1. Support for negated address added in Junos OS Release 12.1X45-D10. The output fields for Policy Statistics expanded, and the output fields for the **global** and **policy-name** options expanded to include from-zone and to-zone global match criteria in Junos OS Release 12.1X47-D10. Support for the **initial-tcp-mss** and **reverse-tcp-mss** options added in Junos OS Release 12.3X48-D20. Output field and description for **source-end-user-profile** option added in Junos OS Release 15.1x49-D70.

Description Display a summary of all security policies configured on the device. If a particular policy is specified, display information specific to that policy.

Options

- **none**—Display basic information about all configured policies.
- **detail**—(Optional) Display a detailed view of all of the policies configured on the device.
- **policy-name** ***policy-name***—(Optional) Display information about a specified policy.
- **global**—(Optional) Display information about global policies.

Required Privilege Level view

Related Documentation

- *Security Policies Overview*
- *Understanding Security Policy Rules*
- *Understanding Security Policy Elements*

List of Sample Output

show security policies on page 438
show security policies policy-name detail on page 439
show security policies (Services-Offload) on page 440
show security policies (Device Identity) on page 440
show security policies detail on page 440
show security policies detail (TCP Options) on page 441
show security policies policy-name (Negated Address) on page 442
show security policies policy-name detail (Negated Address) on page 442
show security policies global on page 442

Output Fields Table 55 on page 436 lists the output fields for the **show security policies** command. Output fields are listed in the approximate order in which they appear.

Table 55: show security policies Output Fields

Field Name	Field Description
From zone	Name of the source zone.
To zone	Name of the destination zone.
Policy	Name of the applicable policy.
Description	Description of the applicable policy.
State	Status of the policy: • **enabled**: The policy can be used in the policy lookup process, which determines access rights for a packet and the action taken in regard to it. • **disabled**: The policy cannot be used in the policy lookup process, and therefore it is not available for access control.
Index	Internal number associated with the policy.
Sequence number	Number of the policy within a given context. For example, three policies that are applicable in a from-zoneA-to-zoneB context might be ordered with sequence numbers 1, 2, 3. Also, in a from-zoneC-to-zoneD context, four policies might have sequence numbers 1, 2, 3, 4.
Source addresses	For standard display mode, the names of the source addresses for a policy. Address sets are resolved to their individual names. For detail display mode, the names and corresponding IP addresses of the source addresses for a policy. Address sets are resolved to their individual address name-IP address pairs.
Destination addresses	Name of the destination address (or address set) as it was entered in the destination zone's address book. A packet's destination address must match this value for the policy to apply to it.
source-end-user-profile	Name of the device identity profile (referred to as **end-user-profile** in the CLI) that contains attributes, or characteristics of a device. Specification of the device identity profile in the **source-end-user-profile** field is part of the device identity feature. If a device matches the attributes specified in the profile and other security policy parameters, then the security policy's action is applied to traffic issuing from the device.
Source addresses (excluded)	Name of the source address excluded from the policy.
Destination addresses (excluded)	Name of the destination address excluded from the policy.
Source identities	One or more user roles specified for a policy.

Table 55: show security policies Output Fields *(continued)*

Field Name	Field Description
Applications	Name of a preconfigured or custom application whose type the packet matches, as specified at configuration time. • **IP protocol**: The Internet protocol used by the application—for example, TCP, UDP, ICMP. • **ALG**: If an ALG is explicitly associated with the policy, the name of the ALG is displayed. If **application-protocol ignore** is configured, **ignore** is displayed. Otherwise, **0** is displayed. However, even if this command shows **ALG: 0**, ALGs might be triggered for packets destined to well-known ports on which ALGs are listening, unless ALGs are explicitly disabled or when **application-protocol ignore** is not configured for custom applications. • **Inactivity timeout**: Elapsed time without activity after which the application is terminated. • **Source port range**: The low-high source port range for the session application.
Destination Address Translation	Status of the destination address translation traffic: • **drop translated**—Drop the packets with translated destination addresses. • **drop untranslated**—Drop the packets without translated destination addresses.

Application Firewall	An application firewall includes the following:
	• **Rule-set**—Name of the rule set.
	• **Rule**—Name of the rule.
	  ◦ **Dynamic applications**—Name of the applications.
	  ◦ **Dynamic application groups**—Name of the application groups.
	  ◦ **Action**—The action taken with respect to a packet that matches the application firewall rule set. Actions include the following:
	    ▪ **permit**
	    ▪ **deny**
	• **Default rule**—The default rule applied when the identified application is not specified in any rules of the rule set.

Action or Action-type	• The action taken in regard to a packet that matches the policy's tuples. Actions include the following:
	  ◦ **permit**
	  ◦ **firewall-authentication**
	  ◦ **tunnel ipsec-vpn** ***vpn-name***
	  ◦ **pair-policy** ***pair-policy-name***
	  ◦ **source-nat pool** ***pool-name***
	  ◦ **pool-set** ***pool-set-name***
	  ◦ **interface**
	  ◦ **destination-nat** ***name***
	  ◦ **deny**
	  ◦ **reject**
	  ◦ **services-offload**

Session log	Session log entry that indicates whether the **at-create** and **at-close** flags were set at configuration time to log session information.

Table 55: show security policies Output Fields *(continued)*

Field Name	Field Description
Scheduler name	Name of a preconfigured scheduler whose schedule determines when the policy is active and can be used as a possible match for traffic.

Policy statistics	• **Input bytes**—The total number of bytes presented for processing by the device.
	  ◦ **Initial direction**—The number of bytes presented for processing by the device from the initial direction.
	  ◦ **Reply direction**—The number of bytes presented for processing by the device from the reply direction.
	• **Output bytes**—The total number of bytes actually processed by the device.
	  ◦ **Initial direction**—The number of bytes from the initial direction actually processed by the device.
	  ◦ **Reply direction**—The number of bytes from the reply direction actually processed by the device.
	• **Input packets**—The total number of packets presented for processing by the device.
	  ◦ **Initial direction**—The number of packets presented for processing by the device from the initial direction.
	  ◦ **Reply direction**—The number of packets presented for processing by the device from the reply direction.
	• **Output packets**—The total number of packets actually processed by the device.
	  ◦ **Initial direction**—The number of packets actually processed by the device from the initial direction.
	  ◦ **Reply direction**—The number of packets actually processed by the device from the reply direction.
	• **Session rate**—The total number of active and deleted sessions.
	• **Active sessions**—The number of sessions currently present because of access control lookups that used this policy.
	• **Session deletions**—The number of sessions deleted since system startup.
	• **Policy lookups**—The number of times the policy was accessed to check for a match.

Per policy TCP Options	Configured syn and sequence checks, and the configured TCP MSS value for the initial direction and /or the reverse direction.

Sample Output

show security policies

```
user@host> show security policies
From zone: trust, To zone: untrust
  Policy: p1, State: enabled, Index: 4, Sequence number: 1
    Source addresses:
    sa-1-ipv4: 198.51.100.11/24
    sa-2-ipv6: 2001:db8:a0b:12f0::1/32
    sa-3-ipv6: 2001:db8:a0b:12f0::22/32
    sa-4-wc:   203.0.113.1/255.255.0.255
    Destination addresses:
    da-1-ipv4: 2.2.2.2/24
    da-2-ipv6: 2001:db8:a0b:12f0::8/32
    da-3-ipv6: 2001:db8:a0b:12f0::9/32
    da-4-wc:   192.168.22.11/255.255.0.255
```



```
    Source identities: role1, role2, role4
    Applications: any
    Action: permit, application services, log, scheduled
    Application firewall : my_ruleset1
  Policy: p2, State: enabled, Index: 5, Sequence number: 2
    Source addresses:
    sa-1-ipv4:  198.51.100.11/24
    sa-2-ipv6:  2001:db8:a0b:12f0::1/32
    sa-3-ipv6:  2001:db8:a0b:12f0::22/32
    Destination addresses:
    da-1-ipv4:  2.2.2.2/24
    da-2-ipv6:  2001:db8:a0b:12f0::1/32
    da-3-ipv6:  2001:db8:a0b:12f0::9/32
    Source identities: role1, role4
    Applications: any
    Action: deny, scheduled
```

show security policies policy-name detail

```
user@host> show security policies policy-name p1 detail
Policy: p1, action-type: permit, State: enabled, Index: 4
  Description: The policy p1 is for the sales team
  Sequence number: 1
  From zone: trust, To zone: untrust
  Source addresses:
    sa-1-ipv4:  198.51.100.11/24
    sa-2-ipv6:  2001:db8:a0b:12f0::1/32
    sa-3-ipv6:  2001:db8:a0b:12f0::9/32
    sa-4-wc:    203.0.113.1/255.255.0.255
  Destination addresses:
    da-1-ipv4: 192.0.2.0/24
    da-2-ipv6: 2001:db8:a0b:12f0::1/32
    da-3-ipv6: 2001:db8:a0b:12f0::9/32
    da-4-wc:   192.168.22.11/255.255.0.255
 Source identities:
  role1
  role2
  role4
  Application: any
    IP protocol: 0, ALG: 0, Inactivity timeout: 0
      Source port range: [0-0]
      Destination port range: [0-0]
  Destination Address Translation: drop translated
  Application firewall :
  Rule-set: my_ruleset1
    Rule: rule1
      Dynamic Applications: junos:FACEBOOK-ACCESS, junos:YMSG
      Dynamic Application groups: junos:web, junos:chat
      Action: deny
    Default rule: permit
  Session log: at-create, at-close
  Scheduler name: sch20
  Per policy TCP Options: SYN check: No, SEQ check: No
  Policy statistics:
    Input  bytes       :                18144                   545 bps
      Initial direction:                 9072                  272 bps
      Reply direction  :                 9072                   272 bps
    Output bytes       :                18144                   545 bps
      Initial direction:                 9072                   272 bps
      Reply direction  :                 9072                   272 bps
    Input  packets     :                  216                     6 pps
```

```
    Initial direction:          108                3 bps
    Reply direction  :          108                3 bps
  Output packets     :          216                6 pps
    Initial direction:          108                3 bps
    Reply direction  :          108                3 bps
  Session rate       :          108                3 sps
  Active sessions    :           93
  Session deletions  :           15
  Policy lookups     :          108
```

show security policies (Services-Offload)

```
user@host> show security policies
Default policy: deny-all
From zone: trust, To zone: untrust
  Policy: p1, State: enabled, Index: 4, Scope Policy: 0, Sequence number: 1
    Source addresses: any
    Destination addresses: any
    Source identities: role1, role2, role4
    Applications: any
    Action: permit, services-offload, count
From zone: untrust, To zone: trust
  Policy: p2, State: enabled, Index: 5, Scope Policy: 0, Sequence number: 1
    Source addresses: any
    Destination addresses: any
    Source identities: role1, role2, role4
    Applications: any
    Action: permit, services-offload
```

show security policies (Device Identity)

```
user@host>  show security policies
From zone: trust, To zone: untrust
       Policy: dev-id-marketing, State: enabled, Index: 5, Scope Policy: 0,
Sequence number: 1
         Source addresses: any
         Destination addresses: any
         source-end-user-profile: marketing-profile
         Applications: any
         Action: permit
```

show security policies detail

```
user@host> show security policies detail
Default policy: deny-all
Policy: p1, action-type: permit, services-offload:enabled , State: enabled, Index:
 4, Scope Policy: 0
  Policy Type: Configured
  Description: The policy p1 is for the sales team
  Sequence number: 1
  From zone: trust, To zone: untrust
  Source addresses:
    any-ipv4(global):  0.0.0.0/0
    any-ipv6(global): ::/0
  Destination addresses:
    any-ipv4(global):  0.0.0.0/0
    any-ipv6(global): ::/0
 Source identities:
  role1
  role2
  role4
  Application: any
```



```
    IP protocol: 0, ALG: 0, Inactivity timeout: 0
      Source port range: [0-0]
      Destination port range: [0-0]
  Per policy TCP Options: SYN check: No, SEQ check: No
  Policy statistics:
    Input  bytes       :               18144                545 bps
      Initial direction:                9072               272 bps
      Reply direction  :                9072                272 bps
    Output bytes       :               18144                545 bps
      Initial direction:                9072                272 bps
      Reply direction  :                9072                272 bps
    Input  packets     :                 216                  6 pps
      Initial direction:                 108                  3 bps
      Reply direction  :                 108                  3 bps
    Output packets     :                 216                  6 pps
      Initial direction:                 108                  3 bps
      Reply direction  :                 108                  3 bps
    Session rate       :                 108                  3 sps
    Active sessions    :                  93
    Session deletions  :                  15
    Policy lookups     :                 108
Policy: p2, action-type: permit, services-offload:enabled , State: enabled, Index:
 5, Scope Policy: 0
  Policy Type: Configured
  Description: The policy p2 is for the sales team
  Sequence number: 1
  From zone: untrust, To zone: trust
  Source addresses:
    any-ipv4(global):  0.0.0.0/0
    any-ipv6(global): ::/0
  Destination addresses:
    any-ipv4(global):  0.0.0.0/0
    any-ipv6(global): ::/0
 Source identities:
  role1
  role2
  role4
  Application: any
    IP protocol: 0, ALG: 0, Inactivity timeout: 0
      Source port range: [0-0]
      Destination port range: [0-0]
  Per policy TCP Options: SYN check: No, SEQ check: No
```

show security policies detail (TCP Options)

```
user@host> show security policies policy-name policy1 detail
node0:
--------------------------------------------------------------------------
Policy: policy1, action-type: permit, State: enabled, Index: 7, Scope Policy: 0
  Policy Type: Configured
  Sequence number: 2
  From zone: trust, To zone: untrust
  Source addresses:
    any-ipv4(global):  0.0.0.0/0
    any-ipv6(global): ::/0
  Destination addresses:
    any-ipv4(global):  0.0.0.0/0
    any-ipv6(global): ::/0
  Application: any
    IP protocol: 0, ALG: 0, Inactivity timeout: 0
      Source port range: [0-0]
```

```
    Destination port range: [0-0]
  Per policy TCP Options: SYN check: No, SEQ check: No
  Per policy TCP MSS: initial: 800, reverse: 900
```

show security policies policy-name (Negated Address)

```
user@host> show security policies policy-name p1
node0:
--------------------------------------------------------------------------
From zone: trust, To zone: untrust
  Policy: p1, State: enabled, Index: 4, Scope Policy: 0, Sequence number: 1
    Source addresses(excluded): as1
    Destination addresses(excluded): as2
    Applications: any
    Action: permit
```

show security policies policy-name detail (Negated Address)

```
user@host> show security policies policy-name p1 detail
node0:
--------------------------------------------------------------------------
Policy: p1, action-type: permit, State: enabled, Index: 4, Scope Policy: 0
  Policy Type: Configured
  Sequence number: 1
  From zone: trust, To zone: untrust
  Source addresses(excluded):
    ad1(ad): 255.255.255.255/32
    ad2(ad):  198.51.100.1/24
    ad3(ad):  198.51.100.6  ~ 198.51.100.56
    ad4(ad):  192.0.2.8/24
    ad5(ad):  198.51.100.99 ~ 198.51.100.199
    ad6(ad):  203.0.113.9/24
    ad7(ad):  203.0.113.23/24
  Destination addresses(excluded):
    ad13(ad2): 198.51.100.76/24
    ad12(ad2): 198.51.100.88/24
    ad11(ad2): 192.0.2.23 ~ 192.0.2.66
    ad10(ad2): 192.0.2.93
    ad9(ad2):  203.0.113.76 ~ 203.0.113.106
    ad8(ad2):  203.0.113.199
  Application: any
    IP protocol: 0, ALG: 0, Inactivity timeout: 0
      Source port range: [0-0]
      Destination port range: [0-0]
  Per policy TCP Options: SYN check: No, SEQ check: No
```

show security policies global

```
user@host> show security policies global policy-name Pa
node0:
--------------------------------------------------------------------------
  Global policies:
  Policy: Pa, State: enabled, Index: 5, Scope Policy: 0, Sequence number: 1
    From zones: zone1, zone2
    To zones: zone3, zone4    Source addresses: any
    Destination addresses: any
    Applications: any
    Action: permit
```

show security zones

Supported Platforms SRX Series, vSRX

Syntax

show security zones
<detail | terse>
< *zone-name* >

Release Information Command introduced in Junos OS Release 8.5. The **Description** output field added in Junos OS Release 12.1.

Description Display information about security zones.

Options

- none—Display information about all zones.
- **detail** | **terse**—(Optional) Display the specified level of output.
- *zone-name* —(Optional) Display information about the specified zone.

Required Privilege Level view

Related Documentation

- *Security Zones and Interfaces Overview*
- *Supported System Services for Host Inbound Traffic*
- security-zone on page 322

List of Sample Output

show security zones on page 444
show security zones abc on page 444
show security zones abc detail on page 444
show security zones terse on page 445

Output Fields Table 56 on page 443 lists the output fields for the **show security zones** command. Output fields are listed in the approximate order in which they appear.

Table 56: show security zones Output Fields

Field Name	Field Description
Security zone	Name of the security zone.
Description	Description of the security zone.
Policy configurable	Whether the policy can be configured or not.
Interfaces bound	Number of interfaces in the zone.
Interfaces	List of the interfaces in the zone.
Zone	Name of the zone.

Table 56: show security zones Output Fields *(continued)*

Field Name	Field Description
Type	Type of the zone.

Sample Output

show security zones

```
user@host> show security zones
Functional zone: management
   Description: This is the management zone.
   Policy configurable: No
   Interfaces bound: 1
   Interfaces:
     ge-0/0/0.0
Security zone: Host
   Description: This is the host zone.
   Send reset for non-SYN session TCP packets: Off
   Policy configurable: Yes
   Interfaces bound: 1
   Interfaces:
     fxp0.0
Security zone: abc
   Description: This is the abc zone.
   Send reset for non-SYN session TCP packets: Off
   Policy configurable: Yes
   Interfaces bound: 1
   Interfaces:
     ge-0/0/1.0
Security zone: def
   Description: This is the def zone.
   Send reset for non-SYN session TCP packets: Off
   Policy configurable: Yes
   Interfaces bound: 1
   Interfaces:
     ge-0/0/2.0
```

Sample Output

show security zones abc

```
user@host> show security zones abc
Security zone: abc
   Description: This is the abc zone.
   Send reset for non-SYN session TCP packets: Off
   Policy configurable: Yes
   Interfaces bound: 1
   Interfaces:
     ge-0/0/1.0
```

Sample Output

show security zones abc detail

```
user@host> show security zones abc detail
Security zone: abc
   Description: This is the abc zone.
```



```
Send reset for non-SYN session TCP packets: Off
Policy configurable: Yes
Interfaces bound: 1
Interfaces:
  ge-0/0/1.0
```

Sample Output

show security zones terse

```
user@host> show security zones terse
Zone                        Type
my-internal                 Security
my-external                 Security
dmz                         Security
```

show spanning-tree interface

Supported Platforms SRX Series

Syntax

```
show spanning-tree interface
<brief | detail>
<interface-name interface-name>
<msti msti-id>
<routing-instances routing-instance-name>
<vlan-id vlan-id>
```

Release Information Command introduced in Junos OS Release 11.1.

Description Display the configured or calculated interface-level spanning-tree protocol (can be either STP, RSTP, or MSTP) parameters. In **brief** mode, the command output does not display interfaces that are administratively disabled or do not have a physical link.

Options

brief | detail—(Optional) Display the specified level of output.

interface-name ***interface-name***—(Optional) Name of an interface.

msti ***msti-id***—(Optional) Display STP bridge information for the specified MSTP instance ID or common and internal spanning tree (CIST). Specify **0** for CIST. Specify a value from **1** through **64** for an MSTI.

vlan-id ***vlan-id***—(Optional) For MSTP interfaces, display interface information for the specified VLAN. Specify a value from **0** through **4094**.

Required Privilege Level view

Related Documentation

- Understanding the Spanning Tree Protocol on page 137
- Configuring the Spanning Tree Protocol (J- WebProcedure) on page 141
- Configuring the Spanning Tree Protocol (CLI Procedure) on page 143

List of Sample Output

show spanning-tree interface on page 447
show spanning-tree interface brief on page 448
show spanning-tree interface detail on page 448
show spanning-tree interface (Specified Interface) on page 449

Output Fields Table 57 on page 446 lists the output fields for the **show spanning-tree Interface** command. Output fields are listed in the approximate order in which they appear.

Table 57: show spanning-tree interface Output Fields

Field Name	Field Description
Interface name	Interface configured to participate in the STP, RSTP, or MSTP instance.
Port ID	Logical interface identifier configured to participate in the MSTP instance.

Table 57: show spanning-tree interface Output Fields *(continued)*

Field Name	Field Description
Designated port ID	Port ID of the designated port for the LAN segment this interface is attached to.
Designated bridge ID	Bridge ID of the designated bridge for the LAN segment this interface is attached to.
Port Cost	Configured cost for the interface.
State	STP port state. Forwarding (FWD), blocking (BLK), listening, learning, or disabled.
Role	MSTP or RSTP port role. Designated (DESG), backup (BKUP), alternate (ALT), (ROOT), or Root Prevented (Root-Prev).
Link type	MSTP or RSTP link type. Shared or point-to-point (pt-pt) and edge or non edge.
Alternate	Identifies the interface as an MSTP or RSTP alternate root port (yes) or non-alternate root port (no).
Boundary Port	Identifies the interface as an MSTP regional boundary port (yes) or non-boundary port (no).
Edge delay while expiry count	Number of times the edge delay timer expired on that interface.
Rcvd info while expiry count	Number of times the rcvd info timer expired on that interface.

Sample Output

show spanning-tree interface

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

Spanning tree interface parameters for instance 0

Interface     Port ID    Designated  Designated     Port    State  Role
                          port ID    bridge ID      Cost
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  Designated     Port    State  Role
                          port ID    bridge ID      Cost
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  Designated     Port    State  Role
```



```
                         port ID    bridge ID      Cost
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 brief

```
user@host> 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 detail

```
user@host> 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
Rvcd 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
Rvcd 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
Rvcd 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
Rvcd info while expiry count   : 0
[output truncated]
```

show spanning-tree interface (Specified Interface)

user@host> **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 vlans

Supported Platforms SRX Series, vSRX

Syntax

show vlans
<brief | detail | extensive>
<interface *interface-name*>
<logical-system (*logical-system* | *all*)>
<operational>

Release Information Command introduced in Junos OS Release 8.4.

Description Display VLAN information.

Options

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

- show ethernet-switching mac-learning-log (View) on page 343
- show ethernet-switching table (View) on page 345

List of Sample Output

show vlans on page 450
show vlans brief on page 450
show vlans detail on page 451

Sample Output

show vlans

```
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

```
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

```
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
```

