Junos® OS for EX Series Ethernet Switches, Release 10.4: Network Management and Monitoring

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Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, California 94089
USA
408-745-2000
www.juniper.net

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About This Topic Collection

How to Use This Guide

Complete documentation for the EX Series product family is provided on webpages at http://www.juniper.net/techpubs/en_US/release-independent/information-products/pathway-pages/ex-series/product/index.html. We have selected content from these webpages and created a number of EX Series guides that collect related topics into a book-like format so that the information is easy to print and easy to download to your local computer.

The release notes are at http://www.juniper.net/techpubs/en_US/junos10.4/information-products/topic-collections/release-notes/10.4/junos-release-notes-10.4.pdf.

List of EX Series Guides for Junos OS Release 10.4

Title	Description
Complete Hardware Guide for EX2200 Ethernet Switches	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX2200 Ethernet switches
Complete Hardware Guide for EX3200 Ethernet Switches	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX3200 Ethernet switches
Complete Hardware Guide for EX4200 Ethernet Switches	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX4200 Ethernet switches
Complete Hardware Guide for EX4500 Ethernet Switches	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX4500 Ethernet switches

Title	Description
Complete Hardware Guide for EX8208 Ethernet Switches	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX8208 Ethernet switches
Complete Hardware Guide for EX8216 Ethernet Switches	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX8216 Ethernet switches
Complete Hardware Guide for the XRE200 External Routing Engine	Component descriptions, site preparation, installation, replacement, and safety and compliance information for the XRE200 External Routing Engine
Complete Software Guide for Junos® OS for EX Series Ethernet Switches, Release 10.4	Software feature descriptions, configuration examples, and tasks for Junos OS for EX Series switches
Software Topic Collections	Software feature descriptions, configuration examples and tasks, and reference pages for configuration statements and operational commands (This information also appears in the *Complete Software Guide for Junos® OS for EX Series Ethernet Switches, Release 10.4*.)
Junos® OS for EX Series Ethernet Switches, Release 10.4: EX4200 Virtual Chassis	
Junos® OS for EX Series Ethernet Switches, Release 10.4: EX8200 Virtual Chassis	
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Junos® OS for EX Series Ethernet Switches, Release 10.4: User Interfaces	

Downloading Software

You can download Junos OS for EX Series switches from the Download Software area at http://www.juniper.net/customers/support/ . To download the software, you must have a Juniper Networks user account. For information about obtaining an account, see http://www.juniper.net/entitlement/setupAccountInfo.do.

Documentation Symbols Key

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.

Text and Syntax Conventions		
Convention	Description	Examples
Bold text like this	Represents text that you type.	To enter configuration mode, type the **configure** command: user@host> **configure**
`Fixed-width text like this`	Represents output that appears on the terminal screen.	`user@host>` **show chassis alarms** `No alarms currently active`
Italic text like this	• Introduces important new terms. • Identifies book names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS System Basics Configuration Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# **set system domain-name** *domain-name*
Plain text like this	Represents names of configuration statements, commands, files, and directories; IP addresses; configuration hierarchy levels; or labels on routing platform components.	• To configure a stub area, include the **stub** statement at the **[edit protocols ospf area area-id]** hierarchy level. • The console port is labeled **CONSOLE**.
< > (angle brackets)	Enclose optional keywords or variables.	**stub <default-metric** ***metric*****>;**

Text and Syntax Conventions		
Convention	Description	Examples
| (pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	**broadcast | multicast** (***string1*** **|** ***string2*** **|** ***string3***)
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	**rsvp { # Required for dynamic MPLS only**
[ ] (square brackets)	Enclose a variable for which you can substitute one or more values.	**community name members [** ***community-ids*** **]**

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

; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
J-Web GUI Conventions		
Bold text like this	Represents J-Web graphical user interface (GUI) items you click or select.	• In the Logical Interfaces box, select **All Interfaces**. • To cancel the configuration, click **Cancel**.
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select **Protocols>Ospf**.

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We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. Send e-mail to techpubs-comments@juniper.net with the following:

- Document URL or title
- Page number if applicable
- Software version
- Your name and company

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

PART 1

Network Management and Monitoring

CHAPTER 1

Port Mirroring

Port Mirroring—Overview

Understanding Port Mirroring on EX Series Switches

Use port mirroring to facilitate analyzing traffic on your Juniper Networks EX Series Ethernet Switch on a packet level. Use port mirroring as part of monitoring switch traffic for such purposes as enforcing policies concerning network usage and file sharing, and identifying sources of problems on your network by locating abnormal or heavy bandwidth usage from particular stations or applications.

Port mirroring copies packets to either a local interface for local monitoring or to a VLAN for remote monitoring. You can use port mirroring to copy these packets:

- Packets entering or exiting a port
- Packets entering a VLAN on Juniper Networks EX2200, EX3200, EX4200, or EX4500 Ethernet Switches
- Packets exiting a VLAN on Juniper Networks EX8200 Ethernet Switches

This topic describes:

Port Mirroring Overview

Port mirroring is needed for traffic analysis on a switch because a switch, unlike a hub, does not broadcast packets to every port on the device. The switch sends packets only to the port to which the destination device is connected. You configure port mirroring on

the switch to send copies of unicast traffic to either a local analyzer port or an analyzer VLAN. Then you can analyze the mirrored traffic using a protocol analyzer application. The protocol analyzer application can run either on a computer connected to the analyzer output interface or on a remote monitoring station.

We recommend that you disable port mirroring when you are not using it and that you select specific interfaces as input to the port mirror analyzer in preference to using the **all** keyword option. You can also limit the amount of mirrored traffic by using statistical sampling, setting a ratio to select a statistical sample, or using a firewall filter. Mirroring only the necessary packets reduces any potential performance impact.

With local port mirroring, traffic from multiple ports is replicated to the analyzer output interface. If the output interface for an analyzer reaches capacity, packets are dropped. You should consider whether the traffic being mirrored exceeds the capacity of the analyzer output interface.

You can use port mirroring on a switch to mirror any of the following:

- **Packets entering or exiting a port**—You can mirror the packets in any combination (on up to 256 ports). For example, you can send copies of the packets entering some ports and the packets exiting other ports to the same local analyzer port or analyzer VLAN.
- **Packets entering a VLAN on an EX2200, EX3200, EX4200, or EX4500 switch**—You can mirror the packets entering a VLAN on these switches to either a local analyzer port or to an analyzer VLAN. (On EX3200, EX4200, and EX4500 switches, you can configure multiple VLANs [up to 256 VLANs], including a VLAN range and PVLANs, as ingress input to an analyzer.)
- **Packets exiting a VLAN on an EX8200 switch**—You can mirror the packets exiting a VLAN on an EX8200 switch to either a local analyzer port or to an analyzer VLAN. You can configure multiple VLANs (up to 256 VLANs), including a VLAN range and PVLANs, as egress input to an analyzer.
- **Statistical sample**—You can mirror a statistical sample of packets that are
  - Entering or exiting a port
  - Entering a VLAN on an EX2200, EX3200, EX4200, or EX4500 switch
  - Exiting a VLAN on an EX8200 switch

  You specify the sample number of packets by setting the ratio. You can send the sample to either a local analyzer port or to an analyzer VLAN.
- **Policy-based sample**—You can mirror a policy-based sample of packets that are entering a port or a VLAN. You configure a firewall filter to establish a policy to select certain packets. You can send the sample to a local analyzer port or to an analyzer VLAN.

NOTE: Juniper Networks Junos operating system (Junos OS) for EX Series switches implements port mirroring differently than other Junos OS packages. Junos OS for EX Series switches does not include the port-mirroring statement found in the edit forwarding-options level of the hierarchy of other Junos OS packages, nor the port-mirror action in firewall filter terms.

Limitations of Port Mirroring

Port mirroring on EX Series switches has the following limitations:

- On an EX2200 switch, you cannot configure multiple VLANs (including a VLAN range or PVLANs) as ingress input to an analyzer.
- On an EX2200, EX3200, EX4200, or EX4500 switch, you can enable only one analyzer (port mirroring configuration).
- On EX8200 switches, you can configure seven analyzers (port mirroring configurations). Of these, one can be configured for input and output, the others only for output configured using firewall filters—the action of the firewall filters provides the input to the analyzers.

  An analyzer configured using a firewall filter does not support mirroring of packets that are egressing ports.
- Packets with physical layer errors are filtered out and thus are not sent to the analyzer port or analyzer VLAN.
- You cannot mirror packets exiting or entering the following ports:
  - Dedicated Virtual Chassis ports (VCPs)
  - Management port (**me0** or **vme0**)
  - Routed VLAN interfaces (RVIs) and VLAN-tagged L3 interfaces
- On EX2200, EX3200, EX4200, and EX4500 switches, mirrored packets exiting a tagged interface might contain an incorrect VLAN ID and Ethertype.
- On EX8200 switches, if you configure port mirroring to mirror packets egressing from 10-Gigabit Ethernet ports, packets might be dropped in the network traffic and in the mirrored traffic.
- On EX8200 switches, you can set a ratio only for ingress packets.
- On EX8200 switches, when an egress VLAN that belongs to a routed VLAN interface (RVI) is configured as the input for a port mirroring analyzer, the analyzer appends an incorrect dot1q (802.1Q) header to the mirrored packets on the routed traffic or does not mirror any packets on the routed traffic. As a workaround, configure a port mirroring analyzer with each port of the VLAN as egress input.
- Mirrored packets exiting an interface do not reflect the rewritten DSCP or 802.1p bits.

Table 1 on page 6 lists some port mirroring terms and their descriptions.

Port Mirroring Terminology

Table 1: Port Mirroring Terminology

Term	Description
Analyzer	A port-mirroring configuration on an EX Series switch. The analyzer includes: • The name of the analyzer • Source (input) ports or VLAN (optional) • A destination for mirrored packets (either a monitor port or a monitor VLAN) • Ratio field for specifying statistical sampling of packets (optional) • Loss-priority setting
Analyzer output interface Also known as monitor port	Interface to which mirrored traffic is sent and to which a protocol analyzer application is connected. NOTE: Interfaces used as output for a port mirror analyzer must be configured as family **ethernet-switching**. Analyzer output interfaces have the following limitations: • Cannot also be a source port. • Cannot be used for switching. • Do not participate in Layer 2 protocols, such as Spanning Tree Protocol (STP), when part of a port mirroring configuration. • When configured as an analyzer output interface, they lose any existing VLAN associations. If the bandwidth of the analyzer output interface is not sufficient to handle the traffic from the source ports, overflow packets are dropped.
Analyzer VLAN Also known as monitor VLAN	VLAN to which mirrored traffic is sent. The mirrored traffic can be used by a protocol analyzer application. The monitor VLAN is spread across the switches in your network.
Firewall-based analyzer	An analyzer session that has only an “output” stanza. A firewall-based analyzer must be used along with a firewall filter to achieve the functionality of an analyzer.
Input interface Also known as mirrored ports or monitored interfaces	An interface on the switch that is being mirrored, either on traffic entering or exiting the interface. An input interface cannot also be an output interface for an analyzer.
Mirror ratio	See statistical sampling.
Monitoring station	A computer running a protocol analyzer application.
Native analyzer session	An analyzer session that has both “input” and “output” stanzas.
Policy-based mirroring	Mirroring of packets that match the match items in the defined firewall filter term. The action item **analyzer *analyzer-name*** is used in the firewall filter to send the packets to the port mirror analyzer.
Protocol analyzer application	An application used to examine packets transmitted across a network segment. Also commonly called network analyzer, packet sniffer, or probe.

Table 1: Port Mirroring Terminology *(continued)*

Term	Description
Remote port mirroring	Functions the same as local port mirroring, except that the mirrored traffic is not copied to a local analyzer port but is flooded into an analyzer VLAN that you create specifically for the purpose of receiving mirrored traffic. In the intermediate switch, you can avoid flooding of the mirrored traffic to the member ports of the VLAN by setting the "ingress only" attribute to the incoming ports of the VLAN and the "egress only" attribute to the outgoing port of the VLAN.
Statistical sampling	You can configure the system to mirror a sampling of the packets, by setting a ratio of 1:*x*, where *x* is a value from 1 through 2047. For example, when the ratio is set to 1, all packets are copied to the analyzer. When the ratio is set to 200, 1 of every 200 packets is copied.

Related Documentation

- Example: Configuring Port Mirroring for Local Monitoring of Employee Resource Use on EX Series Switches on page 7
- Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches on page 12
- Configuring Port Mirroring to Analyze Traffic (J-Web Procedure) on page 22 or Configuring Port Mirroring to Analyze Traffic (CLI Procedure) on page 19
- Firewall Filter Match Conditions and Actions for EX Series Switches

Examples: Port Mirroring Configuration

- Example: Configuring Port Mirroring for Local Monitoring of Employee Resource Use on EX Series Switches on page 7
- Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches on page 12

Example: Configuring Port Mirroring for Local Monitoring of Employee Resource Use on EX Series Switches

EX Series switches allow you to configure port mirroring to send copies of packets to either a local interface for local monitoring or to a VLAN for remote monitoring. You can use port mirroring to copy these packets:

- Packets entering or exiting a port
- Packets entering a VLAN on EX2200, EX3200, EX4200, or EX4500 switches
- Packets exiting a VLAN on EX8200 switches

You can analyze the mirrored traffic using a protocol analyzer application installed on a system connected to the local destination interface (or a running on a remote monitoring station if you are sending mirrored traffic to an analyzer VLAN).

This example describes how to configure an EX Series switch to mirror traffic entering interfaces connected to employee computers to an analyzer output interface on the same switch.

This example describes how to configure local port mirroring:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 9.0 or later for EX Series switches
- One EX Series switch

Before you configure port mirroring, be sure you have an understanding of port mirroring concepts.

Overview and Topology

This topic includes two related examples that describe how to mirror traffic entering ports on the switch to a destination interface on the same switch. The first example shows how to mirror all traffic entering the ports connected to employee computers. The second example shows the same scenario, but includes a filter to mirror only the employee traffic going to the Web.

Network Topology

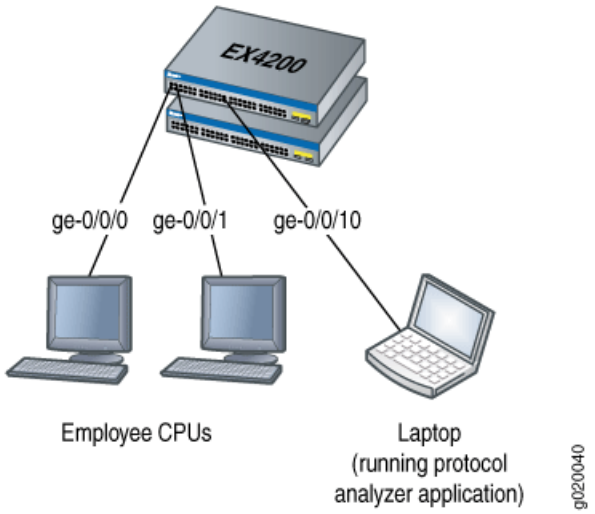
In this example, **ge-0/0/0** and **ge-0/0/1** serve as connections for employee computers.

In this example, one interface, **ge-0/0/10**, is reserved for analysis of mirrored traffic. Connect a PC running a protocol analyzer application to the analyzer output interface to analyze the mirrored traffic.

NOTE: Multiple ports mirrored to one interface can cause buffer overflow and dropped packets.

Figure 1 on page 9 shows the network topology for this example.

Figure 1: Network Topology for Local Port Mirroring Example



Mirroring All Employee Traffic for Local Analysis

To configure port mirroring for all employee traffic for local analysis, perform these tasks:

CLI Quick Configuration

To quickly configure local port mirroring for ingress traffic to the two ports connected to employee computers, copy the following commands and paste them into the switch terminal window:

```
[edit]
set interfaces ge-0/0/0 unit 0 family ethernet-switching
set interfaces ge-0/0/1 unit 0 family inet 192.1.1.1/24
set interfaces ge-0/0/10 unit 0 family ethernet-switching
set ethernet-switching options analyzer employee–monitor input ingress interface ge-0/0/0.0
set ethernet-switching options analyzer employee–monitor input ingress interface ge-0/0/1.0
set ethernet-switching options analyzer employee–monitor output interface ge-0/0/10.0
```

Step-by-Step Procedure

To configure an analyzer called **employee-monitor** and specify the input (source) interfaces and the analyzer output interface:

1. Configure each interface connected to employee computers as an input interface for the port-mirror analyzer that we are calling **employee-monitor**:

   ```
   [edit ethernet-switching-options]
   user@switch# set analyzer employee-monitor input ingress interface ge–0/0/0.0
   user@switch# set analyzer employee-monitor input ingress interface ge–0/0/1.0
   ```

2. Configure the output analyzer interface for the **employee-monitor** analyzer. This will be the destination interface for the mirrored packets:

   ```
   [edit ethernet-switching-options]
   user@switch# set analyzer employee-monitor output interface ge-0/0/10.0
   ```

Results

Check the results of the configuration:

```
[edit]
user@switch# show
ethernet-switching-options {
   analyzer employee-monitor {
```

```
        input {
          ingress {
            interface ge-0/0/0.0;
            interface ge-0/0/1.0;
          }
        }
        output {
          interface {
            ge-0/0/10.0;
          }
        }
      }
    }
```

Mirroring Employee-to-Web Traffic for Local Analysis

To configure port mirroring for employee to web traffic, perform these tasks:

CLI Quick Configuration

To quickly configure local port mirroring of traffic from the two ports connected to employee computers, filtering so that only traffic to the external Web is mirrored, copy the following commands and paste them into the switch terminal window:

```
[edit]
set ethernet-switching-options analyzer employee–web–monitor output interface ge-0/0/10.0
set firewall family ethernet-switching filter watch-employee term employee-to-corp from
destination-address 192.0.2.16/28
set firewall family ethernet-switching filter watch-employee term employee-to-corp from
source-address 192.0.2.16/28
set firewall family ethernet-switching filter watch-employee term employee-to-corp then accept
set firewall family ethernet-switching filter watch-employee term employee-to-web from
destination-port 80
set firewall family ethernet-switching filter watch-employee term employee-to-web then analyzer
employee-web-monitor
set interfaces ge-0/0/0 unit 0 family ethernet-switching filter input watch-employee
set interfaces ge-0/0/1 unit 0 family ethernet-switching filter input watch-employee
```

Step-by-Step Procedure

To configure local port mirroring of employee-to-web traffic from the two ports connected to employee computers:

1. Configure the local analyzer interface:

   ```
   [edit interfaces]
   user@switch# set ge-0/0/10 unit 0 family ethernet-switching
   ```

2. Configure the **employee-web-monitor** analyzer output (the input to the analyzer comes from the action of the filter):

   ```
   [edit ethernet-switching-options]
   user@switch# set analyzer employee-web-monitor output interface ge-0/0/10.0
   ```

3. Configure a firewall filter called **watch-employee** to send mirrored copies of employee requests to the Web to the **employee-web-monitor** analyzer. Accept all traffic to and from the corporate subnet (destination or source address of **192.0.2.16/28**). Send mirrored copies of all packets destined for the Internet (**destination port 80**) to the **employee-web-monitor** analyzer.

   ```
   [edit firewall family ethernet-switching]
   user@switch# set filter watch-employee term employee-to-corp from
   destination-address 192.0.2.16/28
   ```

```
user@switch# set filter watch-employee term employee-to-corp from source-address
192.0.2.16/28
user@switch# set filter watch-employee term employee-to-corp then accept
user@switch# set filter watch-employee term employee-to-web from destination-port
80
user@switch# set filter watch-employee term employee-to-web then analyzer
employee-web-monitor
```

4. Apply the **watch-employee** filter to the appropriate ports:

```
[edit interfaces]
user@switch# set ge-0/0/0 unit 0 family ethernet-switching filter input watch-employee
user@switch# set ge-0/0/1 unit 0 family ethernet-switching filter input watch-employee
```

Results Check the results of the configuration:

```
[edit]
user@switch# show
ethernet-switching-options {
   analyzer employee-web-monitor {
      output {
         interface ge-0/0/10.0;
         }
      }
}
...
firewall family ethernet-switching {
   filter watch-employee {
      term employee-to-corp {
         from {
            destination-address 192.0.2.16/28;
            source-address 192.0.2.16/28;
         }
         then accept {
      }
      term employee-to-web {
         from {
            destination-port 80;
         }
         then analyzer employee-web-monitor;
      }
   }
}
...
interfaces {
   ge-0/0/0 {
      unit 0 {
         family ethernet-switching {
            port-mode trunk;
            vlan members [employee-vlan, voice-vlan];
            filter {
               input watch-employee;
            }
         }
      }
   }
```

```
    ge-0/0/1 {
      family ethernet-switching {
        filter {
          input watch-employee;
        }
      }
    }
  }
```

Verification

To confirm that the configuration is correct, perform these tasks:

- Verifying That the Analyzer Has Been Correctly Created on page 12

Verifying That the Analyzer Has Been Correctly Created

Purpose Verify that the analyzer named **employee-monitor** or **employee-web-monitor** has been created on the switch with the appropriate input interfaces, and appropriate output interface.

Action You can verify the port mirror analyzer is configured as expected using the **show analyzer** command.

```
user@switch> show analyzer
  Analyzer name                 : employee-monitor
  Output interface              : ge-0/0/10.0
  Mirror ratio                  : 1
  Loss priority                 : Low
  Ingress monitored interfaces : ge-0/0/0.0
  Ingress monitored interfaces : ge-0/0/1.0
  Egress monitored interfaces  : None
```

Meaning This output shows that the **employee-monitor** analyzer has a ratio of 1 (mirroring every packet, the default setting), a loss priority of low (set this option to high only when the analyzer output is to a VLAN), is mirroring the traffic entering the **ge-0/0/0** and **ge-0/0/1** interfaces, and sending the mirrored traffic to the **ge-0/0/10** interface.

Related Documentation

- Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches on page 12
- Configuring Port Mirroring to Analyze Traffic (CLI Procedure) on page 19
- Configuring Port Mirroring to Analyze Traffic (J-Web Procedure) on page 22
- Understanding Port Mirroring on EX Series Switches on page 3

Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches

EX Series switches allow you to configure port mirroring to send copies of packets to either a local interface for local monitoring or to a VLAN for remote monitoring. You can use port mirroring to copy these packets:

- Packets entering or exiting a port
- Packets entering a VLAN on EX2200, EX3200, EX4200, or EX4500 switches
- Packets exiting a VLAN on EX8200 switches

You can analyze the mirrored traffic using a protocol analyzer application running on a remote monitoring station if you are sending mirrored traffic to an analyzer VLAN.

This topic includes two related examples that describe how to mirror traffic entering ports on the switch to the **remote-analyzer** VLAN so that you can perform analysis from a remote monitoring station. The first example shows how to mirror all traffic entering the ports connected to employee computers. The second example shows the same scenario, but includes a filter to mirror only the employee traffic going to the Web.

This example describes how to configure remote port mirroring:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 9.5 or later for EX Series switches
- One EX3200 or EX4200 switch connected to another EX3200 or EX4200 switch

Before you configure port mirroring, be sure you have an understanding of port mirroring concepts.

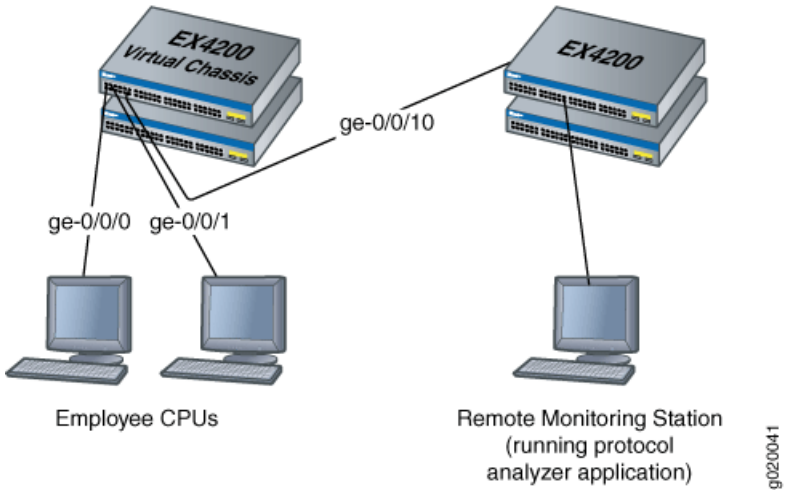
Input interfaces that are referred by the analyzer must be configured.

Overview and Topology

This topic includes two related examples that describe how to configure port mirroring to the **remote-analyzer** VLAN so that analysis can be performed from a remote monitoring station. The first example shows how to configure an EX Series switch to mirror all traffic from employee computers. The second example shows the same scenario, but the setup includes a filter to mirror only the employee traffic going to the Web.

Figure 2 on page 14 shows the network topology for this example.

Figure 2: Remote Port Mirroring Example Network Topology



In this example:

- Interface **ge-0/0/0** is a Layer 2 interface and interface **ge-0/0/1** is a Layer 3 interface that serve as connections for employee computers.
- Interface **ge-0/0/10** is a Layer 2 interface that connects to another switch.
- VLAN **remote-analyzer** is configured on all switches in the topology to carry the mirrored traffic.

NOTE: The interface connected to the remote monitoring station must be a member of VLAN remote-analyzer, and this VLAN must be configured on all switches between the monitored switch and the monitoring station.

Mirroring All Employee Traffic for Remote Analysis

To configure port mirroring for remote traffic analysis for all incoming and outgoing employee traffic, perform these tasks:

CLI Quick Configuration

To quickly configure port mirroring for remote traffic analysis for incoming and outgoing employee traffic, copy the following commands and paste them into the switch terminal window:

```
[edit]
set vlans remote-analyzer vlan-id 999
set interfaces ge-0/0/10 unit 0 family ethernet-switching port-mode trunk
set interfaces ge-0/0/10 unit 0 family ethernet-switching vlan members 999
set ethernet-switching-options analyzer employee-monitor input ingress interface ge-0/0/0.0
set ethernet-switching-options analyzer employee-monitor input ingress interface ge-0/0/1.0
set ethernet-switching-options analyzer employee-monitor input egress interface ge-0/0/0.0
set ethernet-switching-options analyzer employee-monitor input egress interface ge-0/0/1.0
set ethernet-switching-options analyzer employee-monitor loss-priority high output vlan
remote-analyzer
```

Step-by-Step Procedure

To configure basic remote port mirroring:

1. Configure the VLAN tag ID for the **remote-analyzer** VLAN:

```
[edit vlans]
user@switch# set remote-analyzer vlan-id 999
```

2. Configure the interface on the network port connected to another switch for trunk mode and associate it with the **remote-analyzer** VLAN:

```
[edit interfaces]
user@switch# set ge-0/0/10 unit 0 family ethernet-switching port-mode trunk
user@switch# set ge-0/0/10 unit 0 family ethernet-switching vlan members 999
```

3. Configure the **employee-monitor** analyzer:

```
[edit ethernet-switching-options]
user@switch# set analyzer employee–monitor loss-priority high
user@switch# set analyzer employee-monitor input ingress interface ge-0/0/0.0
user@switch# set analyzer employee–monitor input ingress interface ge-0/0/1.0
user@switch# set analyzer employee–monitor output vlan remote-analyzer
set analyzer employee-monitor input egress interface ge-0/0/0.0
set analyzer employee-monitor input egress interface ge-0/0/1.0
```

Results

Check the results of the configuration:

```
[edit]
user@switch# show
ethernet-switching-options {
  analyzer employee-monitor {
    loss-priority high;
    input {
      ingress {
        interface ge-0/0/0.0;
        interface ge-0/0/1.0;
      }
      egress {
        interface ge-0/0/0.0;
        interface ge-0/0/1.0;
      }
    }
    output {
      vlan {
        remote-analyzer;
      }
    }
  }
}
```

Mirroring Employee-to-Web Traffic for Remote Analysis

To configure port mirroring for remote traffic analysis of employee to web traffic, perform these tasks:

CLI Quick Configuration

To quickly configure port mirroring to mirror employee traffic to the external Web, copy the following commands and paste them into the terminal window:

```
[edit]
```

```
set ethernet-switching-options analyzer employee-web-monitor loss-priority high output vlan
999
set vlans remote-analyzer vlan-id 999
set interfaces ge-0/0/10 unit 0 family ethernet-switching port mode trunk
set interfaces ge-0/0/10 unit 0 family ethernet-switching vlan members 999
set firewall family ethernet-switching filter watch-employee term employee-to-corp from
destination-address 192.0.2.16/28
set firewall family ethernet-switching filter watch-employee term employee-to-corp from
source-address 192.0.2.16/28
set firewall family ethernet-switching filter watch-employee term employee-to-corp then accept
set firewall family ethernet-switching filter watch-employee term employee-to-web from
destination-port 80
set firewall family ethernet-switching filter watch-employee term employee-to-web then analyzer
employee–web-monitor
set ge-0/0/0 unit 0 family ethernet-switching filter input watch-employee
set interfaces ge-0/0/1 unit 0 family ethernet-switching filter input watch-employee
```

Step-by-Step Procedure

To configure port mirroring of all traffic from the two ports connected to employee computers to the **remote-analyzer** VLAN for use from a remote monitoring station:

1. Configure the **employee-web-monitor** analyzer:

```
[edit ethernet-switching-options]
user@switch# set interfaces ge-0/0/10 unit 0 family ethernet-switching port mode
trunk
user@switch# set analyzer employee-web-monitor loss-priority high output vlan 999
```

2. Configure the VLAN tag ID for the **remote-analyzer** VLAN:

```
[edit vlans]
user@switch# set remote-analyzer vlan-id 999
```

3. Configure the interface to associate it with the **remote-analyzer** VLAN:

```
[edit interfaces]
user@switch# set ge-0/0/10 unit 0 family ethernet-switching vlan members 999
```

4. Configure the firewall filter called **watch-employee**:

```
[edit firewall family ethernet-switching]
user@switch# set filter watch-employee term employee-to-corp from
destination-address 192.0.2.16/28
user@switch# set filter watch-employee term employee-to-corp from source-address
192.0.2.16/28
user@switch# set filter watch-employee term employee-to-corp then accept
user@switch# set filter watch-employee term employee-to-web from destination-port
80
user@switch# set filter watch-employee term employee-to-web then analyzer
employee-web-monitor
```

5. Apply the firewall filter to the employee interfaces:

```
[edit interfaces]
user@switch# set ge-0/0/0 unit 0 family ethernet-switching filter input watch-employee
user@switch# set ge-0/0/1 unit 0 family ethernet-switching filter input watch-employee
```

Results

Check the results of the configuration:

```
[edit]
user@switch# show
interfaces {
```

```
    ...
    ge-0/0/10 {
      unit 0 {
        family ethernet-switching {
          port-mode trunk;
          vlan {
            members remote-analyzer;
          }
        }
      }
    }
    ge-0/0/0 {
      unit 0 {
        family ethernet-switching {
          filter {
            input watch-employee;
          }
        }
      }
    }
    ge-0/0/1 {
      unit 0 {
        family ethernet-switching {
          filter {
            input watch-employee;
          }
        }
      }
    }
  }
  ...
  firewall {
    family ethernet-switching {
      ...
      filter watch-employee {
        term employee-to-corp {
          from {
            source-address {
              192.0.2.16/28;
            }
            destination-address {
              192.0.2.16/28;
            }
          }
          then accept;
        }
        term employee-to-web {
          from {
            destination-port 80;
          }
          then analyzer employee-web-monitor;
        }
      }
    }
  }
  ethernet-switching-options {
```

```
    analyzer employee-web-monitor {
      loss-priority high;
      output {
        vlan {
          999;
        }
      }
    }
  vlans {
    remote-analyzer {
      vlan-id 999;
    }
  }
```

Verification

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

- Verifying That the Analyzer Has Been Correctly Created on page 18

Verifying That the Analyzer Has Been Correctly Created

Purpose Verify that the analyzer named **employee-monitor** or **employee-web-monitor** has been created on the switch with the appropriate input interfaces, and appropriate output interface.

Action You can verify the port mirror analyzer is configured as expected using the **show analyzer** command. To view previously created analyzers that are disabled, go to the J-Web interface.

```
user@switch> show analyzer
 Analyzer name                : employee-monitor
 Output VLAN                  : remote-analyzer
 Mirror ratio                 : 1
 Loss priority                : High
 Ingress monitored interfaces : ge-0/0/0.0
 Ingress monitored interfaces : ge-0/0/1.0
```

Meaning This output shows that the **employee-monitor** analyzer has a ratio of 1 (mirroring every packet, the default), a loss priority of high (set this option to high whenever the analyzer output is to a VLAN), is mirroring the traffic entering **ge-0/0/0** and **ge-0/0/1**, and sending the mirrored traffic to the analyzer called **remote-analyzer**.

Related Documentation

- Example: Configuring Port Mirroring for Local Monitoring of Employee Resource Use on EX Series Switches on page 7
- Configuring Port Mirroring to Analyze Traffic (CLI Procedure) on page 19
- Configuring Port Mirroring to Analyze Traffic (J-Web Procedure) on page 22
- Understanding Port Mirroring on EX Series Switches on page 3

Configuring Port Mirroring

Configuring Port Mirroring to Analyze Traffic (CLI Procedure)

EX Series switches allow you to configure port mirroring to send copies of packets to either a local interface for local monitoring or to a VLAN for remote monitoring. You can use port mirroring to copy these packets:

- Packets entering or exiting a port
- Packets entering a VLAN on EX2200, EX3200, EX4200, or EX4500 switches
- Packets exiting a VLAN on EX8200 switches

We recommend that you disable port mirroring when you are not using it and select specific input interfaces in preference to using the **all** keyword. You can also limit the amount of mirrored traffic by using a firewall filter or the **ratio** keyword to mirror only a selection of packets.

NOTE: If you want to create additional analyzers without deleting the existing analyzer, first disable the existing analyzer using the **disable analyzer** ***analyzer-name*** command or the J-Web configuration page for port mirroring.

NOTE: Interfaces used as output for a port mirror analyzer must be configured as family **ethernet-switching**.

Configuring Port Mirroring for Local Traffic Analysis

To mirror interface traffic or VLAN traffic on the switch to an interface on the switch:

1. Choose a name for the port mirroring configuration—in this case, **employee-monitor**—and specify the input—in this case, packets entering **ge-0/0/0** and **ge-0/0/1**:

```
[edit ethernet-switching-options]
user@switch# set analyzer employee-monitor input ingress interface ge–0/0/0.0

[edit ethernet-switching-options]
user@switch# set analyzer employee-monitor input ingress interface ge–0/0/1.0
```

2. Optionally, you can specify a statistical sampling of the packets by setting a ratio:

```
[edit ethernet-switching-options]
```

```
user@switch# set analyzer employee-monitor ratio 200
```

When the ratio is set to 200, 1 of every 200 packets is mirrored to the analyzer. You can use statistical sampling to reduce the volume of mirrored traffic, as a high volume of mirrored traffic can be performance intensive for the switch. On EX8200 switches, you can set a ratio only for ingress packets.

3. Configure the destination interface for the mirrored packets:

```
[edit ethernet-switching-options]
user@switch# set analyzer employee-monitor output interface ge-0/0/10.0
```

Configuring Port Mirroring for Remote Traffic Analysis

To mirror traffic that is traversing interfaces or a VLAN on the switch to a VLAN for analysis from a remote location:

1. Configure a VLAN to carry the mirrored traffic. This VLAN is called **remote-analyzer** and given the ID of 999 by convention in this documentation:

```
[edit]
user@switch# set vlans remote-analyzer vlan-id 999
```

2. Set the uplink module interface that is connected to the distribution switch to trunk mode and associate it with the **remote-analyzer** VLAN:

```
[edit]
user@switch# set interfaces ge-0/1/1 unit 0 family ethernet-switching port-mode trunk
vlan members 999
```

3. Configure the analyzer:

   a. Choose a name and set the loss priority to high. Loss priority should always be set to high when configuring for remote port mirroring:

```
[edit ethernet-switching-options]
user@switch# set analyzer employee–monitor loss-priority high
```

   b. Specify the traffic to be mirrored—in this example the packets entering ports **ge-0/0/0** and **ge-0/0/1**:

```
[edit ethernet-switching-options]
user@switch# set analyzer employee–monitor input ingress interface ge-0/0/0.0

[edit ethernet-switching-options]
user@switch# set analyzer employee–monitor input ingress interface ge-0/0/1.0
```

   c. Specify the **remote-analyzer** VLAN as the output for the analyzer:

```
[edit ethernet-switching-options]
user@switch# set analyzer employee-monitor output vlan 999
```

4. Optionally, you can specify a statistical sampling of the packets by setting a ratio:

```
[edit ethernet-switching-options]
user@switch# set analyzer employee-monitor ratio 200
```

When the ratio is set to 200, 1 out of every 200 packets is mirrored to the analyzer. You can use this to reduce the volume of mirrored traffic as a very high volume of mirrored traffic can be performance intensive for the switch.

Filtering the Traffic Entering an Analyzer

To filter which packets are mirrored to an analyzer, create the analyzer and then use it as the action in the firewall filter. You can use firewall filters in both local and remote port mirroring configurations.

If the same analyzer is used in multiple filters or terms, the packets are copied to the analyzer output port or analyzer VLAN only once.

To filter mirrored traffic, create an analyzer and then create a firewall filter. The filter can use any of the available match conditions and must have an action of **analyzer *analyzer-name***. The action of the firewall filter provides the input to the analyzer.

To configure port mirroring with filters:

1. Configure the analyzer name (here, **employee-monitor**) and the output:

   a. For local analysis, set the output to the local interface to which you will connect the computer running the protocol analyzer application:

      ```
      [edit ethernet-switching-options]
      user@switch# set analyzer employee-monitor output interface ge-0/0/10.0
      ```

   b. For remote analysis, set the loss priority to high and set the output to the **remote-analyzer** VLAN:

      ```
      [edit ethernet-switching-options]
      user@switch# set analyzer employee—monitor loss-priority high output vlan 999
      ```

2. Create a firewall filter using any of the available match conditions and specify the action as **analyzer employee-monitor**:

   This step shows a firewall filter called **example-filter**, with two terms:

   a. Create the first term to define the traffic that should not pass through to the analyzer:

      ```
      [edit firewall family ethernet-switching]
      user@switch# set filter example-filter term no-analyzer from source-address ip—address
      ```

      ```
      [edit firewall family ethernet-switching]
      user@switch# set filter example-filter term no-analyzer from destination-address
      ip-address
      ```

      ```
      [edit firewall family ethernet-switching]
      user@switch# set filter example-filter term no-analyzer then accept
      ```

   b. Create the second term to define the traffic that should pass through to the analyzer:

      ```
      [edit firewall family ethernet-switching]
      user@switch# set filter example-filter term to-analyzer from destination-port 80
      ```

      ```
      [edit firewall family ethernet-switching]
      ```

```
user@switch# set filter example-filter term to-analyzer then analyzer employee–monitor
```

3. Apply the firewall filter to the interfaces or VLAN that are input to the analyzer:

```
[edit]
user@switch# set interfaces ge-0/0/0 unit 0 family ethernet-switching filter input
example-filter

[edit]
user@switch# set vlan rspan filter input example-filter
```

Related Documentation

- Configuring Port Mirroring to Analyze Traffic (J-Web Procedure) on page 22
- Example: Configuring Port Mirroring for Local Monitoring of Employee Resource Use on EX Series Switches on page 7
- Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches on page 12
- Example: Configuring Firewall Filters for Port, VLAN, and Router Traffic on EX Series Switches
- Understanding Port Mirroring on EX Series Switches on page 3
- Firewall Filters for EX Series Switches Overview

Configuring Port Mirroring to Analyze Traffic (J-Web Procedure)

EX Series switches allow you to configure port mirroring to send copies of packets to either a local interface for local monitoring or to a VLAN for remote monitoring. You can use port mirroring to copy these packets:

- Packets entering or exiting a port
- Packets entering a VLAN on EX2200, EX3200, EX4200, or EX4500 switches
- Packets exiting a VLAN on EX8200 switches

To configure port mirroring on an EX Series switch using the J-Web interface:

1. Select **Configure** > **Security** > **Port Mirroring**.

   The first part of the screen displays analyzer details such as the name, status, analyzer port, ratio, and loss priority.

   The second part of the screen lists ingress and egress ports of the selected analyzer.

   NOTE: After you make changes to the configuration in this page, you must commit the changes for them to take effect. To commit all changes to the active configuration, select **Commit Options** > **Commit**. See Using the Commit Options to Commit Configuration Changes for details about all commit options.

2. Click one:

- Add—Add an analyzer. Enter information as specified in Table 2 on page 23.
- Edit—Modify details of the selected analyzer. Enter information as specified in Table 2 on page 23.
- Delete—Delete the selected analyzer.
- Enable/Disable—Enable or disable the selected analyzer (toggle).

NOTE: On EX2200, EX3200, EX4200, and EX4500 switches, only one analyzer can be enabled at a time. On EX8200 switches, a maximum of seven analyzers can be enabled.

NOTE: When an analyzer is deleted or disabled, any filter association is removed.

Table 2: Port Mirroring Configuration Settings

Field	Function	Your Action
Analyzer Name	Specifies the name of the analyzer.	Type a name for the analyzer.
Ratio	Specifies the ratio of packets to be mirrored. For example: • A ratio of 1 sends copies of all packets. • A ratio of 2047 sends copies of 1 out of every 2047 packets.	Enter a number from 0 through 2047.
Loss Priority	Specifies the loss priority of the mirrored packets. By default, the switch applies a lower priority to mirrored data than to regular port-to-port data—mirrored traffic is dropped in preference to regular traffic when capacity is exceeded. For port mirroring configurations with output to an analyzer VLAN, set the loss priority to high.	Keep the default of low, unless the output is to a VLAN.
Analyzer Port	Specifies a local interface or VLAN to which mirrored packets are sent. NOTE: A VLAN must have only one associated interface to be specified as an analyzer interface.	Click **Select**. In the Select Analyzer Port/VLAN window, select either port or VLAN as the **Analyzer Type**. Next, select the required port or VLAN.
Ingress	Specifies interfaces or VLANs for which entering traffic is mirrored.	Click **Add** and select Port or VLAN. Next, select the interfaces or VLANs. Click **Remove** to delete an ingress interface or VLAN.
Egress	Specifies interfaces for which exiting traffic is mirrored.	Click **Add** to add egress interfaces. Click **Remove** to remove egress interfaces.

Related Documentation

- Configuring Port Mirroring to Analyze Traffic (CLI Procedure) on page 19
- Example: Configuring Port Mirroring for Local Monitoring of Employee Resource Use on EX Series Switches on page 7
- Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches on page 12
- Understanding Port Mirroring on EX Series Switches on page 3

Verifying Port Mirroring Configuration

- Verifying Input and Output for Port Mirroring Analyzers on EX Series Switches on page 24

Verifying Input and Output for Port Mirroring Analyzers on EX Series Switches

Purpose Verify that an analyzer has been created on the switch and has the appropriate output interfaces, and appropriate output interface.

Action You can verify the port mirror analyzer is configured as expected using the **show analyzer** command.

```
[edit]
user@switch> show analyzer
Analyzer name                  : employee-monitor
  Output VLAN                  : remote-analyzer
  Mirror ratio                 : 1
  Loss priority                : High
  Ingress monitored interfaces : ge-0/0/0.0
  Ingress monitored interfaces : ge-0/0/1.0
```

You can view all of the port mirror analyzers configured on the switch, including any that are disabled, using the **show ethernet-switching-options** command in configuration mode.

```
user@switch# show ethernet-switching-options
inactive: analyzer employee-web-monitor {
    loss-priority high;
    output {

analyzer employee-monitor {
    loss-priority high;
    input {
        ingress {
            interface ge-0/0/0.0;
            interface ge-0/0/1.0;
        }
    }
    output {
        vlan {
            remote-analyzer;
        }
    }
}
```

Meaning This output shows that the employee-monitor analyzer has a ratio of 1 (mirroring every packet, the default), a loss priority of high (set this option to high whenever the analyzer

output is to a VLAN), is mirroring the traffic entering **ge-0/0/0** and **ge-0/0/1**, and sending the mirrored traffic to the analyzer called remote-analyzer.

Related Documentation

- Configuring Port Mirroring to Analyze Traffic (J-Web Procedure) on page 22
- Configuring Port Mirroring to Analyze Traffic (CLI Procedure) on page 19
- Example: Configuring Port Mirroring for Local Monitoring of Employee Resource Use on EX Series Switches on page 7
- Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches on page 12
- Understanding Port Mirroring on EX Series Switches on page 3

Configuration Statements for Port Mirroring

- [edit ethernet-switching-options] Configuration Statement Hierarchy on page 25

[edit ethernet-switching-options] Configuration Statement Hierarchy

```
ethernet-switching-options {
  analyzer {
    name {
      loss-priority priority;
      ratio number;
      input {
        ingress {
          interface (all | interface-name);
          vlan (vlan-id | vlan-name);
        }
        egress {
          interface (all | interface-name);
        }
      }
      output {
        interface interface-name;
        vlan (vlan-id | vlan-name);
      }
    }
  }
  bpdu-block {
    disable-timeout timeout;
    interface (all | [interface-name]);
  }
  dot1q-tunneling {
    ether-type (0x8100 | 0x88a8 | 0x9100);
  }
  interfaces interface-name {
    no-mac-learning;
  }
  mac-notification {
    notification-interval seconds;
  }
  mac-table-aging-time seconds;
```

```
port-error-disable {
  disable-timeout timeout;
}
redundant-trunk-group {
  group name {
    preempt-cutover-timer seconds;
    interface
      primary;
    }
    interface
  }
}
secure-access-port {
  dhcp-snooping-file {
    location local_pathname | remote_URL;
    timeout seconds;
    write-interval seconds;
  }
  interface (all | interface-name) {
    allowed-mac {
      mac-address-list;
    }
    (dhcp-trusted | no-dhcp-trusted );
    fcoe-trusted;
    mac-limit limit action action;
    no-allowed-mac-log;
    static-ip  ip-address {
      vlan  vlan-name;
      mac mac-address;
    }
  }
  vlan (all | vlan-name) {
    (arp-inspection | no-arp-inspection );
    dhcp-option82 {
      circuit-id {
        prefix hostname;
        use-interface-description;
        use-vlan-id;
      }
      remote-id {
        prefix hostname | mac | none;
        use-interface-description;
        use-string string;
      }
      vendor-id [string];
    }
    (examine-dhcp | no-examine-dhcp );
    examine-fip {
      fc-map fc-map-value;
    }
    (ip-source-guard | no-ip-source-guard);
    mac-move-limit limit action action;
  }
}
storm-control {
  action-shutdown;
```

```
    interface (all | interface-name) {
      bandwidth bandwidth;
      no-broadcast;
      no-multicast;
      no-registered-multicast;
      no-unknown-unicast;
      no-unregistered-multicast;
    }
  }
  traceoptions {
    file filename <files number> <no-stamp> <replace> <size size> <world-readable |
      no-world-readable>;
    flag flag <disable>;
  }
  unknown-unicast-forwarding {
    vlan (all | vlan-name) {
      interface interface-name;
    }
  }
  voip {
    interface (all | [interface-name | access-ports]) {
      vlan vlan-name ;
      forwarding-class (assured-forwarding | best-effort | expedited-forwarding |
        network-control);
    }
  }
}
```

Related Documentation

- Understanding Port Mirroring on EX Series Switches on page 3
- Port Security for EX Series Switches Overview
- Understanding BPDU Protection for STP, RSTP, and MSTP on EX Series Switches
- Understanding Redundant Trunk Links on EX Series Switches
- Understanding Storm Control on EX Series Switches
- Understanding 802.1X and VoIP on EX Series Switches
- Understanding Q-in-Q Tunneling on EX Series Switches
- Understanding Unknown Unicast Forwarding on EX Series Switches
- Understanding MAC Notification on EX Series Switches
- Understanding FIP Snooping

analyzer

Syntax

```
analyzer {
  name {
    ratio number;
    loss-priority priority;
    input {
      ingress {
        interface (all | interface-name);
        vlan (vlan-id | vlan-name);
      }
      egress {
        interface (all | interface-name);
      }
    output {
      interface interface-name;
      vlan (vlan-id | vlan-name);
    }
  }
}
```

Hierarchy Level [edit ethernet-switching-options]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure port mirroring. One analyzer (port mirroring configuration) can be configured on an EX2200, EX3200, EX4200, or EX4500 switch and seven analyzers (port mirroring configurations) can be configured on an EX8208 or EX8216 switch at a time. Other analyzers can be present and disabled.

Default Port mirroring is disabled and Junos OS creates no default analyzers.

Options *name*—Name that identifies the analyzer. The name can be up to 125 characters long, must begin with a letter, and can include uppercase letters, lowercase letters, numbers, dashes, and underscores. No other special characters are allowed.

The remaining statements are explained separately.

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

Related Documentation

- Example: Configuring Port Mirroring for Local Monitoring of Employee Resource Use on EX Series Switches on page 7
- Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches on page 12
- Understanding Port Mirroring on EX Series Switches on page 3

egress

Syntax

```
egress {
  interface (all | interface-name);
}
```

Hierarchy Level [edit **ethernet-switching-options analyzer** *name* **input**]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify ports for which traffic exiting the interface is mirrored in an port mirroring configuration.

The statement is explained separately.

Default No default.

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

Related Documentation

- Understanding Port Mirroring on EX Series Switches on page 3

ethernet-switching-options

Syntax

```
ethernet-switching-options {
  analyzer {
    name {
      loss-priority priority;
      ratio number;
      input {
        ingress {
          interface (all | interface-name);
          vlan (vlan-id | vlan-name);
        }
        egress {
          interface (all | interface-name);
        }
      }
      output {
        interface interface-name;
        vlan (vlan-id | vlan-name);
      }
    }
  }
  bpdu-block {
    disable-timeout timeout;
    interface (all | [interface-name]);
  }
  dot1q-tunneling {
    ether-type (0x8100 | 0x88a8 | 0x9100);
  }
  interfaces interface-name {
    no-mac-learning;
  }
  mac-notification {
    notification-interval seconds;
  }
  mac-table-aging-time seconds;
  port-error-disable {
    disable-timeout timeout;
  }
  redundant-trunk-group {
    group name {
      interface interface-name <primary>;
      interface interface-name;
    }
  }
  secure-access-port {
    dhcp-snooping-file {
      location local_pathname | remote_URL;
      timeout seconds;
      write-interval seconds;
    }
    interface (all | interface-name) {
      allowed-mac {
        mac-address-list;
```

```
      }
      (dhcp-trusted | no-dhcp-trusted);
      fcoe-trusted;
      mac-limit limit action action;
      no-allowed-mac-log;
      static-ip ip-address {
        vlan  vlan-name;
        mac mac-address;
      }
    }
    vlan (all | vlan-name) {
      (arp-inspection | no-arp-inspection);
      dhcp-option82 {
        circuit-id {
          prefix hostname;
          use-interface-description;
          use-vlan-id;
        }
        remote-id {
          prefix hostname | mac | none;
          use-interface-description;
          use-string string;
        }
        vendor-id [string];
      }
      (examine-dhcp | no-examine-dhcp);
      examine-fip {
        fc-map fc-map-value;
      }
      (ip-source-guard | no-ip-source-guard);
      mac-move-limit limit action action;
    }
  }
  storm-control {
    action-shutdown;
    interface (all | interface-name) {
      bandwidth bandwidth;
      no-broadcast;
      no-multicast;
      no-registered-multicast;
      no-unknown-unicast;
      no-unregistered-multicast;
    }
  }
  traceoptions {
    file filename <files number> <no-stamp> <replace> <size size> <world-readable |
      no-world-readable>;
    flag flag <disable>;
  }
  unknown-unicast-forwarding {
    vlan (all | vlan-name) {
      interface interface-name;
    }
  }
  voip {
    interface (all | [interface-name | access-ports]) {
```

```
            vlan vlan-name ;
            forwarding-class (assured-forwarding | best-effort | expedited-forwarding |
              network-control);
        }
    }
}
```

Hierarchy Level [edit]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure Ethernet switching options.

The remaining statements are explained separately.

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

Related Documentation

- Understanding Port Mirroring on EX Series Switches on page 3
- Port Security for EX Series Switches Overview
- Understanding BPDU Protection for STP, RSTP, and MSTP on EX Series Switches
- Understanding Redundant Trunk Links on EX Series Switches
- Understanding Storm Control on EX Series Switches
- Understanding 802.1X and VoIP on EX Series Switches
- Understanding Q-in-Q Tunneling on EX Series Switches
- Understanding Unknown Unicast Forwarding on EX Series Switches
- Understanding MAC Notification on EX Series Switches
- Understanding FIP Snooping

ingress

Syntax

```
ingress {
  interface (all | interface-name);
  vlan (vlan-id | vlan-name);
}
```

Hierarchy Level [edit ethernet-switching-options analyzer *name* input]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure ports or VLANs for which the entering traffic is mirrored as part of an port mirroring configuration.

The statements are explained separately.

Default No default.

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

Related Documentation

- Example: Configuring Port Mirroring for Local Monitoring of Employee Resource Use on EX Series Switches on page 7
- Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches on page 12
- Understanding Port Mirroring on EX Series Switches on page 3

input

Syntax

```
input {
  ingress {
    interface (all | interface-name);
    vlan (vlan-id | vlan-name);
  }
  egress {
    interface (all | interface-name);
  }
}
```

Hierarchy Level [edit **ethernet-switching-options analyzer** *name*]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Define the traffic to be mirrored in a port mirroring configuration—the definition can be a combination of:

- Packets entering or exiting a port
- Packets entering a VLAN on an EX2200, EX3200, EX4200, or EX4500 switch
- Packets exiting a VLAN on an EX8200 switch

The remaining statements are explained separately.

Default No default.

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

Related Documentation

- Example: Configuring Port Mirroring for Local Monitoring of Employee Resource Use on EX Series Switches on page 7
- Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches on page 12
- Understanding Port Mirroring on EX Series Switches on page 3

interface

Syntax interface (all | *interface-name*);

Hierarchy Level [edit **ethernet-switching-options analyzer** *name* **input egress**],
[edit **ethernet-switching-options analyzer** *name* **input ingress**],
[edit **ethernet-switching-options analyzer** *name* **output**]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the interfaces for which traffic is mirrored.

Options all—Apply port mirroring to all interfaces on the switch. Mirroring a high volume of traffic can be performance intensive for the switch. Therefore, you should generally select specific input interfaces in preference to using the all keyword, or use the all keyword in combination with setting a ratio for statistical sampling.

interface-name—Apply port mirroring to the specified interface only.

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

Related Documentation

- Example: Configuring Port Mirroring for Local Monitoring of Employee Resource Use on EX Series Switches on page 7
- Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches on page 12
- Understanding Port Mirroring on EX Series Switches on page 3

loss-priority

Syntax loss-priority *priority*;

Hierarchy Level [edit **ethernet-switching-options analyzer** *name*]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure a loss priority for mirrored packets. By default, the switch applies a lower priority to mirrored data than to regular port-to-port data—mirrored traffic is dropped in preference for regular traffic when capacity is exceeded. For port mirroring configurations with output to an analyzer VLAN, set the loss priority to high.

Default Low

Options *priority*—The value for priority can be low or high.
Default: low

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

Related Documentation
- Understanding Port Mirroring on EX Series Switches on page 3
- Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches on page 12

output

Syntax

```
output {
  interface interface-name;
  vlan (vlan-id | vlan-name);
}
```

Hierarchy Level [edit ethernet-switching-options analyzer *name*]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the destination for mirrored traffic, either an interface on the switch, for local monitoring, or a VLAN, for remote monitoring.

The statements are explained separately.

Default No default.

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

Related Documentation

- Example: Configuring Port Mirroring for Local Monitoring of Employee Resource Use on EX Series Switches on page 7
- Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches on page 12
- Understanding Port Mirroring on EX Series Switches on page 3

ratio

Syntax ratio *number*;

Hierarchy Level [edit **ethernet-switching-options analyzer** *name*]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure port mirroring to copy a sampling of packets, by setting a ratio of 1:x, A ratio of 1 mirrors all packets, and 2047 mirrors 1 out of every 2047 packets.

On EX8200 switches, you can set a ratio only for ingress packets.

Default 1

Options ***number***—The number of packets in the sample, out of which 1 packet is mirrored.
Range: 1 through 2047
Default: 1

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

Related Documentation
- Understanding Port Mirroring on EX Series Switches on page 3

vlan

Syntax vlan (*vlan-id* | *vlan-name*);

Hierarchy Level [edit **ethernet-switching-options analyzer** *name* **input ingress**],
[edit **ethernet-switching-options analyzer** *name* **output**]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure mirrored traffic to be sent to a VLAN for remote monitoring.

Options *vlan-id*—Numeric VLAN identifer.

vlan-name—Name of the VLAN.

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

Related Documentation
- Example: Configuring Port Mirroring for Remote Monitoring of Employee Resource Use on EX Series Switches on page 12
- Understanding Port Mirroring on EX Series Switches on page 3

Operational Commands for Port Mirroring

show analyzer

Syntax **show analyzer *analyzer-name***

Release Information Command introduced in Junos OS Release 9.0 for EX Series switches.

Description Display information about analyzers configured for port mirroring.

Options *analyzer-name*—(Optional) Displays the status of a specific analyzer on the switch.

Required Privilege Level view

List of Sample Output **show analyzer on page 39**

Output Fields Table 3 on page 39 lists the output fields for the **command-name** command. Output fields are listed in the approximate order in which they appear.

Table 3: show analyzer Output Fields

Field Name	Field Description
Analyzer name	Displays the name of the analyzer.
Output interface	Specifies a local interface to which mirrored packets are sent. An analyzer can have output to either an interface or a VLAN, not both.
Output VLAN	Specifies a VLAN to which mirrored packets are sent. An analyzer can have output to either an interface or a VLAN, not both.
Mirror ratio	Displays the ratio of packets to be mirrored, between 1 and 2047 where 1 sends copies of all packets and 2047 sends copies of 1 out of every 2047 packets.
Loss priority	Displays the loss priority of mirrored packets. By default, loss priority is set to **low**, with mirrored traffic dropped in preference for regular traffic when capacity is exceeded. For analyzers with output to a VLAN, set the loss priority to **high**.
Egress monitored interfaces	Displays interfaces for which traffic exiting the interfaces is mirrored.
Ingress monitored interfaces	Displays interfaces for which traffic entering the interfaces is mirrored.
Ingress monitored VLANs	Displays VLANs for which traffic entering the VLAN is mirrored.

show analyzer

```
user@host> show analyzer
Analyzer name                  : employee-monitor
  Output interface             : ge-0/0/10.0
  Output VLAN                  : remote-analyzer
  Mirror ratio                 : 1
  Loss priority                : High
  Egress monitored interfaces  : ge-0/0/3.0
  Ingress monitored interfaces : ge-0/0/0.0
```

```
Ingress monitored interfaces : ge-0/0/1.0
```

CHAPTER 2

sFlow Monitoring Technology

sFlow Technology—Overview

Understanding How to Use sFlow Technology for Network Monitoring on an EX Series Switch

The sFlow technology is a monitoring technology for high-speed switched or routed networks. sFlow monitoring technology randomly samples network packets and sends the samples to a monitoring station. You can configure sFlow technology on a Juniper Networks EX Series Ethernet Switch to continuously monitor traffic at wire speed on all interfaces simultaneously.

This topic describes:

Sampling Mechanism and Architecture of sFlow Technology on EX Series Switches

sFlow technology uses the following two sampling mechanisms:

- Packet-based sampling: Samples one packet out of a specified number of packets from an interface enabled for sFlow technology.
- Time-based sampling: Samples interface statistics at a specified interval from an interface enabled for sFlow technology.

The sampling information is used to create a network traffic visibility picture. The Junos operating system (Junos OS) fully supports the sFlow standard described in RFC 3176,

InMon Corporation's sFlow: A Method for Monitoring Traffic in Switched and Routed Networks (see http://faqs.org/rfcs/rfc3176.html).

NOTE: sFlow technology on the switches samples only raw packet headers. A raw Ethernet packet is the complete Layer 2 network frame.

An sFlow monitoring system consists of an sFlow agent embedded in the switch and a centralized collector. The sFlow agent's two main activities are random sampling and statistics gathering. It combines interface counters and flow samples and sends them across the network to the sFlow collector.

EX Series switches adopt the distributed sFlow architecture. The sFlow agent has two separate sampling entities that are associated with each Packet Forwarding Engine. These sampling entities are known as subagents. Each subagent has a unique ID that is used by the collector to identify the data source. A subagent has its own independent state and forwards its own sample messages to the sFlow agent. The sFlow agent is responsible for packaging the samples into datagrams and sending them to the sFlow collector. Because sampling is distributed across subagents, the protocol overhead associated with sFlow technology is significantly reduced at the collector. If the mastership assignment changes in a Virtual Chassis setup, sFlow technology continues to function.

Adaptive Sampling

The switches use adaptive sampling to ensure both sampling accuracy and efficiency. Adaptive sampling is a process of monitoring the overall incoming traffic rate on the network device and providing intelligent feedback to interfaces to dynamically adapt their sampling rate to the traffic conditions. Interfaces on which incoming traffic exceeds the system threshold are checked so that all violations can be regulated without affecting the traffic on other interfaces. Every 5 seconds the agent checks interfaces to get the number of samples, and interfaces are grouped based on the slot that they belong to. The top five interfaces that produce the highest number of samples are selected. Using the binary backoff algorithm, the sampling load on these interfaces is reduced by half and allotted to interfaces that have a lower sampling rate. Therefore when the processor limit is reached, the sampling rate is adapted such that it does not load the processor any further. If the switch is rebooted, the adaptive sampling rate is reset to the user-configured sampling rate. Also, if you modify the sampling rate, the adaptive sampling rate changes.

The advantage of adaptive sampling is that the switch continues to operate at its optimum level even when there is a change in the traffic patterns in the interfaces. You do not need to make any changes. Because the sampling rate adapts dynamically to changing network conditions, the resources are utilized optimally resulting in a high performance network.

Infrequent sampling flows are not reported in the sFlow information, but over time the majority of flows are reported. Based on a defined sampling rate, 1 out of *N* packets is captured and sent to the collector. This type of sampling does not provide a 100 percent accurate result in the analysis, but it does provide a result with quantifiable accuracy. A polling interval defines how often the sFlow data for a specific interface are sent to the collector, but an sFlow agent can also schedule polling.

NOTE: sFlow technology on EX Series switches does not support graceful restart. When a graceful restart occurs, the adaptive sampling rate is set to the user-configured sampling rate.

sFlow Agent Address Assignment

The sFlow collector uses the sFlow agent's IP address to determine the source of the sFlow data. You can configure the IP address of the sFlow agent to ensure that the agent ID for the sFlow agent remains constant. If you do not specify the IP address to be assigned to the agent, the IP address assigned to the agent is based on the following order of priority of interfaces configured on the switch:

1. Virtual management Ethernet (VME) interface

2. Management Ethernet interface

If neither of the preceding interfaces has been configured, the IP address of any Layer 3 interface or the routed VLAN interface (RVI) is used as the IP address for the agent. At least one interface must be configured on the switch for an IP address to be automatically assigned to the agent. When the agent IP address is assigned automatically, the IP address is dynamic and changes when the switch reboots.

sFlow data can be used to provide network traffic visibility information. You can explicitly configure the IP address to be assigned to source data (sFlow datagrams). If you do not explicitly configure that address, the IP address of the configured Gigabit Ethernet interface, 10-Gigabit Ethernet interface, or the routed VLAN interface (RVI) is used as the source IP address.

Related Documentation

- Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches on page 43
- Configuring sFlow Technology for Network Monitoring (CLI Procedure) on page 48
- Monitoring Interface Status and Traffic

Example: sFlow Technology Configuration

- Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches on page 43

Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches

You can configure sFlow technology, designed for monitoring high-speed switched or routed networks, to continuously monitor traffic at wire speed on all interfaces simultaneously. You can specify sample rates for ingress and egress packets. sFlow data can be used to provide network traffic visibility information.

This example describes how to configure and use sFlow technology to monitor network traffic. Junos OS fully supports the sFlow standard described in RFC 3176, *InMon*

Corporation's sFlow: A Method for Monitoring Traffic in Switched and Routed Networks (see http://faqs.org/rfcs/rfc3176.html).

Requirements

This example uses the following hardware and software components:

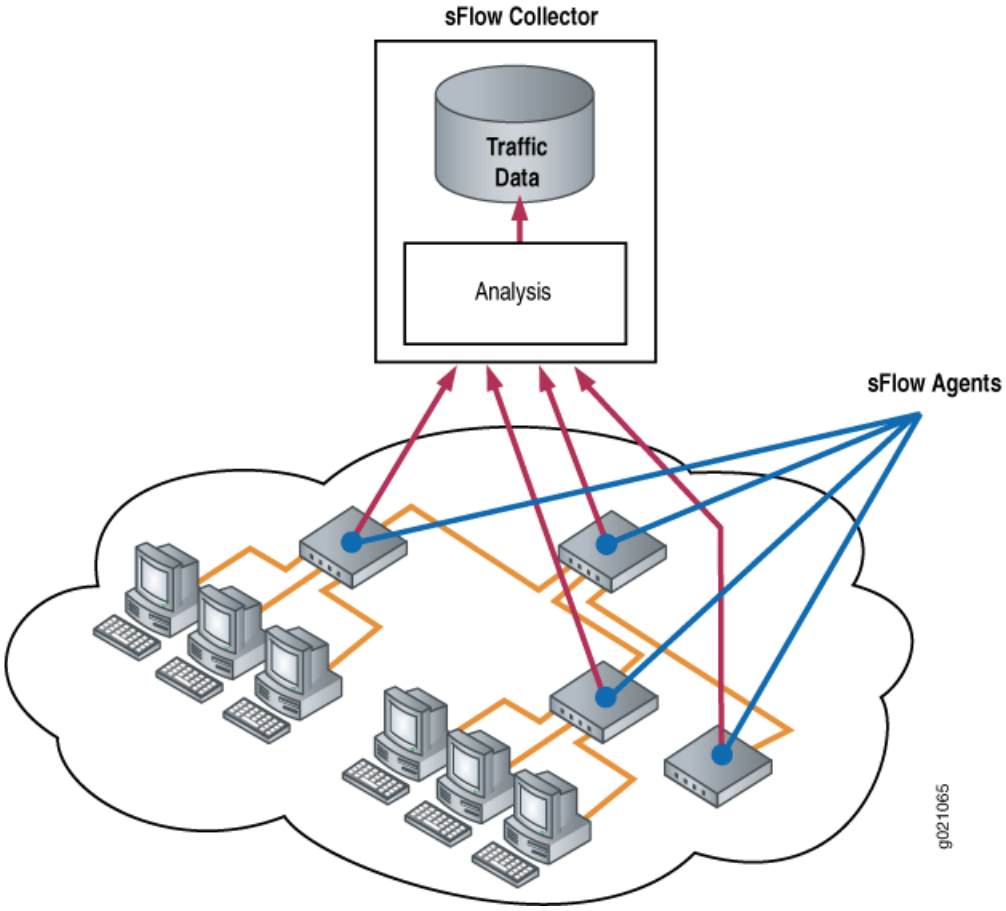
- One EX Series switch
- Junos OS Release 9.3 or later for EX Series switches

Overview and Topology

sFlow technology is a statistical-sampling–based network monitoring technology for high-speed switched or routed networks. sFlow technology samples network packets and sends the samples to a monitoring station. You can specify sample rates for ingress and egress packets. The information gathered is used to create a network traffic visibility picture.

An sFlow monitoring system consists of an sFlow agent embedded in the switch and a centralized collector. The sFlow agent runs on the switch. It combines interface counters and flow samples and sends them across the network to the sFlow collector. Figure 3 on page 45 depicts the basic elements of the sFlow system.

Figure 3: sFlow Technology Monitoring System



Configuration

To configure sFlow technology, perform the following tasks:

CLI Quick Configuration

To quickly configure sFlow technology, copy the following commands and paste them into the switch terminal window:

```
[edit protocols]
set sflow collector 10.204.32.46
set sflow collector udp-port 5600
set sflow interfaces ge-0/0/0
set sflow polling-interval 20
set sflow sample-rate egress 1000
```

Step-by-Step Procedure

To configure sFlow technology:

1. Configure the IP address of the collector:

```
[edit protocols]
user@switch# set sflow collector 10.204.32.46
```

NOTE: You can configure a maximum of 4 collectors.

2. Configure the UDP port of the collector. The default UDP port assigned is 6343.

```
[edit protocols sflow]
user@switch# set collector udp-port 5600
```

3. Enable sFlow technology on a specific interface:

```
[edit protocols sflow]
user@switch# set interfaces ge-0/0/0
```

NOTE: You cannot enable sFlow technology on a Layer 3 VLAN-tagged interface.

You cannot enable sFlow technology on a link aggregation group (LAG) interface—that is, an aggregated Ethernet interface with a name such as ae0. You can enable sFlow technology on the member interfaces that make up the LAG.

4. Specify how often the sFlow agent polls the interface:

```
[edit protocols sflow]
user@switch# set polling-interval 20
```

NOTE: The polling interval can be specified as a global parameter also. Specify 0 if you do not want to poll the interface.

5. Specify the rate at which egress packets must be sampled:

NOTE: The sample-rate *number* (the global sample-rate) statement has been deprecated and might be removed from future product releases. We strongly recommend that you phase out its use.

```
[edit protocols sflow]
user@switch# set sample-rate egress 1000
```

NOTE: If you set only the egress sample rate, the ingress sample rate will be disabled.

Results Check the results of the configuration:

```
[edit protocols sflow]
  user@switch# show
  polling-interval 20;
  sample-rate egress 1000;
  collector 10.204.32.46 {
  udp-port 5600;
  }
  interfaces ge-0/0/0.0;
```

Verification

To confirm that the configuration is correct, perform these tasks:

- Verifying That sFlow Technology Has Been Configured Properly on page 47
- Verifying That sFlow Technology Is Enabled on the Intended Interface on page 47
- Verifying the sFlow Collector Configuration on page 48

Verifying That sFlow Technology Has Been Configured Properly

Purpose Verify that sFlow technology has been configured properly.

Action Use the **show sflow** command:

```
user@switch> show sflow
sFlow: Enabled
Sample limit: 300 packets/second
Polling interval: 20 seconds
Sample rate egress: 1:1000: Enabled
Sample rate ingress: 1:2048: Disabled
Agent ID: 10.204.96.222
```

NOTE: The sample limit cannot be configured and is set to 300 packets/second.

Meaning The output shows that sFlow technology is enabled and specifies the values for the sample limit, polling interval, and sample rate.

Verifying That sFlow Technology Is Enabled on the Intended Interface

Purpose Verify that sFlow technology is enabled on interfaces and display the sampling parameters.

Action Use the **show sflow interface** command:

```
user@switch> show sflow interface
Interface       Status     Sample rate    Adapted sample rate   Polling-interval

            Egress Ingress   Egress Ingress   Egress Ingress
ge-0/0/0.0  Enabled  Disabled  1000    2048    1000     2048           20
```

NOTE: The sample limit cannot be configured and is set to 300 packets/second.

Meaning The output indicates that sFlow technology is enabled on the **ge-0/0/0.0** interface with an egress sample rate of 1000, a disabled ingress sample rate, a sampling limit of 300 packets per second and a polling interval of 20 seconds.

Verifying the sFlow Collector Configuration

Purpose Verify the sFlow collector's configuration.

Action Use the **show sflow collector** command:

```
user@switch> show sflow collector

Collector         Udp-port    No. of samples
 address
10.204.32.46      5600        1000
10.204.32.76      3400        1000
```

Meaning The output displays the IP address of the collectors and the UDP ports. It also displays the number of samples.

Related Documentation

- Configuring sFlow Technology for Network Monitoring (CLI Procedure) on page 48
- Understanding How to Use sFlow Technology for Network Monitoring on an EX Series Switch on page 41

Configuring sFlow Technology

- Configuring sFlow Technology for Network Monitoring (CLI Procedure) on page 48

Configuring sFlow Technology for Network Monitoring (CLI Procedure)

You can configure sFlow technology, designed for monitoring high-speed switched or routed networks, to continuously monitor traffic at wire speed on all interfaces simultaneously. Junos OS fully supports the sFlow standard described in RFC 3176, *InMon Corporation's sFlow: A Method for Monitoring Traffic in Switched and Routed Networks* (see http://faqs.org/rfcs/rfc3176.html).`

To configure sFlow features:

1. Configure the IP address of the collector:

```
[edit protocols]
user@switch# set sflow collector ip-address
```

2. Configure the UDP port of the collector. The default UDP port assigned is 6343.

```
[edit protocols sflow]
user@switch# set collector udp-port port-number
```

3. Enable sFlow technology on a specific interface:

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

NOTE: You cannot enable sFlow technology on a Layer 3 VLAN-tagged interface.

You cannot enable sFlow technology on a link aggregation group (LAG), but you can enable it on the member interfaces of a LAG.

4. Specify how often the sFlow agent polls the interface:

```
[edit protocols sflow]
user@switch# set polling-interval seconds
```

NOTE: Specify 0 if you do not want to poll the interface.

5. Specify the rate at which packets must be sampled. You can specify either an egress or an ingress qualifier.

NOTE: The sample-rate *number* (the global sample-rate) statement has been deprecated and might be removed from future product releases. We strongly recommend that you phase out its use.

To specify the egress sample rate:

```
[edit protocols sflow]
user@switch# set sample-rate egress number
```

To specify the ingress sample rate:

```
[edit protocols sflow]
user@switch# set sample-rate ingress number
```

6. To configure the polling interval and sample rate at the interface level:

```
[edit protocols sflow interfaces interface-name]
user@switch# set polling-interval seconds


[edit protocols sflow interfaces]
user@switch# set sample-rate egress number
```

```
[edit protocols sflow interfaces]
user@switch# set sample-rate ingress number
```

NOTE: The interface-level configuration overrides the global configuration.

7. To specify an IP address to be used as the agent ID for the sFlow agent:

```
[edit protocols sflow]
user@switch# set agent-id ip-address
```

8. To specify the source IP address to be used for sFlow datagrams:

```
[edit protocols sflow]
user@switch# set source-ip ip-address
```

Related Documentation

- Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches on page 43
- Understanding How to Use sFlow Technology for Network Monitoring on an EX Series Switch on page 41

Configuration Statements for sFlow Technology

- [edit protocols] Configuration Statement Hierarchy on page 50

[edit protocols] Configuration Statement Hierarchy

```
protocols {
  connections {
    remote-interface-switch connection-name {
      interface interface-name.unit-number;
      transmit-lsp label-switched-path;
      receive-lsp label-switched-path;
    }
  }
  dot1x {
    authenticator {
      authentication-profile-name profile-name;
      interface (all | [ interface-names ]) {
        disable;
        guest-vlan ( vlan-id | vlan-name);
        mac-radius <restrict>;
        maximum-requests number;
        no-reauthentication;
        quiet-period seconds;
        reauthentication {
          interval seconds;
        }
        retries number;
        server-fail (deny | permit | use-cache | vlan-id | vlan-name);
        server-reject-vlan (vlan-id | vlan-name);
        server-timeout seconds;
        supplicant (multiple | single | single-secure);
```

```
        supplicant-timeout seconds;
        transmit-period seconds;
      }
      static mac-address {
        interface interface-name;
        vlan-assignment (vlan-id |vlan-name);
      }
}
gvrp {
  <enable | disable>;
  interface (all | [interface-name]) {
    disable;
  }
  join-timer millseconds;
  leave-timer milliseconds;
  leaveall-timer milliseconds;
}
igmp-snooping {
  traceoptions {
    file filename <files number> <size size> <world-readable | no-world-readable>
      <match regex>;
    flag flag (detail | disable | receive | send);
  }
  vlan (vlan-id | vlan-number) {
    data-forwarding {
      source {
        groups group-prefix;
      }
      receiver {
        source-vlans vlan-list;
        install ;
      }
    }
    disable {
      interface interface-name
    }
    immediate-leave;
    interface interface-name {
      group-limit limit;
      multicast-router-interface;
      static (IGMP Snooping) {
        group ip-address;
      }
    }
    proxy ;
    query-interval seconds;
    query-last-member-interval seconds;
    query-response-interval seconds;
    robust-count number;
  }
}
lldp {
  disable;
  advertisement-interval seconds;
  hold-multiplier number;
  interface (all | interface-name) {
```

```
    disable;
  }
  lldp-configuration-notification-interval seconds;
  management-address ip-management-address;
  ptopo-configuration-maximum-hold-time seconds;
  ptopo-configuration-trap-interval seconds;
  traceoptions {
    file filename <files number> <size size> <world-readable | no-world-readable>
      <match regex>;
    flag flag (detail | disable | receive | send);
  }
}
lldp-med {
  disable;
  fast-start number;
  interface (all | interface-name) {
    disable;
    location {
      elin number;
      civic-based {
        what number;
        country-code code;
        ca-type {
          number {
            ca-value value;
          }
        }
      }
    }
  }
}
mpls {
  interface ( all | interface-name );
  label-switched-path lsp-name to remote-provider-edge-switch;
  path destination {
    <address | hostname> <strict | loose>
  }
mstp {
  disable;
  bpdu-block-on-edge;
  bridge-priority priority;
  configuration-name name;
  forward-delay seconds;
  hello-time seconds;
  interface (all | interface-name) {
    disable;
    bpdu-timeout-action {
      block;
      log;
    }
    cost  cost;
    edge;
    mode mode;
    no-root-port;
    priority priority;
  }
```

```
    max-age seconds;
    max-hops hops;
    msti msti-id {
      vlan (vlan-id | vlan-name);
      interface interface-name {
        disable;
        cost  cost;
        edge;
        mode mode;
        priority priority;
      }
    }
    revision-level revision-level;
    traceoptions {
      file filename <files number > <size size> <no-stamp | world-readable |
        no-world-readable>;
      flag flag;
    }
  }
  mvrp {
    disable
    interface (all | interface-name) {
      disable;
      join-timer milliseconds;
      leave-timer milliseconds;
      leaveall-timer milliseconds;
      registration (forbidden | normal);
    }
    no-dynamic-vlan;
    traceoptions {
      file filename <files number > <size size> <no-stamp | world-readable |
        no-world-readable>;
      flag flag;
    }
  }
  oam {
    ethernet{
      connectivity-fault-management {
        action-profile profile-name {
          default-actions {
            interface-down;
          }
        }
        linktrace {
          age (30m | 10m | 1m | 30s | 10s);
          path-database-size path-database-size;
        }
        maintenance-domain domain-name {
          level number;
          mip-half-function (none | default |explicit);
          name-format (character-string | none | dns | mac+2oct);
          maintenance-association ma-name {
            continuity-check {
              hold-interval minutes;
              interval (10m | 10s | 1m | 1s| 100ms);
              loss-threshold number;
```

```
            }
            mep mep-id {
              auto-discovery;
              direction down;
              interface interface-name;
              remote-mep mep-id {
                action-profile profile-name;
              }
            }
          }
        }
        link-fault-management {
          action-profile profile-name;
            action {
              syslog;
              link-down;
            }
            event {
              link-adjacency-loss;
              link-event-rate;
              frame-error count;
              frame-period count;
              frame-period-summary count;
              symbol-period count;
            }
            interface interface-name {
              link-discovery (active | passive);
              pdu-interval interval;
              event-thresholds threshold-value;
              remote-loopback;
              event-thresholds {
                frame-errorcount;
                frame-period count;
                frame-period-summary count;
                symbol-period count;
              }
            }
            negotiation-options {
              allow-remote-loopback;
              no-allow-link-events;
            }
        }
      }
    }
    rstp {
      disable;
      bpdu-block-on-edge;
      bridge-priority priority;
      forward-delay seconds;
      hello-time seconds;
      interface (all | interface-name) {
        disable;
        bpdu-timeout-action {
          block;
          log;
```

```
        }
        cost cost;
        edge;
        mode mode;
        no-root-port;
        priority priority;
      }
      max-age seconds;
      }
      traceoptions {
        file filename <files number > <size size> <no-stamp | world-readable |
          no-world-readable>;
        flag flag;
      }
    }
    sflow {
      agent-id;
      collector {
        ip-address;
        udp-port port-number;
      }
      disable;
      interfaces interface-name {
        disable;
        polling-interval seconds;
        sample-rate {
          egress number;
          ingress number;
        }
      }
      polling-interval seconds;
      sample-rate {
        egress number;
        ingress number;
      }
      source-ip;
    }
    stp {
      disable;
      bridge-priority priority;
      forward-delay seconds;
      hello-time seconds;
      interface (all | interface-name) {
        disable;
        bpdu-timeout-action {
          block;
          log;
        }
        cost cost;
        edge;
        mode mode;
        no-root-port;
        priority priority;
      }
      max-age seconds;
    }
```

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

Related Documentation

- 802.1X for EX Series Switches Overview
- Example: Configure Automatic VLAN Administration Using GVRP
- Understanding Server Fail Fallback and Authentication on EX Series Switches
- IGMP Snooping on EX Series Switches Overview
- Understanding 802.1X and LLDP and LLDP-MED on EX Series Switches
- Understanding MSTP for EX Series Switches
- Understanding Multiple VLAN Registration Protocol (MVRP) on EX Series Switches
- Understanding Ethernet OAM Connectivity Fault Management for an EX Series Switch on page 247
- Understanding Ethernet OAM Link Fault Management for an EX Series Switch on page 209
- Understanding RSTP for EX Series Switches
- Understanding STP for EX Series Switches

- Understanding How to Use sFlow Technology for Network Monitoring on an EX Series Switch on page 41
- Understanding VSTP for EX Series Switches

collector

Syntax

```
collector {
  ip-address;
  udp-port port-number;
}
```

Hierarchy Level [edit protocols sflow]

Release Information Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Configure a remote collector for sFlow network traffic monitoring. The switch sends sFlow UDP datagrams to this collector for analysis. You can configure up to four collectors on the switch. You configure a collector by specifying its IP address and a UDP port.

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

- [edit protocols] Configuration Statement Hierarchy on page 50
- Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches on page 43
- Configuring sFlow Technology for Network Monitoring (CLI Procedure) on page 48

disable

Syntax disable;

Hierarchy Level [edit protocols **sflow**],
[edit protocols **sflow interfaces** *interface-name*]

Release Information Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Disable the sFlow monitoring protocol on all interfaces on the switch or on the specified interface.

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

Related Documentation

- [edit protocols] Configuration Statement Hierarchy on page 50
- Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches on page 43
- Configuring sFlow Technology for Network Monitoring (CLI Procedure) on page 48

interfaces

Syntax

```
interfaces interface-name {
    disable;
    polling-interval seconds;
    sample-rate {
        egress number;
        ingress number;
    }
}
```

Hierarchy Level [edit protocols sflow]

Release Information Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Configure sFlow network traffic monitoring on the specified interface on the switch. You can configure sFlow parameters such as polling interval and sample rate with different values on different interfaces, and you can also disable sFlow monitoring on individual interfaces.

The remaining statements are explained separately.

Options *interface-name*—Name of the interface on which to configure sFlow parameters.

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

Related Documentation

- [edit protocols] Configuration Statement Hierarchy on page 50
- Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches on page 43
- Configuring sFlow Technology for Network Monitoring (CLI Procedure) on page 48

polling-interval

Syntax polling-interval *seconds*;

Hierarchy Level [edit protocols **sflow**],
[edit protocols **sflow interfaces** *interface-name*]

Release Information Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Configure the interval (in seconds) that the switch waits between port statistics update messages. "Polling" refers to the switch's gathering various statistics for the network interfaces configured for sFlow monitoring and exporting the statistics to the configured sFlow collector.

Default If no polling interval is configured for a particular interface, the switch waits the number of seconds that is configured for the global sFlow configuration. If no global interval is configured, the switch waits 20 seconds between messages.

Options *seconds*—Number of seconds between port statistics update messages. A **0** (zero) value specifies that polling is disabled.

Range: 0–3600 seconds

Default: 20 seconds

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

Related Documentation

- [edit protocols] Configuration Statement Hierarchy on page 50
- Configuring sFlow Technology for Network Monitoring (CLI Procedure) on page 48
- Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches on page 43

sample-rate

Syntax

```
sample-rate {
    egress number;
    ingress number;
}
```

Hierarchy Level

[edit protocols **sflow**],
[edit protocols **sflow interfaces** *interface-name*]

Release Information

Statement introduced in Junos OS Release 9.3 for EX Series switches.
Option *number* (directly following sample-rate) deprecated and options **egress *number*** and **ingress *number*** added in Junos OS Release 10.4 for EX Series switches.

Description

Set the ratios of the number of packets to be sampled in sFlow network traffic monitoring. For example, if you specify a rate of 1000, every thousandth packet (1 packet out of 1000) is sampled.

Default

By default, both ingress and egress sample rates are disabled if no global sample rate is configured.

NOTE: The **sample-rate *number*** (the global sample-rate) statement has been deprecated and might be removed from future product releases. We strongly recommend that you phase out its use.

Options

egress *number*—Egress qualifier for the sample rate.

Range: 100–1073741823

Default: 2048

ingress *number*—Ingress qualifier for the sample rate.

Range: 100–1073741823

Default: 2048

Required Privilege Level

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

Related Documentation

- [edit protocols] Configuration Statement Hierarchy on page 50
- Configuring sFlow Technology for Network Monitoring (CLI Procedure) on page 48
- Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches on page 43

sflow

Syntax

```
sflow {
    agent-id ip-address;
    collector {
        ip-address;
        udp-port port-number;
    }
    disable;
    interfaces interface-name {
        disable;
        polling-interval seconds;
        sample-rate number;
    }
    polling-interval seconds;
    sample-rate number;
    source-ip ip-address;
}
```

Hierarchy Level [edit protocols]

Release Information Statement introduced in Junos OS Release 9.3 for EX Series switches.
Options **agent-id** and **source-ip** added in Junos OS Release 10.2 for EX Series switches.

Description Configure sFlow technology, designed for monitoring high-speed switched or routed networks, to continuously monitor traffic at wire speed on specified interfaces simultaneously. sFlow data can be used to provide network traffic visibility information.

The remaining statements are explained separately.

Default The sFlow protocol 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

- [edit protocols] Configuration Statement Hierarchy on page 50
- Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches on page 43
- Configuring sFlow Technology for Network Monitoring (CLI Procedure) on page 48

udp-port

Syntax udp-port *port-number*;

Hierarchy Level [edit protocols **sflow collector**]

Release Information Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Configure the UDP port for a remote collector for sFlow network traffic monitoring. The switch sends sFlow UDP datagrams to the collector for analysis.

Options ***port-number***—UDP port number for this collector.
Default: 6343

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

Related Documentation

- [edit protocols] Configuration Statement Hierarchy on page 50
- Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches on page 43
- Configuring sFlow Technology for Network Monitoring (CLI Procedure) on page 48

Operational Commands for sFlow Technology

show sflow

Syntax
show sflow
<collector>
<interface>

Release Information
Command introduced in Junos OS Release 9.3 for EX Series switches.

Description
Display default sFlow technology configuration information.

Options
none—Display default sFlow technology configuration information.

collector—(Optional) Display standard status information about the specified sFlow collector.

interface—(Optional) Display standard status information about the specified sFlow interface.

Required Privilege Level
view

Related Documentation
- **show sflow interface on page 67**
- **show sflow collector on page 66**
- Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches on page 43
- Configuring sFlow Technology for Network Monitoring (CLI Procedure) on page 48

List of Sample Output
show sflow on page 65

Output Fields
Table 4 on page 64 lists the output fields for the **show sflow** command. Output fields are listed in the approximate order in which they appear.

Table 4: show sflow Output Fields

Field Name	Field Description	Level of Output
sFlow	Status of the feature: **enabled** or **disabled**.	All levels
Sample rate egress	Rate at which egress packets are sampled.	All levels
Sample rate ingress	Rate at which ingress packets are sampled.	All levels
Sample limit	Number of packets sampled per second. The sample limit cannot be configured and is set to 300 packets/second.	All levels
Polling interval	Interval at which the sFlow agent polls the interface.	All levels
Agent ID	The IP address assigned to the sFlow agent.	All levels

show sflow

```
sFlow         : Enabled
Sample rate egress     : 1:1000
Sample rate ingress  : 1: 2048: Disabled
Sample limit     : 300 packets/second
Polling interval : 20 seconds
Agent ID    : 10.93.54.7
Source IP address : 10.93.54.7
```

show sflow collector

Syntax show sflow collector

Release Information Command introduced in Junos OS Release 9.3 for EX Series switches.

Description Displays a list of configured sFlow collectors and their properties.

Required Privilege Level view

Related Documentation

- **show sflow on page 64**
- **show sflow interface on page 67**
- Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches on page 43
- Configuring sFlow Technology for Network Monitoring (CLI Procedure) on page 48

Output Fields Table 5 on page 66 lists the output fields for the **show sflow collector** command. Output fields are listed in the approximate order in which they appear.

Table 5: show sflow collector Output Fields

Field Name	Field Description	Level of Output
IP address	IP address of the collector.	All levels
UDP port	UDP port number.	All levels
No of samples	Packet sampling rate.	All levels

show sflow collector

```
IP-address     UDP-Port  No of samples
10.204.32.46    5600    1000
100.204.32.76    3400    1000
```

show sflow interface

Syntax show sflow interface

Release Information Command introduced in Junos OS Release 9.3 for EX Series switches.

Description Display the interfaces on which sFlow technology is enabled and the sampling parameters.

Required Privilege Level view

Related Documentation

- **show sflow on page 64**
- **show sflow collector on page 66**
- Example: Configuring sFlow Technology to Monitor Network Traffic on EX Series Switches on page 43
- Configuring sFlow Technology for Network Monitoring (CLI Procedure) on page 48

List of Sample Output **show sflow interface on page 67**

Output Fields Table 6 on page 67 lists the output fields for the **show sflow interface** command. Output fields are listed in the approximate order in which they appear.

Table 6: show sflow interface Output Fields

Field Name	Field Description	Level of Output
Interface	Interfaces on which sFlow technology is enabled.	All levels
Status Egress	Indicates whether egress sample rate is enabled.	All levels
Status Ingress	Indicates whether ingress sample rate is enabled.	All levels
Sample rate Egress	Rate at which egress packets are sampled.	All levels
Sample rate Ingress	Rate at which ingress packets are sampled.	All levels
Adapted sample rate Egress	Adapted rate at which egress packets are sampled.	All levels
Adapted sample rate Ingress	Adapted rate at which ingress packets are sampled.	All levels
Polling-interval	The interval at which the sFlow agent polls the interface.	All levels

show sflow interface

```
Interface       Status     Sample rate    Adapted sample rate   Polling-interval
                       Egress Ingress   Egress Ingress   Egress Ingress
ge-0/0/0.0  Enabled  Disabled  1000    2048    1000     2048          20
```


CHAPTER 3

SNMP

Configuring SNMP

Configuring SNMP (J-Web Procedure)

You can use the J-Web interface to define system identification information, create SNMP communities, create SNMP trap groups, and configure health monitor options for EX Series switches.

To configure SNMP features:

1. Select **Configure** > **Services** > **SNMP**.
2. Enter information into the configuration page for SNMP as described in Table 7 on page 69.
3. To apply the configuration click **Apply**.

NOTE: After you make changes to the configuration in this page, you must commit the changes for them to take effect. To commit all changes to the active configuration, select **Commit Options** > **Commit**. See Using the Commit Options to Commit Configuration Changes for details about all commit options.

Table 7: SNMP Configuration Page

Field	Function	Your Action
Identification		
Contact Information	Free-form text string that specifies an administrative contact for the system.	Type contact information for the administrator of the system (such as name and phone number).

Table 7: SNMP Configuration Page *(continued)*

Field	Function	Your Action
System Description	Free-form text string that specifies a description for the system.	Type information that describes the system
Local Engine ID	Provides an administratively unique identifier of an SNMPv3 engine for system identification. The local engine ID contains a prefix and a suffix. The prefix is formatted according to specifications defined in RFC 3411. The suffix is defined by the local engine ID. Generally, the local engine ID suffix is the MAC address of Ethernet management port 0.	Type the MAC address of Ethernet management port 0.
System Location	Free-form text string that specifies the location of the system.	Type location information for the system (lab name or rack name, for example).
System Override Name	Free-form text string that overrides the system hostname.	Type the hostname of the system.
Communities To add a community, click **Add**		
Community Name	Specifies the name of the SNMP community.	Type the name of the community being added.
Authorization	Specifies the type of authorization (either read-only or read-write) for the SNMP community being configured.	Select the authorization (either read-only or read-write) from the list.
Traps To add a trap group, click **Add**.		
Trap Group Name	Specifies the name of the SNMP trap group being configured.	Type the name of the group being added.

Table 7: SNMP Configuration Page *(continued)*

Field	Function	Your Action
Categories	Specifies which trap categories are added to the trap group being configured.	• To generate traps for authentication failures, select **Authentication**. • To generate traps for chassis and environment notifications, select **Chassis**. • To generate traps for configuration changes, select **Configuration**. • To generate traps for link-related notifications (up-down transitions), select **Link**. • To generate traps for remote operation notifications, select **Remote operations**. • To generate traps for remote network monitoring (RMON), select **RMON alarm**. • To generate traps for routing protocol notifications, select **Routing**. • To generate traps on system warm and cold starts, select **Startup**. • To generate traps on Virtual Router Redundancy Protocol (VRRP) events (such as new-master or authentication failures), select **VRRP events**.
Targets	Specifies one or more hostnames or IP addresses for the systems to receive SNMP traps generated by the trap group being configured.	1. Enter the hostname or IP address, in dotted decimal notation, of the target system to receive the SNMP traps. 2. Click **Add**.
Health Monitoring		
Enable Health Monitoring	Enables the SNMP health monitor on the switch. The health monitor periodically (over the time you specify in the interval field) checks the following key indicators of switch health: • Percentage of file storage used • Percentage of Routing Engine CPU used • Percentage of Routing Engine memory used • Percentage of memory used for each system process • Percentage of CPU used by the forwarding process • Percentage of memory used for temporary storage by the forwarding process	Select the check box to enable the health monitor and configure options. Clear the check box to disable the health monitor. NOTE: If you select the **Enable Health Monitoring** check box and do not specify options, then SNMP health monitoring is enabled with default values.
Interval	Specifies the sampling frequency, in seconds, over which the key health indicators are sampled and compared with the rising and falling thresholds. For example, if you configure the interval as 100 seconds, the values are checked every 100 seconds.	Enter an interval time, in seconds, from **1** through **2147483647**. The default value is 300 seconds (5 minutes).

Table 7: SNMP Configuration Page *(continued)*

Field	Function	Your Action
Rising Threshold	Specifies the value at which SNMP generates an event (trap and system log message) when the value of a sampled indicator is increasing. For example, if the rising threshold is 90 (the default), SNMP generates an event when the value of any key indicator reaches or exceeds 90 percent.	Enter a value from **0** through **100**. The default value is **90**.
Falling Threshold	Specifies the value at which SNMP generates an event (trap and system log message) when the value of a sampled indicator is decreasing. For example, if the falling threshold is 80 (the default), SNMP generates an event when the value of any key indicator falls back to 80 percent or less.	Enter a value from **0** through **100**. The default value is **80**. NOTE: The falling threshold value must be less than the rising threshold value.

Related Documentation

- Monitoring System Process Information
- Monitoring System Properties

Configuration Statements for SNMP

- [edit snmp] Configuration Statement Hierarchy on page 72

[edit snmp] Configuration Statement Hierarchy

```
snmp {
    rmon {
        history index {
            bucket-size number;
            interface interface-name;
            interval seconds;
            owner owner-name;
        }
    }
}
```

Related Documentation

- Configuring SNMP (J-Web Procedure) on page 69
- *Junos OS Network Management Configuration Guide*

address

Syntax address *address*;

Hierarchy Level [edit snmp v3 **target-address** *target-address-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the SNMP target address.

Options ***address***—IPv4 address of the system to receive traps or informs. You must specify an address, not a hostname.

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

Related Documentation
- Configuring the Address

address-mask

Syntax address-mask *address-mask*;

Hierarchy Level [edit snmp v3 **target-address** *target-address-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Verify the source addresses for a group of target addresses.

Options ***address-mask*** combined with the address defines a range of addresses.

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

Related Documentation
- Configuring the Address Mask

agent-address

Syntax agent-address outgoing-interface;

Hierarchy Level [edit snmp **trap-options**]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Set the agent address of all SNMPv1 traps generated by this router. Currently, the only option is **outgoing-interface**, which sets the agent address of each SNMPv1 trap to the address of the outgoing interface of that trap.

Options **outgoing-interface**—Value of agent address of all SNMPv1 traps generated by this router. The **outgoing-interface** option sets the agent address of each SNMPv1 trap to the address of the outgoing interface of that trap.

Default: disabled (The agent address is not specified in SNMPv1 traps.)

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

Related Documentation

- Configuring the Agent Address for SNMP Traps

alarm

Syntax

```
alarm index {
  description description;
  falling-event-index index;
  falling-threshold integer;
  falling-threshold-interval seconds;
  interval seconds;
  request-type (get-next-request | get-request | walk-request);
  rising-event-index index;
  rising-threshold integer;
  sample-type (absolute-value | delta-value);
  startup-alarm (falling-alarm | rising-alarm | rising-or-falling alarm);
  syslog-subtag syslog-subtag;
  variable oid-variable;
}
```

Hierarchy Level [edit snmp rmon]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure RMON alarm entries.

Options *index*—Identifies this alarm entry as an integer.

The remaining statements are explained separately.

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

Related Documentation

- Configuring an Alarm Entry and Its Attributes
- **event on page 86**

authorization

Syntax authorization *authorization*;

Hierarchy Level [edit snmp **community** *community-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Set the access authorization for SNMP **Get**, **GetBulk**, **GetNext**, and **Set** requests.

Options ***authorization***—Access authorization level:

- **read-only**—Enable **Get**, **GetNext**, and **GetBulk** requests.
- **read-write**—Enable all requests, including **Set** requests. You must configure a view to enable **Set** requests.

Default: read-only

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

Related Documentation
- Configuring the SNMP Community String

bucket-size

Syntax bucket-size *number*;

Hierarchy Level [edit **snmp rmon history**]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the sampling of Ethernet statistics for network fault diagnosis, planning, and performance tuning.

Default 50

Options ***number***—Number of discrete samples of Ethernet statistics requested.

Required Privilege Level snmp—To view this statement in the configuration.
snmp–control—To add this statement to the configuration.

Related Documentation
- Configuring SNMP (J-Web Procedure) on page 69
- *Junos OS Network Management Configuration Guide*

categories

Syntax
```
categories {
  category;
}
```

Hierarchy Level [edit snmp **trap-group** *group-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Define the types of traps that are sent to the targets of the named trap group.

Default If you omit the **categories** statement, all trap types are included in trap notifications.

Options ***category***—Name of a trap type.

Values: **authentication**, **chassis**, **configuration**, **link**, **remote-operations**, **rmon-alarm**, **routing**, **sonet-alarms**, **startup**, **vrrp-events**

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

Related Documentation
- Configuring SNMP Trap Groups

client-list

Syntax
```
client-list client-list-name {
  ip-addresses;
}
```

Hierarchy Level [edit snmp]

Release Information Statement introduced in Junos OS Release 8.5.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Define a list of SNMP clients.

Options ***client-list-name***—Name of the client list.

ip-addresses—IP addresses of the SNMP clients to be added to the client list,

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

Related Documentation
- Adding a Group of Clients to an SNMP Community

client-list-name

Syntax client-list-name *client-list-name*;

Hierarchy Level [edit snmp **community** *community-name*]

Release Information Statement introduced in Junos OS Release 8.5.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Add a client list or prefix list to an SNMP community.

Options ***client-list-name***—Name of the client list or prefix list.

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

Related Documentation
- Adding a Group of Clients to an SNMP Community

clients

Syntax
```
clients {
  address <restrict>;
}
```

Hierarchy Level [edit snmp **community** *community-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the IPv4 or IPv6 addresses of the SNMP client hosts that are authorized to use this community.

Default If you omit the **clients** statement, all SNMP clients using this community string are authorized to access the router.

Options ***address***—Address of an SNMP client that is authorized to access this router. You must specify an address, not a hostname. To specify more than one client, include multiple ***address*** options.

restrict—(Optional) Do not allow the specified SNMP client to access the router.

Default: The client is granted access.

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

Related Documentation
- Configuring the SNMP Community String

commit-delay

Syntax commit-delay *seconds*;

Hierarchy Level [edit snmp **nonvolatile**]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the timer for the SNMP **Set** reply and start of the commit.

Options ***seconds***—Delay between affirmative SNMP **Set** reply and start of the commit.

Default: 5 seconds

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

Related Documentation

- Configuring the Commit Delay Timer

community

Syntax

```
community community-name {
    authorization authorization;
    client-list-name client-list-name;
    clients {
        address restrict;
    }
    view view-name;
}
```

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Define an SNMP community. An SNMP community authorizes SNMP clients based on the source IP address of incoming SNMP request packets. A community also defines which MIB objects are available and the operations (read-only or read-write) allowed on those objects.

The SNMP client application specifies an SNMP community name in **Get**, **GetBulk**, **GetNext**, and **Set** SNMP requests.

Default If you omit the **community** statement, all SNMP requests are denied.

Options ***community-name***—Community string. If the name includes spaces, enclose it in quotation marks (" ").

The remaining statements are explained separately.

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

Related Documentation

- Configuring the SNMP Community String

community

Syntax community *community-name*;

Hierarchy Level [edit snmp rmon **event** *index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description The trap group that is used when generating a trap (if **eventType** is configured to send traps). If that trap group has the **rmon-alarm** trap category configured, a trap is sent to all the targets configured for that trap group. The community string in the trap matches the name of the trap group (and hence, the value of **eventCommunity**). If nothing is configured, traps are sent to each group with the **rmon-alarm** category set.

Options *community-name*—Identifies the trap group that is used when generating a trap if the event is configured to send traps.

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

Related Documentation
- Configuring an Event Entry and Its Attributes

community-name

Syntax community-name *community-name*;

Hierarchy Level [edit snmp v3 **snmp-community** *community-index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description The community name defines an SNMP community. The SNMP community authorizes SNMPv1 or SNMPv2 clients. The access privileges associated with the configured security name define which MIB objects are available and the operations (notify, read, or write) allowed on those objects.

Options ***community-name***—Community string for an SNMPv1 or SNMPv2c community. If unconfigured, it is the same as the community index. If the name includes spaces, enclose it in quotation marks (" ").

NOTE: Community names must be unique. You cannot configure the same community name at the **[edit snmp community]** and **[edit snmp v3 snmp-community** *community-index***]** hierarchy levels.

The community name at the **[edit snmp v3 snmp-community** *community-index***]** hierarchy level is encrypted and not displayed in the command-line interface (CLI).

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

Related Documentation

- Configuring the SNMPv3 Community

contact

Syntax contact *contact*;

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Define the value of the MIB II **sysContact** object, which is the contact person for the managed system.

Options ***contact***—Name of contact person. If the name includes spaces, enclose it in quotation marks (" ").

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

Related Documentation
- Configuring the System Contact on a Device Running Junos OS

description

Syntax description *description*;

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Define the value of the MIB II **sysDescription** object, which is the description of the system being managed.

Options ***description***—System description. If the name includes spaces, enclose it in quotation marks (" ").

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

Related Documentation
- Configuring the System Description on a Device Running Junos OS

description

Syntax description *description*;

Hierarchy Level [edit snmp rmon **alarm** *index*],
[edit snmp rmon **event** *index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Text description of alarm or event.

Options ***description***—Text description of an alarm or event entry. If the description includes spaces, enclose it in quotation marks (" ").

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

Related Documentation
- Configuring the Description
- Configuring an Event Entry and Its Attributes

destination-port

Syntax destination-port *port-number*;

Hierarchy Level [edit snmp **trap-group**]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Assign a trap port number other than the default.

Default If you omit this statement, the default port is 162.

Options ***port-number***—SNMP trap port number.

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

Related Documentation
- Configuring SNMP Trap Groups

engine-id

Syntax

```
engine-id {
  (local engine-id-suffix | use-default-ip-address | use-mac-address);
}
```

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description The local engine ID is defined as the administratively unique identifier of an SNMPv3 engine, and is used for identification, not for addressing. There are two parts of an engine ID: prefix and suffix. The prefix is formatted according to the specifications defined in RFC 3411, *An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks*. You can configure the suffix here.

NOTE: SNMPv3 authentication and encryption keys are generated based on the associated passwords and the engine ID. If you configure or change the engine ID, you must commit the new engine ID before you configure SNMPv3 users. Otherwise the keys generated from the configured passwords are based on the previous engine ID.

For the engine ID, we recommend using the MAC address of fxp0.

Options

local *engine-id-suffix*—Explicit setting for the engine ID suffix.

use-default-ip-address—The engine ID suffix is generated from the default IP address.

use-mac-address—The SNMP engine identifier is generated from the MAC address of the management interface on the router.

Default: use-default-ip-address

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

Related Documentation

- Configuring the Local Engine ID

event

Syntax

```
event index {
    community community-name;
    description description;
    type type;
}
```

Hierarchy Level [edit snmp rmon]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure RMON event entries.

Options *index*—Identifier for a specific event entry.

The remaining statements are explained separately.

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

Related Documentation
- Configuring an Event Entry and Its Attributes
- **alarm on page 75**

falling-event-index

Syntax falling-event-index *index*;

Hierarchy Level [edit snmp rmon alarm *index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description The index of the event entry that is used when a falling threshold is crossed. If this value is zero, no event is triggered.

Options *index*—Index of the event entry that is used when a falling threshold is crossed.

Range: 0 through 65,535

Default: 0

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

Related Documentation
- Configuring the Falling Event Index or Rising Event Index
- **rising-event-index on page 104**

falling-threshold

Syntax falling-threshold *percentage*;

Hierarchy Level [edit snmp **health-monitor**]

Release Information Statement introduced in Junos OS Release 8.0.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description The lower threshold is expressed as a percentage of the maximum possible value for the sampled variable. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval is greater than this threshold, a single event is generated. A single event is also generated if the first sample after this entry becomes valid is less than or equal to this threshold. After a falling event is generated, another falling event cannot be generated until the sampled value rises above this threshold and reaches the **rising-threshold**.

Options *percentage*—The lower threshold for the alarm entry.

Range: 1 through 100

Default: 70 percent of the maximum possible value

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

Related Documentation

- Configuring the Falling Threshold or Rising Threshold
- **rising-threshold on page 105**

falling-threshold

Syntax falling-threshold *integer*;

Hierarchy Level [edit snmp rmon **alarm** *index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description The lower threshold for the sampled variable. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval is greater than this threshold, a single event is generated. A single event is also generated if the first sample after this entry becomes valid is less than or equal to this threshold, and the associated startup-alarm value is equal to falling-alarm value or rising-or-falling-alarm value. After a falling event is generated, another falling event cannot be generated until the sampled value rises above this threshold and reaches the **rising-threshold**.

Options ***integer***—The lower threshold for the alarm entry.

Range: -2,147,483,648 through 2,147,483,647

Default: 20 percent less than **rising-threshold**

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

Related Documentation

- Configuring the Falling Threshold or Rising Threshold
- **rising-threshold on page 106**

falling-threshold-interval

Syntax falling-threshold-interval *seconds*;

Hierarchy Level [edit snmp rmon **alarm** *index*]

Release Information Statement introduced in Junos OS Release 8.3.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Interval between samples when the rising threshold is crossed. Once the alarm crosses the falling threshold, the regular sampling interval is used.

Options ***seconds***—Time between samples, in seconds.
Range: 1 through 2,147,483,647 seconds
Default: 60 seconds

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

Related Documentation
- Configuring the Falling Threshold Interval
- **interval on page 95**

filter-duplicates

Syntax filter-duplicates;

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Filter duplicate **Get**, **GetNext**, or **GetBulk** SNMP requests.

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

Related Documentation
- Filtering Duplicate SNMP Requests

filter-interfaces

Syntax

```
filter-interfaces {
  interfaces {
    all-internal-interfaces;
    interface 1;
    interface 2;
  }
}
```

Hierarchy Level [edit snmp]

Release Information Statement introduced in Junos OS Release 9.4.
Statement introduced in Junos OS Release 9.4 for EX Series Switches.

Description Filter out information related to specific interfaces from the output of SNMP **Get** and **GetNext** requests performed on interface-related MIBs.

Options

all-internal-interfaces—Filters out information related to internal interfaces from the output of SNMP **Get** and **GetNext** requests.

interfaces—Specifies the interfaces to filter out from the output of SNMP **Get** and **GetNext** requests.

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

Related Documentation

- Filtering Interface Information Out of SNMP Get and GetNext Output

group (Configuring Group Name)

Syntax group *group-name*;

Hierarchy Level [edit snmp v3 vacm access]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Assign the security name to a group.

Options ***group-name***—SNMPv3 group name created for the SNMPv3 group.

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

Related Documentation

- Configuring the Group

group (Defining Access Privileges for an SNMPv3 Group)

Syntax group *group-name*;

Hierarchy Level [edit snmp v3 vacm security-to-group security-model (usm | v1 | v2c) security-name *security-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Define access privileges granted to a group.

Options ***group-name***—Identifies a collection of SNMP security names that belong to the same access policy SNMP.

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

Related Documentation
- Configuring the Group

health-monitor

Syntax
```
health-monitor {
  falling-threshold percentage;
  interval seconds;
  rising-threshold percentage;
}
```

Hierarchy Level [edit snmp]

Release Information Statement introduced in Junos OS Release 8.0.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure health monitoring.

The remaining statements are explained separately.

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

Related Documentation
- Configuring Health Monitoring on Devices Running Junos OS

history

Syntax

```
history history-index {
    bucket-size number;
    interface interface-name;
    interval seconds;
    owner owner-name;
}
```

Hierarchy Level [edit snmp rmon]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure RMON history group entries. This RMON feature can be used with the Simple Network Management Protocol (SNMP) agent in the switch to monitor all the traffic flowing among switches on all connected LAN segments. It collects statistics in accordance with user-configurable parameters.

The history group controls the periodic statistical sampling of data from various types of networks. This group contains configuration entries that specify an interface, polling period, and other parameters. The **interface** ***interface-name*** statement is mandatory. Other statements in the history group are optional.

Default Not configured.

Options ***history-index***—Identifies this history entry as an integer.

Range: 1 through 655535

Required Privilege Level snmp—To view this statement in the configuration.
snmp–control—To add this statement to the configuration.

Related Documentation

- Configuring SNMP (J-Web Procedure) on page 69
- *Junos OS Network Management Configuration Guide*

interface

Syntax interface [*interface-names*];

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the interfaces on which SNMP requests can be accepted.

Default If you omit this statement, SNMP requests entering the router through any interface are accepted.

Options ***interface-names***—Names of one or more logical interfaces.

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

Related Documentation
- Configuring the Interfaces on Which SNMP Requests Can Be Accepted

interface

Syntax interface *interface-name*;

Hierarchy Level [edit **snmp rmon history** *history-index*]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the interface to be monitored in the specified RMON history entry.

Only one interface can be specified for a particular RMON history index. There is a one-to-one relationship between the interface and the history index. The interface must be specified in order for the RMON history to be created.

Options ***interface-name***—Specify the interface to be monitored within the specified entry of the RMON history of Ethernet statistics.

Required Privilege Level snmp—To view this statement in the configuration.
snmp–control—To add this statement to the configuration.

Related Documentation
- Configuring SNMP (J-Web Procedure) on page 69
- *Junos OS Network Management Configuration Guide*

interval

Syntax interval *seconds*;

Hierarchy Level [edit **snmp rmon history**]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the interval over which data is to be sampled for the specified interface.

Default **1800 sec**

Options ***seconds***—Interval at which data is to be sampled for the specified interface.

Required Privilege Level snmp—To view this statement in the configuration.
snmp–control—To add this statement to the configuration.

interval

Syntax interval *seconds*;

Hierarchy Level [edit snmp **health-monitor**]

Release Information Statement introduced in Junos OS Release 8.0.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Interval between samples.

Options ***seconds***—Time between samples, in seconds.

Range: **1** through **2147483647** seconds

Default: **300** seconds

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

Related Documentation

- Configuring the Interval

interval

Syntax interval *seconds*;

Hierarchy Level [edit snmp rmon **alarm** *index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Interval between samples.

Options ***seconds***—Time between samples, in seconds.

Range: 1 through 2,147,483,647 seconds

Default: 60 seconds

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

Related Documentation

- Configuring the Interval

location

Syntax location *location*;

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Define the value of the MIB II **sysLocation** object, which is the physical location of the managed system.

Options ***location***—Location of the local system. You must enclose the name within quotation marks (" ").

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

Related Documentation

- Configuring the System Location for a Device Running Junos OS

logical-system

Syntax

```
logical-system logical-system-name {
    routing-instance routing-instance-name;
}
```

Hierarchy Level

[edit snmp **community** *community-name*],
[edit snmp **trap-group**],
[edit snmp **trap-options**]
[edit snmp **v3target-address** *target-address-name*]

Release Information

Statement introduced in Junos OS Release 9.3
Statement introduced in Junos OS Release 9.0 for EX Series switches.

NOTE: The logical-system statement replaces the logical-router statement, and is backward-compatible with Junos OS Release 8.3 and later.

Description

Specify a logical system name for SNMP v1 and v2c clients.

Include at the **[edit snmp trap-options]** hierarchy level to specify a logical-system address as the source address of an SNMP trap.

Include at the **[edit snmp v3 target-address]** hierarchy level to specify a logical-system name as the destination address for an SNMPv3 trap or inform.

Options

logical-system-name—Name of the logical system.

routing-instance ***routing-instance-name***—Statement to specify a routing instance associated with the logical system.

Required Privilege Level

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

Related Documentation

- Specifying a Routing Instance in an SNMPv1 or SNMPv2c Community
- Configuring the Trap Target Address

message-processing-model

Syntax message-processing-model (v1 | v2c | v3);

Hierarchy Level [edit snmp v3 target-parameters *target-parameter-name* parameters]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the message processing model to be used when generating SNMP notifications.

Options **v1**—SNMPv1 message process model.

v2c—SNMPv2c message process model.

v3—SNMPv3 message process model.

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

Related Documentation
- Configuring the Message Processing Model

name

Syntax name *name*;

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Set the system name from the command-line interface.

Options ***name***—System name override.

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

Related Documentation
- Configuring the System Name

nonvolatile

Syntax

```
nonvolatile {
  commit-delay seconds;
}
```

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
The **commit-delay** statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure options for SNMP **Set** requests.

The statement is explained separately.

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

Related Documentation

- Configuring the Commit Delay Timer
- **commit-delay on page 79**

notify

Syntax

```
notify name {
  tag tag-name;
  type (trap | inform);
}
```

Hierarchy Level [edit snmp v3]

Release Information Statement introduced before Junos OS Release 7.4.
type inform option added in Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Select management targets for notifications as well as the type of notifications. Notifications can be either traps or informs.

Options ***name***—Name assigned to the notification.

tag-name—Notifications are sent to all targets configured with this tag.

type—Notification type is **trap** or **inform**. Traps are unconfirmed notifications. Informs are confirmed notifications.

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

Related Documentation

- Configuring the Inform Notification Type and Target Address
- Configuring the SNMPv3 Trap Notification

notify-filter (Configuring the Profile Name)

Syntax

```
notify-filter profile-name {
  oid oid (include | exclude);
}
```

Hierarchy Level [edit snmp v3]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Define a group of MIB objects on which to define access. The notify filter limits the type of traps or informs sent to the NMS.

Options ***profile-name***—Name assigned to the notify filter.

The remaining statement is explained separately.

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

Related Documentation

- Configuring the Trap Notification Filter
- **oid on page 101**

notify-filter (Applying to the Management Target)

Syntax notify-filter *profile-name*;

Hierarchy Level [edit snmp v3 target-parameters *target-parameters-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the notify filter to be used by a specific set of target parameters.

Options ***profile-name***—Name of the notify filter to apply to notifications.

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

Related Documentation

- Applying the Trap Notification Filter

notify-view

Syntax notify-view *view-name*;

Hierarchy Level [edit snmp v3 vacm access group *group-name* default-context-prefix security-model (any | usm | v1 | v2c) security-level (authentication | none | privacy)]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Associate the view with a community or a group name (SNMPv3).

Options ***view-name***—Name of the view to which the SNMP user group has access.

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

Related Documentation
- Configuring MIB Views
- Configuring the Notify View

oid

Syntax oid *object-identifier* (exclude| include);

Hierarchy Level [edit snmp view *view-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify an object identifier (OID) used to represent a subtree of MIB objects.

Options **exclude**—Exclude the subtree of MIB objects represented by the specified OID.

include—Include the subtree of MIB objects represented by the specified OID.

object-identifier—OID used to represent a subtree of MIB objects. All MIB objects represented by this statement have the specified OID as a prefix. You can specify the OID using either a sequence of dotted integers or a subtree name.

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

Related Documentation
- Configuring MIB Views

oid

Syntax oid *oid* (include | exclude);

Hierarchy Level [edit snmp v3 **notify-filter** *profile-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify an object identifier (OID) used to represent a subtree of MIB objects.

Options **exclude**—Exclude the subtree of MIB objects represented by the specified OID.

include—Include the subtree of MIB objects represented by the specified OID.

oid—Object identifier used to represent a subtree of MIB objects. All MIB objects represented by this statement have the specified OID as a prefix. You can specify the OID using either a sequence of dotted integers or a subtree name.

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

Related Documentation
- Configuring the Trap Notification Filter

owner

Syntax owner *owner-name*;

Hierarchy Level [edit **snmp rmon history**]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the user or group responsible for this configuration.

Options ***owner-name***—The user or group responsible for this configuration.
Range: 0 through 32 alphanumeric characters

Required Privilege Level snmp—To view this statement in the configuration.
snmp–control—To add this statement to the configuration.

Related Documentation
- Configuring SNMP (J-Web Procedure) on page 69
- *Junos OS Network Management Configuration Guide*

parameters

Syntax

```
parameters {
  message-processing-model (v1 | v2c | v3);
  security-level (none | authentication | privacy);
  security-model (usm | v1 | v2c);
  security-name security-name;
}
```

Hierarchy Level [edit snmp v3 **target-parameters** *target-parameters-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure a set of target parameters.

The remaining statements are explained separately.

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

Related Documentation
- Defining and Configuring the Trap Target Parameters

port

Syntax port *port-number*;

Hierarchy Level [edit snmp v3 **target-address** *target-address-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure a UDP port number for an SNMP target.

Default If you omit this statement, the default port is 162.

Options ***port-number***—Port number for the SNMP target.

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

Related Documentation
- Configuring the Port

read-view

Syntax read-view *view-name*;

Hierarchy Level [edit snmp v3 vacm access group *group-name* default-context-prefix security-model (any | usm | v1 | v2c) **security-level** (authentication | none | privacy)]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Associate the view with a community or a group name (SNMPv3).

Options ***view-name***—The name of the view to which the SNMP user group has access.

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

Related Documentation
- Configuring the Read View
- Configuring MIB Views

request-type

Syntax request-type (get-next-request | get-request | walk-request);

Hierarchy Level [edit snmp rmon **alarm** *index*]

Release Information Statement introduced in Junos OS Release 8.3.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Extend monitoring to a specific SNMP object instance (**get-request**), or extend monitoring to all object instances belonging to a MIB branch (**walk-request**), or extend monitoring to the next object instance after the instance specified in the configuration (**get-next-request**).

Options **get-next-request**—Performs an SNMP get next request.

get-request—Performs an SNMP get request.

walk-request—Performs an SNMP walk request.

Default: walk-request

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

Related Documentation
- Configuring the Request Type
- **variable on page 131**

rising-event-index

Syntax rising-event-index *index*;

Hierarchy Level [edit snmp rmon **alarm** *index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Index of the event entry that is used when a rising threshold is crossed. If this value is zero, no event is triggered.

Options ***index***—Index of the event entry that is used when a rising threshold is crossed.

Range: 0 through 65,535

Default: 0

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

Related Documentation

- Configuring the Falling Event Index or Rising Event Index
- **falling-event-index on page 86**

rising-threshold

Syntax rising-threshold *percentage*;

Hierarchy Level [edit snmp **health-monitor**]

Release Information Statement introduced in Junos OS Release 8.0.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description The upper threshold is expressed as a percentage of the maximum possible value for the sampled variable. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval is less than this threshold, a single event is generated. A single event is also generated if the first sample after this entry becomes valid is greater than or equal to this threshold. After a rising event is generated, another rising event cannot be generated until the sampled value falls below this threshold and reaches the **falling-threshold**.

Options *percentage*—The lower threshold for the alarm entry.

Range: 1 through 100

Default: 80 percent of the maximum possible value

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

Related Documentation

- **falling-threshold on page 87**
- Configuring the Falling Threshold or Rising Threshold

rising-threshold

Syntax rising-threshold *integer*;

Hierarchy Level [edit snmp rmon **alarm** *index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Upper threshold for the sampled variable. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval is less than this threshold, a single event is generated. A single event is also generated if the first sample after this entry becomes valid is greater than or equal to this threshold, and the associated startup alarm value is equal to the falling alarm or rising or falling alarm value. After a rising event is generated, another rising event cannot be generated until the sampled value falls below this threshold and reaches the falling threshold.

Options ***integer***—The lower threshold for the alarm entry.
Range: –2,147,483,648 through 2,147,483,647

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

Related Documentation
- Configuring the Falling Threshold or Rising Threshold
- **falling-threshold on page 88**

rmon

Syntax rmon { ... }

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure Remote Monitoring.

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

Related Documentation
- Configuring an Alarm Entry and Its Attributes

rmon

Syntax

```
rmon {
  history history-index {
    interface interface-name;
    bucket-size number;
    interval seconds;
    owner owner-name;
  }
}
```

Hierarchy Level [edit snmp]

Release Information Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description RMON is an existing feature of Junos OS.

The RMON specification provides network administrators with comprehensive network fault diagnosis, planning, and performance tuning information. It delivers this information in nine groups of monitoring elements, each providing specific sets of data to meet common network monitoring requirements. Each group is optional, so that vendors do not need to support all the groups within the MIB.

Junos OS supports RMON Statistics, History, Alarm, and Event groups. The EX Series documentation describes only the **rmon history** statement, which was added with this release.

The statements are explained separately.

Default Disabled.

Required Privilege Level snmp—To view this statement in the configuration.
snmp–control—To add this statement to the configuration.

Related Documentation

- Configuring SNMP (J-Web Procedure) on page 69
- *Junos OS Network Management Configuration Guide*

routing-instance

Syntax routing-instance *routing-instance-name*;

Hierarchy Level [edit snmp **community** *community-name*],
[edit snmp **community** *community-name* logical-system *logical-system-name*],
[edit snmp **trap-group** *group*]

Release Information Statement introduced in Junos OS Release 8.3.
Added to the **[edit snmp community *community-name*]** hierarchy level in Junos OS Release 8.4.
Added to the **[edit snmp community *community-name* logical-system *logical-system-name*]** hierarchy level in Junos OS Release 9.1.
Statement introduced in Junos OS Release 9.1 for EX Series switches.

Description Specify a routing instance for SNMPv1 and SNMPv2 trap targets. All targets configured in the trap group use this routing instance.

If the routing instance is defined within a logical system, include the **logical-system *logical-system-name*** statement at the **[edit snmp community *community-name*]** hierarchy level and specify the **routing-instance** statement under the **[edit snmp community *community-name* logical-system *logical system-name*]** hierarchy level.

Options ***routing-instance-name***—Name of the routing instance.

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

Related Documentation

- Configuring SNMP Trap Groups
- Configuring the Source Address for SNMP Traps
- Specifying a Routing Instance in an SNMPv1 or SNMPv2c Community

routing-instance

Syntax routing-instance *routing-instance-name*;

Hierarchy Level [edit snmp v3 **target-address** *target-address-name*]

Release Information Statement introduced in Junos OS Release 8.3.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify a routing instance for an SNMPv3 trap target.

Options ***routing-instance-name***—Name of the routing instance.

To configure a routing instance within a logical system, specify the logical system name followed by the routing instance name. Use a slash (/) to separate the two names (for example, **test-ls/test-ri**). To configure the default routing instance on a logical system, specify the logical system name followed by **default** (for example, **test-ls/default**).

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

Related Documentation
- Configuring the Trap Target Address

sample-type

Syntax sample-type (absolute-value | delta-value);

Hierarchy Level [edit snmp rmon **alarm** *index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Method of sampling the selected variable.

Options **absolute-value**—Actual value of the selected variable is used when comparing against the thresholds.

delta-value—Difference between samples of the selected variable is used when comparing against the thresholds.

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

Related Documentation
- Configuring the Sample Type

security-level (Generating SNMP Notifications)

Syntax security-level (authentication | none | privacy);

Hierarchy Level [edit snmp v3 target-parameters *target-parameters-name* parameters]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the security level to use when generating SNMP notifications.

Options

authentication—Provides authentication but no encryption.

none—No authentication and no encryption.

privacy—Provides authentication and encryption.

Default: none

Required Privilege Level

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

Related Documentation

- Configuring the Security Level

security-level (Defining Access Privileges)

Syntax

```
security-level (authentication | none | privacy) {
  notify-view view-name;
  read-view view-name;
  write-view view-name;
}
```

Hierarchy Level [edit snmp v3 vacm access **group** *group-name* default-context-prefix **security-model** (any | usm | v1 | v2c)]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Define the security level used for access privileges.

Options

authentication—Provides authentication but no encryption.

none—No authentication and no encryption.

privacy—Provides authentication and encryption.

Default: none

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

Related Documentation

- Configuring the Security Level

security-model (Access Privileges)

Syntax security-model (usm | v1 | v2c);

Hierarchy Level [edit snmp v3 vacm access group *group-name* default-context-prefix]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure a group's security model used for access privileges.

Options

usm—SNMPv3 security model.

v1—SNMPv1 security model.

v2c—SNMPv2c security model.

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

Related Documentation

- Configuring the Security Model

security-model (Group)

Syntax

```
security-model (usm | v1 | v2c) {
    security-name security-name {
        group group-name;
    }
}
```

Hierarchy Level [edit snmp v3 vacm **security-to-group**]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Define a security model for a group.

Options

usm—SNMPv3 security model.

v1—SNMPv1 security model.

v2c—SNMPv2c security model.

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

Related Documentation

- Configuring the Security Model

security-model (SNMP Notifications)

Syntax

```
security-model (usm | v1 | v2c);
```

Hierarchy Level [edit snmp v3 target-parameters *target-parameters-name* **parameters**]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure a group's security model used with sending notifications.

Options

usm—SNMPv3 security model.

v1—SNMPv1 security model.

v2c—SNMPv2c security model.

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

Related Documentation

- Configuring the Security Model

security-name (Security Group)

Syntax

```
security-name security-name {
    group group-name;
}
```

Hierarchy Level [edit snmp v3 vacm security-to-group **security-model** (usm | v1 | v2c)]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Associate a group or a community string with a configured security group.

Options ***security-name***—Username configured at the **[edit snmp v3 usm local-engine user *username*]** hierarchy level. For SNMPv1 and SNMPv2c, the security name is the community string configured at the **[edit snmp v3 snmp-community *community-index*]** hierarchy level.

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

Related Documentation
- Assigning Security Names to Groups

security-name (Community String)

Syntax security-name *security-name*;

Hierarchy Level [edit snmp v3 **snmp-community** *community-index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Associate the community string configured at the **[edit snmp v3 snmp-community *community-index*]** hierarchy level to a security name.

Options ***security-name***—Name used when performing access control.

NOTE: The security name must match the configured security name at the [edit snmp v3 target-parameters *target-parameters-name* parameters] hierarchy level when you configure traps or informs.

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

Related Documentation
- Configuring the Security Names

security-name (SNMP Notifications)

Syntax security-name *security-name*;

Hierarchy Level [edit snmp v3 target-parameters *target-parameters-name* parameters]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the security name used when generating SNMP notifications.

Options ***security-name***—Identifies the user that is used when generating the notification if the USM security model is used. Identifies the SNMP community used when generating the notification if the v1 or v2c security models are used.

NOTE: The access privileges for the group associated with this security name must allow this notification to be sent.

If you are using the v1 or v2 security models, the security name at the **[edit snmp v3 vacm security-to-group]** hierarchy level must match the security name at the **[edit snmp v3 snmp-community *community-index*]** hierarchy level.

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

Related Documentation

- Configuring the Security Name

security-to-group

Syntax

```
security-to-group {
  security-model (usm | v1 | v2c) {
    group group-name;
    security-name security-name;
  }
}
```

Hierarchy Level [edit snmp v3 vacm]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the group to which a specific security name belongs.

The remaining statements are explained separately.

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

Related Documentation
- Assigning Security Model and Security Name to a Group

snmp

Syntax snmp { ... }

Hierarchy Level [edit]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure SNMP.

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

Related Documentation
- Configuring SNMP on a Device Running Junos OS

snmp

Syntax

```
snmp {
  rmon {
    history index {
      interface interface-name;
      bucket-size number;
      interval seconds;
      owner owner-name;
    }
  }
}
```

Hierarchy Level [edit]

Release Information The **history** statement introduced in Junos OS Release 9.0 for EX-series switches.

Description Configure SNMP.

The statements are explained separately.

Required Privilege Level snmp—To view this statement in the configuration.
snmp–control—To add this statement to the configuration.

Related Documentation
- Configuring SNMP (J-Web Procedure) on page 69

snmp-community

Syntax

```
snmp-community community-index {
  community-name community-name;
  security-name security-name;
  tag tag-name;
}
```

Hierarchy Level [edit snmp v3]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the SNMP community.

Options ***community-index***—(Optional) String that identifies an SNMP community.

The remaining statements are explained separately.

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

Related Documentation
- Configuring the SNMPv3 Community

source-address

Syntax source-address *address*;

Hierarchy Level [edit snmp **trap-options**]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Set the source address of every SNMP trap packet sent by this router to a single address regardless of the outgoing interface. If the source address is not specified, the default is to use the address of the outgoing interface as the source address.

Options ***address***—Source address of SNMP traps. You can configure the source address of trap packets two ways: **lo0** or a valid IPv4 address configured on one of the router interfaces. The value **lo0** indicates that the source address of all SNMP trap packets is set to the lowest loopback address configured at interface **lo0**.

Default: disabled (The source address is the address of the outgoing interface.)

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

Related Documentation

- Configuring the Source Address for SNMP Traps

startup-alarm

Syntax startup-alarm (falling-alarm | rising-alarm | rising-or-falling-alarm);

Hierarchy Level [edit snmp rmon **alarm** *index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description The alarm that can be sent upon entry startup.

Options **falling-alarm**—Generated if the first sample after the alarm entry becomes active is less than or equal to the falling threshold.

rising-alarm—Generated if the first sample after the alarm entry becomes active is greater than or equal to the rising threshold.

rising-or-falling-alarm—Generated if the first sample after the alarm entry becomes active satisfies either of the corresponding thresholds.

Default: **rising-or-falling-alarm**

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

Related Documentation
- Configuring the Sample Type

syslog-subtag

Syntax syslog-subtag *syslog-subtag*;

Hierarchy Level [edit snmp rmon **alarm***index*]

Release Information Statement introduced in Junos OS Release 8.5.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Add a tag to the system log message.

Options **syslog-subtag *syslog-subtag***—Tag of not more than 80 uppercase characters to be added to syslog messages.

Default: None

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

Related Documentation
- Configuring the System Log Tag

tag

Syntax tag *tag-name*;

Hierarchy Level [edit snmp v3 **notify** *name*],
[edit snmp v3 **snmp-community** *community-index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure a set of targets to receive traps or informs (for IPv4 packets only).

Options ***tag-name***—Identifies the address of managers that are allowed to use a community string.

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

Related Documentation
- Configuring the Tag
- Configuring the SNMPv3 Trap Notification

tag-list

Syntax tag-list *tag-list*;

Hierarchy Level [edit snmp v3 **target-address** *target-address-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure an SNMP tag list used to select target addresses.

Options ***tag-list***—Defines sets of target addresses. To specify more than one tag, specify the tag names as a space-separated list enclosed within double quotes.

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

Related Documentation
- Configuring the Trap Target Address

target-address

Syntax

```
target-address target-address-name {
    address address;
    address-mask address-mask;
    logical-system logical-system;
    port port-number;
    retry-count number;
    routing-instance instance;
    tag-list tag-list;
    target-parameters target-parameters-name;
    timeout seconds;
}
```

Hierarchy Level [edit snmp v3]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure a management application's address and parameters to be used in sending notifications.

Options *target-address-name*—String that identifies the target address.

The remaining statements are explained separately.

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

Related Documentation

- Configuring the Trap Target Address

target-parameters

Syntax

```
target-parameters target-parameters-name {
  profile-name;
  parameters {
    message-processing-model (v1 | v2c | V3);
    security-level (authentication | none | privacy);
    security-model (usm | v1 | v2c);
    security-name security-name;
  }
}
```

```
target-parameters target-parameters-name; # syntax for the statement at the [edit snmp
  v3 target-address target-address-name] hierarchy level.
```

Hierarchy Level

[edit snmp **v3**]

[edit snmp **v3 target-address** *target-address-name*]

Release Information

Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description

Configure the message processing and security parameters to be used in sending notifications to a particular management target when included at the [edit snmp v3] hierarchy level. The remaining statements at this level are explained separately.

Apply the target parameters configured at the **[edit snmp v3 target-parameters *target-parameters-name*]** hierarchy level to the target-address configuration at the **[edit snmp v3]** hierarchy level.

Required Privilege Level

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

Related Documentation

- Defining and Configuring the Trap Target Parameters
- Applying Target Parameters

targets

Syntax

```
targets {
  address;
}
```

Hierarchy Level [edit snmp **trap-group** *group-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure one or more systems to receive SNMP traps.

Options ***address***—IPv4 or IPv6 address of the system to receive traps. You must specify an address, not a hostname.

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

Related Documentation

- Configuring SNMP Trap Groups

traceoptions

Syntax

```
traceoptions {
  file filename <files number> <match regular-expression> <size size> <world-readable |
    no-world-readable>;
  flag flag;
  no-remote-trace;
}
```

Hierarchy Level [edit snmp]

Release Information

Statement introduced before Junos OS Release 7.4.
file *filename* option added in Junos OS Release 8.1.
world-readable | no-world-readable option added in Junos OS Release 8.1.
match *regular-expression* option added in Junos OS Release 8.1.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description The output of the tracing operations is placed into log files in the **/var/log** directory. Each log file is named after the SNMP agent that generates it. Currently, the following logs are created in the **/var/log** directory when the **traceoptions** statement is used:

- chassisd
- craftd
- ilmid
- mib2d
- rmopd
- serviced
- snmpd

Options

file *filename*—By default, the name of the log file that records trace output is the name of the process being traced (for example, **mib2d** or **snmpd**). Use this option to specify another name.

files *number*—(Optional) Maximum number of trace files per SNMP subagent. When a trace file (for example, **snmpd**) reaches its maximum size, it is archived by being renamed to **snmpd.0**. The previous **snmpd.1** is renamed to **snmpd.2**, and so on. The oldest archived file is deleted.

Range: 2 through 1000 files

Default: 10 files

flag *flag*—Tracing operation to perform. To specify more than one tracing operation, include multiple **flag** statements:

- **all**—Log all SNMP events.
- **configuration**—Log reading of configuration at the **[edit snmp]** hierarchy level.

- **database**—Log events involving storage and retrieval in the events database.
- **events**—Log important events.
- **general**—Log general events.
- **interface-stats**—Log physical and logical interface statistics.
- **nonvolatile-sets**—Log nonvolatile SNMP set request handling.
- **pdu**—Log SNMP request and response packets.
- **policy**—Log policy processing.
- **protocol-timeouts**—Log SNMP response timeouts.
- **routing-socket**—Log routing socket calls.
- **server**—Log communication with processes that are generating events.
- **subagent**—Log subagent restarts.
- **timer-events**—Log internally generated events.
- **varbind-error**—Log variable binding errors.

match *regular-expression*—(Optional) Refine the output to include lines that contain the regular expression.

size *size*—(Optional) Maximum size, in kilobytes (KB), of each trace file before it is closed and archived.

Range: 10 KB through 1 GB

Default: 1000 KB

world-readable | no-world-readable—(Optional) By default, log files can be accessed only by the user who configures the tracing operation. The **world-readable** option enables any user to read the file. To explicitly set the default behavior, use the **no-world-readable** option.

Required Privilege Level

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

Related Documentation

- Tracing SNMP Activity on a Device Running Junos OS

trap-group

Syntax

```
trap-group group-name {
  categories {
    category;
  }
  destination-port port-number;
  routing-instance instance;
  targets {
    address;
  }
  version (all | v1 | v2);
}
```

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Create a named group of hosts to receive the specified trap notifications. The name of the trap group is embedded in SNMP trap notification packets as one variable binding (varbind) known as the community name. At least one trap group must be configured for SNMP traps to be sent.

Options ***group-name***—Name of the trap group. If the name includes spaces, enclose it in quotation marks (" ").

The remaining statements are explained separately.

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

Related Documentation

- Configuring SNMP Trap Groups

trap-options

Syntax

```
trap-options {
  agent-address outgoing-interface;
  source-address address;
}
```

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Using SNMP trap options, you can set the source address of every SNMP trap packet sent by the router to a single address, regardless of the outgoing interface. In addition, you can set the agent address of each SNMPv1 trap. For more information about the contents of SNMPv1 traps, see RFC 1157.

The remaining statements are explained separately.

Default Disabled

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

Related Documentation

- Configuring Source and Agent Addresses for SNMP Traps

type

Syntax type (inform | trap);

Hierarchy Level [edit snmp v3 notify *name*]

Release Information Statement introduced before Junos OS Release 7.4.
inform option added in Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure the type of notification.

Options **inform**—Defines the type of notification as an inform. SNMP informs are confirmed notifications.

trap—Defines the type of notification as a trap. SNMP traps are unconfirmed notifications.

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

Related Documentation

- Configuring SNMP Informs
- Configuring the SNMPv3 Trap Notification

type

Syntax type *type*;

Hierarchy Level [edit snmp rmon **event** *index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Type of notification generated when a threshold is crossed.

Options ***type***—Type of notification:

- **log**—Add an entry to **logTable**.
- **log-and-trap**—Send an SNMP trap and make a log entry.
- **none**—No notifications are sent.
- **snmptrap**—Send an SNMP trap.

Default: log-and-trap

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

Related Documentation

- Configuring an Event Entry and Its Attributes

v3

Syntax

```
v3 {
  notify name {
    tag tag-name;
    type trap;
  }
  notify-filter profile-name {
    oid object-identifier (include | exclude);
  }
  snmp-community community-index {
    community-name community-name;
    security-name security-name;
    tag tag-name;
  }
  target-address target-address-name {
    address address;
    address-mask address-mask;
    logical-system logical-system;
    port port-number;
    retry-count number;
    routing-instance instance;
    tag-list tag-list;
    target-parameters target-parameters-name;
    timeout seconds;
  }
  target-parameters target-parameters-name {
    notify-filter profile-name;
    parameters {
      message-processing-model (v1 | v2c | V3);
      security-level (authentication | none | privacy);
      security-model (usm | v1 | v2c);
      security-name security-name;
    }
  }
  usm {
    local-engine {
      user username {
        authentication-md5 {
          authentication-password authentication-password;
        }
        authentication-sha {
          authentication-password authentication-password;
        }
        authentication-none;
        privacy-aes128 {
          privacy-password privacy-password;
        }
        privacy-des {
          privacy-password privacy-password;
        }
        privacy-des {
          privacy-password privacy-password;
        }
```

```
            privacy-none;
          }
        }
        remote-engine engine-id {
          user username {
            authentication-md5 {
              authentication-password authentication-password;
            }
            authentication-sha {
              authentication-password authentication-password;
            }
            authentication-none;
            privacy-aes128 {
              privacy-password privacy-password;
            }
            privacy-des {
              privacy-password privacy-password;
            }
            privacy-3des {
              privacy-password privacy-password;
            }
            privacy-none {
              privacy-password privacy-password;
            }
          }
        }
      }
      vacm {
        access {
          group group-name {
            default-context-prefix {
              security-model (any | usm | v1 | v2c) {
                security-level (authentication | none | privacy) {
                  notify-view view-name;
                  read-view view-name;
                  write-view view-name;
                }
              }
            }
          }
        }
        security-to-group {
          security-model (usm | v1 | v2c) {
            security-name security-name {
              group group-name;
            }
          }
        }
      }
    }
```

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure SNMPv3.

The remaining statements are explained separately.

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

Related Documentation
- Minimum SNMPv3 Configuration on a Device Running Junos OS

vacm

Syntax

```
vacm {
  access {
    group group-name {
      default-context-prefix {
        security-model (any | usm | v1 | v2c) {
          security-level (authentication | none | privacy) {
            notify-view view-name;
            read-view view-name;
            write-view view-name;
          }
        }
      }
    }
  }
  security-to-group {
    security-model (usm | v1 | v2c);
    security-name security-name {
      group group-name;
    }
  }
}
```

Hierarchy Level [edit snmp v3]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure view-based access control model (VACM) information.

The remaining statements are explained separately.

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

Related Documentation
- Defining Access Privileges for an SNMP Group

variable

Syntax variable *oid-variable*;

Hierarchy Level [edit snmp rmon **alarm** *index*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Object identifier (OID) of MIB variable to be monitored.

Options ***oid-variable***—OID of the MIB variable that is being monitored. The OID can be a dotted decimal (for example, **1.3.6.1.2.1.2.1.2.2.1.10.1**). Alternatively, use the MIB object name (for example, **ifInOctets.1**).

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

Related Documentation
- Configuring the Variable

version

Syntax version (all | v1 | v2);

Hierarchy Level [edit snmp **trap-group** *group-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the version number of SNMP traps.

Options **all**—Send an SNMPv1 and SNMPv2 trap for every trap condition.

v1—Send SNMPv1 traps only.

v2—Send SNMPv2 traps only.

Default: all

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

Related Documentation
- Configuring SNMP Trap Groups

view (Configuring a MIB View)

Syntax

```
view view-name {
  oid object-identifier (include | exclude);
}
```

Hierarchy Level [edit snmp]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Define a MIB view. A MIB view identifies a group of MIB objects. Each MIB object in a view has a common OID prefix. Each object identifier represents a subtree of the MIB object hierarchy. The **view** statement uses a view to specify a group of MIB objects on which to define access. To enable a view, you must associate the view with a community by including the **view** statement at the **[edit snmp community *community-name*]** hierarchy level.

NOTE: To remove an OID completely, use the delete view all oid oid-number command but omit the include parameter.

Options *view-name*—Name of the view

The remaining statement is explained separately.

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

Related Documentation

- Configuring MIB Views
- Associating MIB Views with an SNMP User Group
- **community on page 80**

view (Associating a MIB View with a Community)

Syntax view *view-name*;

Hierarchy Level [edit snmp **community** *community-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Associate a view with a community. A view represents a group of MIB objects.

Options ***view-name***—Name of the view. You must use a view name already configured in the **view** statement at the **[edit snmp]** hierarchy level.

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

Related Documentation
- Configuring the SNMP Community String

write-view

Syntax write-view *view-name*;

Hierarchy Level [edit snmp v3 vacm access group *group-name* default-context-prefix security-model (any | usm | v1 | v2c) **security-level** (authentication | none | privacy)]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Associate the view with a community or a group name (SNMPv3).

Options ***view-name***—The name of the view to which the SNMP user group has access.

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

Related Documentation
- Configuring MIB Views
- Configuring the Write View

Operational Commands for SNMP

clear snmp rmon history

Syntax **clear snmp rmon history <*interface-name* | all>**

Release Information Command introduced in Junos OS Release 9.0 for EX Series switches.

Description Delete the samples of Ethernet statistics collected, but do not delete the RMON history configuration.

The **clear snmp rmon history** command deletes all the samples collected for the interface configured for the history group, but not the configuration of that group. If you want to delete the RMON history group configuration, you must use the **delete snmp rmon history** configuration-mode command.

Options *interface-name*—Delete the samples of Ethernet statistics collected for this interface.

all—Delete the samples of Ethernet statistics collected for all interfaces that have been configured for RMON monitoring.

Required Privilege Level clear

Related Documentation

- **show snmp rmon history on page 156**

clear snmp statistics

Syntax clear snmp statistics

Release Information Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description Clear Simple Network Management Protocol (SNMP) statistics.

Options This command has no options.

Required Privilege Level clear

Related Documentation
- **show snmp statistics on page 159**

List of Sample Output **clear snmp statistics on page 135**

Output Fields See **show snmp statistics** for an explanation of output fields.

clear snmp statistics In the following example, SNMP statistics are displayed before and after the **clear snmp statistics** command is issued:

```
user@host> show snmp statistics
SNMP statistics:
  Input:
    Packets: 8, Bad versions: 0, Bad community names: 0,
    Bad community uses: 0, ASN parse errors: 0,
    Too bigs: 0, No such names: 0, Bad values: 0,
    Read onlys: 0, General errors: 0,
    Total request varbinds: 8, Total set varbinds: 0,
    Get requests: 0, Get nexts: 8, Set requests: 0,
    Get responses: 0, Traps: 0,
    Silent drops: 0, Proxy drops 0
  Output:
    Packets: 2298, Too bigs: 0, No such names: 0,
    Bad values: 0, General errors: 0,
    Get requests: 0, Get nexts: 0, Set requests: 0,
    Get responses: 8, Traps: 2290


user@host> clear snmp statistics


user@host> show snmp statistics
SNMP statistics:
  Input:
    Packets: 0, Bad versions: 0, Bad community names: 0,
    Bad community uses: 0, ASN parse errors: 0,
    Too bigs: 0, No such names: 0, Bad values: 0,
    Read onlys: 0, General errors: 0,
    Total request varbinds: 0, Total set varbinds: 0,
    Get requests: 0, Get nexts: 0, Set requests: 0,
    Get responses: 0, Traps: 0,
    Silent drops: 0, Proxy drops 0
  Output:
```

```
Packets: 0, Too bigs: 0, No such names: 0,
Bad values: 0, General errors: 0,
Get requests: 0, Get nexts: 0, Set requests: 0,
Get responses: 0, Traps: 0
```

request snmp spoof-trap

Syntax

request snmp spoof-trap
<*trap*> variable-bindings <*object*> <*instance*> <*value*>

Release Information

Command introduced in Junos OS Release 8.2.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Spoof (mimic) the behavior of a Simple Network Management Protocol (SNMP) trap.

Options

<*trap*>—Name of the trap to spoof.

variable-bindings <*object*> <*instance*> <*value*>—(Optional) List of variables and values to include in the trap. Each variable binding is specified as an object name, the object instance, and the value (for example, **ifIndex[14] = 14**). Enclose the list of variable bindings in quotation marks (“ “) and use a comma to separate each object name, instance, and value definition (for example, **variable-bindings “ifIndex[14] = 14, ifAdminStatus[14] = 1, ifOperStatus[14] = 2”**). Objects included in the trap definition that do not have instances and values specified as part of the command are included in the trap and spoofed with automatically generated instances and values.

<*dummy name*>—A dummy trap name to display the list of available traps.

Question mark (**?**)—Question mark**?** to display possible completions.

Required Privilege Level

request

List of Sample Output

request snmp spoof-trap (with Variable Bindings) on page 137
request snmp spoof-trap (Illegal Trap Name) on page 137
request snmp spoof-trap (Question Mark ?) on page 141

request snmp spoof-trap (with Variable Bindings)

```
user@host> request snmp spoof-trap linkUp variable-bindings “ifIndex[14] = 14, ifAdminStatus[14]
= 1, ifOperStatus[14] = 2”
Spoof trap request result: trap sent successfully
```

request snmp spoof-trap (Illegal Trap Name)

```
user@host> request snmp spoof-trap xx
Spoof trap request result: trap not found

Allowed Traps:
adslAtucInitFailureTrap
  adslAtucPerfESsThreshTrap
  adslAtucPerfLofsThreshTrap
  adslAtucPerfLolsThreshTrap
  adslAtucPerfLossThreshTrap
  adslAtucPerfLprsThreshTrap
  adslAtucRateChangeTrap
  adslAturPerfESsThreshTrap
  adslAturPerfLofsThreshTrap
  adslAturPerfLossThreshTrap
  adslAturPerfLprsThreshTrap
  adslAturRateChangeTrap
  apsEventChannelMismatch
  apsEventFEPLF
```

```
apsEventModeMismatch
apsEventPSBF
apsEventSwitchover
authenticationFailure
bfdSessDown
bfdSessUp
bgpBackwardTransition
bgpEstablished
coldStart
dlswTrapCircuitDown
dlswTrapCircuitUp
dlswTrapTConnDown
dlswTrapTConnPartnerReject
dlswTrapTConnProtViolation
dlswTrapTConnUp
dsx1LineStatusChange
dsx3LineStatusChange
entConfigChange
fallingAlarm
frDLCIStatusChange
ggsnTrapChanged
ggsnTrapCleared
ggsnTrapNew
gmplsTunnelDown
ifMauJabberTrap
ipv6IfStateChange
isisAreaMismatch
isisAttemptToExceedMaxSequence
isisAuthenticationFailure
isisAuthenticationTypeFailure
isisCorruptedLSPDetected
isisDatabaseOverload
isisIDLenMismatch
isisLSPTooLargeToPropagate
isisManualAddressDrops
isisMaxAreaAddressesMismatch
isisOriginatingLSPBufferSizeMismatch
isisOwnLSPPurge
isisProtocolsSupportedMismatch
isisRejectedAdjacency
isisSequenceNumberSkip
isisVersionSkew
jnxAccessAuthServerDisabled
jnxAccessAuthServerEnabled
jnxAccessAuthServiceDown
jnxAccessAuthServiceUp
jnxBfdSessDetectionTimeHigh
jnxBfdSessTxIntervalHigh
jnxBgpM2BackwardTransition
jnxBgpM2Established
jnxCmCfgChange
jnxCmRescueChange
jnxCollFlowOverload
jnxCollFlowOverloadCleared
jnxCollFtpSwitchover
jnxCollMemoryAvailable
jnxCollMemoryUnavailable
jnxCollUnavailableDest
jnxCollUnavailableDestCleared
jnxCollUnsuccessfulTransfer
jnxDfcHardMemThresholdExceeded
```

```
jnxDfcHardMemUnderThreshold
jnxDfcHardPpsThresholdExceeded
jnxDfcHardPpsUnderThreshold
jnxDfcSoftMemThresholdExceeded
jnxDfcSoftMemUnderThreshold
jnxDfcSoftPpsThresholdExceeded
jnxDfcSoftPpsUnderThreshold
jnxEventTrap
jnxExampleStartup
jnxFEBSwitchover
jnxFanFailure
jnxFanOK
jnxFruCheck
jnxFruFailed
jnxFruInsertion
jnxFruOK
jnxFruOffline
jnxFruOnline
jnxFruPowerOff
jnxFruPowerOn
jnxFruRemoval
jnxHardDiskFailed
jnxHardDiskMissing
jnxJsAvPatternUpdateTrap
jnxJsChassisClusterSwitchover
jnxJsFwAuthCapacityExceeded
jnxJsFwAuthFailure
jnxJsFwAuthServiceDown
jnxJsFwAuthServiceUp
jnxJsNatAddrPoolThresholdStatus
jnxJsScreenAttack
jnxJsScreenCfgChange
jnxLdpLspDown
jnxLdpLspUp
jnxLdpSesDown
jnxLdpSesUp
jnxMIMstCistPortLoopProtectStateChangeTrap
jnxMIMstCistPortRootProtectStateChangeTrap
jnxMIMstErrTrap
jnxMIMstGenTrap
jnxMIMstInvalidBpduRxdTrap
jnxMIMstMstiPortLoopProtectStateChangeTrap
jnxMIMstMstiPortRootProtectStateChangeTrap
jnxMIMstNewRootTrap
jnxMIMstProtocolMigrationTrap
jnxMIMstRegionConfigChangeTrap
jnxMIMstTopologyChgTrap
jnxMacChangedNotification
jnxMplsLdpInitSesThresholdExceeded
jnxMplsLdpPathVectorLimitMismatch
jnxMplsLdpSessionDown
jnxMplsLdpSessionUp
jnxOspfv3IfConfigError
jnxOspfv3IfRxBadPacket
jnxOspfv3IfStateChange
jnxOspfv3LsdbApproachingOverflow
jnxOspfv3LsdbOverflow
jnxOspfv3NbrRestartHelperStatusChange
jnxOspfv3NbrStateChange
jnxOspfv3NssaTranslatorStatusChange
jnxOspfv3RestartStatusChange
```

```
jnxOspfv3VirtIfConfigError
jnxOspfv3VirtIfRxBadPacket
jnxOspfv3VirtIfStateChange
jnxOspfv3VirtNbrRestartHelperStatusChange
jnxOspfv3VirtNbrStateChange
jnxOtnAlarmCleared
jnxOtnAlarmSet
jnxOverTemperature
jnxPMonOverloadCleared
jnxPMonOverloadSet
jnxPingEgressJitterThresholdExceeded
jnxPingEgressStdDevThresholdExceeded
jnxPingEgressThresholdExceeded
jnxPingIngressJitterThresholdExceeded
jnxPingIngressStddevThresholdExceeded
jnxPingIngressThresholdExceeded
jnxPingRttJitterThresholdExceeded
jnxPingRttStdDevThresholdExceeded
jnxPingRttThresholdExceeded
jnxPortBpduErrorStatusChangeTrap
jnxPortLoopProtectStateChangeTrap
jnxPortRootProtectStateChangeTrap
jnxPowerSupplyFailure
jnxPowerSupplyOK
jnxRedundancySwitchover
jnxRmonAlarmGetFailure
jnxRmonGetOk
jnxSecAccessIfMacLimitExceeded
jnxSecAccessdsRateLimitCrossed
jnxSonetAlarmCleared
jnxSonetAlarmSet
jnxSpSvcSetCpuExceeded
jnxSpSvcSetCpuOk
jnxSpSvcSetZoneEntered
jnxSpSvcSetZoneExited
jnxStormEventNotification
jnxSyslogTrap
jnxTemperatureOK
jnxVccpPortDown
jnxVccpPortUp
jnxVpnIfDown
jnxVpnIfUp
jnxVpnPwDown
jnxVpnPwUp
jnxl2aldGlobalMacLimit
jnxl2aldInterfaceMacLimit
jnxl2aldRoutingInstMacLimit
linkDown
linkUp
lldpRemTablesChange
mfrMibTrapBundleLinkMismatch
mplsLspChange
mplsLspDown
mplsLspInfoChange
mplsLspInfoDown
mplsLspInfoPathDown
mplsLspInfoPathUp
mplsLspInfoUp
mplsLspPathDown
mplsLspPathUp
mplsLspUp
```

```
  mplsNumVrfRouteMaxThreshExceeded
  mplsNumVrfRouteMidThreshExceeded
  mplsNumVrfSecIllglLblThrshExcd
  mplsTunnelDown
  mplsTunnelReoptimized
  mplsTunnelRerouted
  mplsTunnelUp
  mplsVrfIfDown
  mplsVrfIfUp
  mplsXCDown
  mplsXCUp
  msdpBackwardTransition
  msdpEstablished
  newRoot
  ospfIfAuthFailure
  ospfIfConfigError
  ospfIfRxBadPacket
  ospfIfStateChange
  ospfLsdbApproachingOverflow
  ospfLsdbOverflow
  ospfMaxAgeLsa
  ospfNbrStateChange
  ospfOriginateLsa
  ospfTxRetransmit
  ospfVirtIfAuthFailure
  ospfVirtIfConfigError
  ospfVirtIfRxBadPacket
  ospfVirtIfStateChange
  ospfVirtIfTxRetransmit
  ospfVirtNbrStateChange
  pethMainPowerUsageOffNotification
  pethMainPowerUsageOnNotification
  pethPsePortOnOffNotification
  pingProbeFailed
  pingTestCompleted
  pingTestFailed
  ptopoConfigChange
  risingAlarm
  rpMauJabberTrap
  sdlcLSStatusChange
  sdlcPortStatusChange
  topologyChange
  traceRoutePathChange
  traceRouteTestCompleted
  traceRouteTestFailed
  vrrpTrapAuthFailure
  vrrpTrapNewMaster
  warmStart
```

request snmp spoof-trap (Question Mark ?)

```
user@host> request snmp spoof-trap ?
Possible completions:
  <trap>               The name of the trap to spoof
  adslAtucInitFailureTrap
  adslAtucPerfESsThreshTrap
  adslAtucPerfLofsThreshTrap
  adslAtucPerfLolsThreshTrap
  adslAtucPerfLossThreshTrap
  adslAtucPerfLprsThreshTrap
  adslAtucRateChangeTrap
  adslAturPerfESsThreshTrap
  adslAturPerfLofsThreshTrap
```

```
  adslAturPerfLossThreshTrap
  adslAturPerfLprsThreshTrap
  adslAturRateChangeTrap
  apsEventChannelMismatch
  apsEventFEPLF
  apsEventModeMismatch
  apsEventPSBF
  apsEventSwitchover
  authenticationFailure
  bfdSessDown
  bfdSessUp
  bgpBackwardTransition
  bgpEstablished
  coldStart
  dlswTrapCircuitDown
  dlswTrapCircuitUp
---(more 10%)---
```

show snmp health-monitor

Syntax show snmp health-monitor
<alarms <detail>> | <logs>

Release Information Command introduced in Junos OS Release 8.0.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description Display information about Simple Network Management Protocol (SNMP) health monitor alarms and logs.

Options none—Display information about all health monitor alarms and logs.

alarms <detail>—(Optional) Display detailed information about health monitor alarms.

logs—(Optional) Display information about health monitor logs.

Required Privilege Level view

List of Sample Output **show snmp health-monitor on page 145**
show snmp health-monitor alarms detail on page 147

Output Fields Table 8 on page 143 describes the output fields for the **show snmp health-monitor** command. Output fields are listed in the approximate order in which they appear.

Table 8: show snmp health-monitor Output Fields

Field Name	Field Description	Level of Output
Alarm Index	Alarm identifier.	All levels
Variable description	Description of the health monitor object instance being monitored.	All levels
Variable name	Name of the health monitor object instance being monitored.	All levels
Value	Current value of the monitored variable in the most recent sample interval.	All levels

Table 8: show snmp health-monitor Output Fields *(continued)*

Field Name	Field Description	Level of Output

State	State of the alarm or event entry:
	• Alarms:
	  • **active**—Entry is fully configured and activated.
	  • **falling threshold crossed**—Value of the variable has crossed the lower threshold limit.
	  • **rising threshold crossed**—Value of the variable has crossed the upper threshold limit.
	  • **under creation**—Entry is being configured and is not yet activated.
	  • **startup**—Alarm is waiting for the first sample of the monitored variable.
	  • **object not available**—Monitored variable of that type is not available to the health monitor agent.
	  • **instance not available**—Monitored variable's instance is not available to the health monitor agent.
	  • **object type invalid**—Monitored variable is not a numeric value.
	  • **object processing errored**—An error occurred when the monitored variable was processed.
	  • **unknown**—State is not one of the above.
		All levels

Variable OID	Object ID to which the variable name is resolved. The format is **x.x.x.x**.	**detail**
Sample type	Method of sampling the monitored variable and calculating the value to compare against the upper and lower thresholds. It can have the value of **absolute value** or **delta value**.	**detail**

Startup alarm	Alarm that might be sent when this entry is first activated, depending on the following criteria:
	• Alarm is sent when one of the following situations exists:
	  • Value of the alarm is above or equal to the rising threshold and the startup type is either **rising alarm** or **rising or falling alarm.**
	  • Value of the alarm is below or equal to the falling threshold and the startup type is either **falling alarm** or **rising or falling alarm**.
	• Alarm is *not* sent when one of the following situations exists:
	  • Value of the alarm is above or equal to the rising threshold and the startup type is **falling alarm**.
	  • Value of the alarm is below or equal to the falling threshold and the startup type is **rising alarm**.
	  • Value of the alarm is between the thresholds.
		detail

Owner	Name of the entry configured by the user. If the entry was created through the CLI, the owner has **monitor** prepended to it.	**detail**
Creator	Mechanism by which the entry was configured (**Health Monitor**).	**detail**
Sample interval	Time period between samples (in seconds).	**detail**
Rising threshold	Upper limit threshold value as a percentage of the maximum possible value.	**detail**

Table 8: show snmp health-monitor Output Fields *(continued)*

Field Name	Field Description	Level of Output
Falling threshold	Lower limit threshold value as a percentage of the maximum possible value.	**detail**
Rising event index	Event triggered when the rising threshold is crossed.	**detail**
Falling event index	Event triggered when the falling threshold is crossed.	**detail**

show snmp health-monitor

```
user@host> show snmp health-monitor

Alarm
Index  Variable description                          Value State

 32768 Health Monitor: root file system utilization
       jnxHrStoragePercentUsed.1                       58 active

 32769 Health Monitor: /config file system utilization
       jnxHrStoragePercentUsed.2                        0 active

 32770 Health Monitor: RE 0 CPU utilization
       jnxOperatingCPU.9.1.0.0                          0 active

 32773 Health Monitor: RE 0 Memory utilization
       jnxOperatingBuffer.9.1.0.0                      35 active

 32775 Health Monitor: jkernel daemon CPU utilization
       Init daemon                                      0 active
       Chassis daemon                                  50 active
       Firewall daemon                                  0 active
       Interface daemon                                 5 active
       SNMP daemon                                     11 active
       MIB2 daemon                                     42 active
       Sonet APS daemon                                 0 active
       VRRP daemon                                      0 active
       Alarm daemon                                     3 active
       PFE daemon                                       0 active
       CRAFT daemon                                     0 active
       Traffic sampling control daemon                  0 active
       Ilmi daemon                                      0 active
       Remote operations daemon                         0 active
       CoS daemon                                       0 active
       Pic Services Logging daemon                      0 active
       Internal Routing Service Daemon                  3 active
       Network Access Service daemon                    0 active
       Forwarding UDP daemon                            0 active
       Routing socket proxy daemon                      0 active
       Disk Monitoring daemon                           1 active
       Inet daemon                                      0 active
       Syslog daemon                                    0 active
       Adaptive Services PIC daemon                     0 active
       ECC parity errors logging Daemon                 0 active
       Layer 2 Tunneling Protocol daemon                0 active
       PPPoE daemon                                     3 active
       Redundancy device daemon                         0 active
       PPP daemon                                       0 active
       Dynamic Flow Capture Daemon                      0 active
```

```
32776 Health Monitor: jroute daemon CPU utilization
      Routing protocol daemon                            1 active
      Management daemon                                  0 active
      Management daemon                                  0 active
      Command line interface                             4 active
      Periodic Packet Management daemon                  0 active
      Link Management daemon                             0 active
      Pragmatic General Multicast daemon                 0 active
      Bidirectional Forwarding Detection daemon          0 active
      SRC daemon                                         0 active
      audit daemon                                       0 active
      Event daemon                                       0 active

32777 Health Monitor: jcrypto daemon CPU utilization
      IPSec Key Management daemon                        0 active

32779 Health Monitor: jkernel daemon Memory utilization
      Init daemon                                    47384 active
      Chassis daemon                                 20204 active
      Firewall daemon                                 1956 active
      Interface daemon                                3340 active
      SNMP daemon                                     4540 active
      MIB2 daemon                                     3880 active
      Sonet APS daemon                                2632 active
      VRRP daemon                                     2672 active
      Alarm daemon                                    1856 active
      PFE daemon                                      2600 active
      CRAFT daemon                                    2000 active
      Traffic sampling control daemon                 3164 active
      Ilmi daemon                                     2132 active
      Remote operations daemon                        2964 active
      CoS daemon                                      3044 active
      Pic Services Logging daemon                     1944 active
      Internal Routing Service Daemon                 1392 active
      Network Access Service daemon                   1992 active
      Forwarding UDP daemon                           1876 active
      Routing socket proxy daemon                     1296 active
      Disk Monitoring daemon                          1180 active
      Inet daemon                                     1296 active
      Syslog daemon                                   1180 active
      Adaptive Services PIC daemon                    3220 active
      ECC parity errors logging Daemon                1100 active
      Layer 2 Tunneling Protocol daemon               3372 active
      PPPoE daemon                                    1424 active
      Redundancy device daemon                        1820 active
      PPP daemon                                      2060 active
      Dynamic Flow Capture Daemon                    10740 active
32780 Health Monitor: jroute daemon Memory utilization
      Routing protocol daemon                         8104 active
      Management daemon                              13360 active
      Management daemon                              19252 active
      Command line interface                          9912 active
      Periodic Packet Management daemon               1484 active
      Link Management daemon                          2016 active
      Pragmatic General Multicast daemon              1968 active
      Bidirectional Forwarding Detection daemon       1956 active
      SRC daemon                                      1772 active
      audit daemon                                    1772 active
      Event daemon                                    1808 active
```

```
 32781 Health Monitor: jcrypto daemon Memory utilization
       IPSec Key Management daemon                    5600 active
```

show snmp health-monitor alarms detail

```
user@host> show snmp health-monitor alarms detail

Alarm Index 32768:
  Variable name                      jnxHrStoragePercentUsed.1
  Variable OID                       1.3.6.1.4.1.2636.3.31.1.1.1.1.1
  Sample type                        absolute value
  Startup alarm                      rising alarm
  Owner                              Health Monitor: root file system
                                     utilization
  Creator                            Health Monitor
  State                              active
  Sample interval                300 seconds
  Rising threshold                80
  Falling threshold               70
  Rising event index           32768
  Falling event index          32768
    Instance Value: 58
    Instance State: active

Alarm Index 32769:
  Variable name                      jnxHrStoragePercentUsed.2
  Variable OID                       1.3.6.1.4.1.2636.3.31.1.1.1.1.2
  Sample type                        absolute value
  Startup alarm                      rising alarm
  Owner                              Health Monitor: /config file system
                                     utilization
  Creator                            Health Monitor
  State                              active
  Sample interval                300 seconds
  Rising threshold                80
  Falling threshold               70
  Rising event index           32768
  Falling event index          32768
    Instance Value: 0
    Instance State: active

Alarm Index 32770:
  Variable name                      jnxOperatingCPU.9.1.0.0
  Variable OID                       1.3.6.1.4.1.2636.3.1.13.1.8.9.1.0.0
  Sample type                        absolute value
  Startup alarm                      rising alarm
  Owner                             Health Monitor: RE 0 CPU utilization


  Creator                            Health Monitor
  State                              active
  Sample interval                300 seconds
  Rising threshold                80
  Falling threshold               70
  Rising event index           32768
  Falling event index          32768
    Instance Value: 0
    Instance State: active

Alarm Index 32773:
  Variable name                      jnxOperatingBuffer.9.1.0.0
  Variable OID                       1.3.6.1.4.1.2636.3.1.13.1.11.9.1.0.0
  Sample type                        absolute value
```

```
  Startup alarm                       rising alarm
  Owner                               Health Monitor: RE 0 Memory utilization


  Creator                             Health Monitor
  State                               active
  Sample interval                 300 seconds
  Rising threshold                 80
  Falling threshold                70
  Rising event index            32768
  Falling event index           32768
    Instance Value: 35
    Instance State: active

Alarm Index 32775:
  Variable name                       sysApplElmtRunCPU.3
  Variable OID                        1.3.6.1.2.1.54.1.2.3.1.9.3
  Sample type                         delta value
  Startup alarm                       rising alarm
  Owner                               Health Monitor: jkernel daemon CPU
                                      utilization
  Creator                             Health Monitor
  State                               active
  Sample interval                 300 seconds
  Rising threshold              24000
  Falling threshold             21000
  Rising event index            32768
  Falling event index           32768
    Instance Name: sysApplElmtRunCPU.3.1.1
    Instance Description: Init daemon
    Instance Value: 0
    Instance State: active

    Instance Name: sysApplElmtRunCPU.3.2.2786
    Instance Description: Chassis daemon
    Instance Value: 50
    Instance State: active

    Instance Name: sysApplElmtRunCPU.3.3.2938
    Instance Description: Firewall daemon
    Instance Value: 0
    Instance State: active

    Instance Name: sysApplElmtRunCPU.3.4.2942
    Instance Description: Interface daemon
    Instance Value: 5
    Instance State: active

    Instance Name: sysApplElmtRunCPU.3.7.7332
    Instance Description: SNMP daemon
    Instance Value: 11
    Instance State: active

    Instance Name: sysApplElmtRunCPU.3.9.2914
    Instance Description: MIB2 daemon
    Instance Value: 42
    Instance State: active

    Instance Name: sysApplElmtRunCPU.3.12.2916
    Instance Description: Sonet APS daemon
    Instance Value: 0
```

```
    Instance State: active

    Instance Name: sysApplElmtRunCPU.3.13.2917
    Instance Description: VRRP daemon
    Instance Value: 0
    Instance State: active

    Instance Name: sysApplElmtRunCPU.3.14.2787
    Instance Description: Alarm daemon
    Instance Value: 3
    Instance State: active

    Instance Name: sysApplElmtRunCPU.3.15.2940
    Instance Description: PFE daemon
    Instance Value: 0
    Instance State: active

    Instance Name: sysApplElmtRunCPU.3.16.2788
    Instance Description: CRAFT daemon
    Instance Value: 0
    Instance State: active

    Instance Name: sysApplElmtRunCPU.3.17.2918
    Instance Description: Traffic sampling control daemon
---(more 23%)---
```

show snmp inform-statistics

Syntax show snmp inform-statistics

Release Information Command introduced in Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description Display information about Simple Network Management Protocol (SNMP) inform requests.

Options This command has no options.

Required Privilege Level view

List of Sample Output **show snmp inform-statistics on page 150**

Output Fields Table 9 on page 150 describes the output fields for the **show snmp inform-statistics** command. Output fields are listed in the approximate order in which they appear.

Table 9: show snmp inform-statistics Output Fields

Field Name	Field Description
Target Name	Name of the device configured to receive and respond to SNMP informs.
Address	IP address of the target device.
Sent	Number of informs sent to the target device and acknowledged by the target device.
Pending	Number of informs held in memory pending a response from the target device.
Discarded	Number of informs discarded after the specified number of retransmissions to the target device were attempted.
Timeouts	Number of informs that did not receive an acknowledgement from the target device within the timeout specified.
Probe Failures	Connection failures that occurred (for example, when the target server returned invalid content or you incorrectly configured the target address).

show snmp inform-statistics

```
user@host> show snmp inform-statistics
Inform Request Statistics:
 Target Name: TA1_v3_md5_none Address: 172.17.20.184
  Sent: 176, Pending: 0
  Discarded: 0, Timeouts: 0, Probe Failures: 0
 Target Name: TA2_v3_sha_none Address: 192.168.110.59
  Sent: 0, Pending: 4
  Discarded: 84, Timeouts: 0, Probe Failures: 258
 Target Name: TA5_v2_none Address: 172.17.20.184
  Sent: 0, Pending: 0
  Discarded: 2, Timeouts: 10, Probe Failures: 0
```

show snmp rmon

Syntax show snmp rmon
<alarms <brief | detail> | events <brief | detail> | logs>

Release Information Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description Display information about Simple Network Management Protocol (SNMP) Remote Monitoring (RMON) alarms and events.

Options none—Display information about all RMON alarms and events.

alarms—(Optional) Display information about RMON alarms.

brief | detail—(Optional) Display brief or detailed information about RMON alarms or events.

events—(Optional) Display information about RMON events.

logs—(Optional) Display information about RMON monitoring logs.

Required Privilege Level view

List of Sample Output **show snmp rmon on page 154**
show snmp rmon alarms detail on page 154
show snmp rmon events detail on page 155

Output Fields Table 10 on page 152 describes the output fields for the **show snmp rmon** command. Output fields are listed in the approximate order in which they appear.

Table 10: show snmp rmon Output Fields

Field Name	Field Description	Level of Output
Alarm Index	Alarm identifier.	All levels

Table 10: show snmp rmon Output Fields *(continued)*

Field Name	Field Description	Level of Output
State	State of the alarm or event entry: Alarms: • **active**—Entry is fully configured and activated. • **falling threshold crossed**—Value of the variable has crossed the lower threshold limit. • **rising threshold crossed**—Value of the variable has crossed the upper threshold limit. • **under creation**—Entry is being configured and is not yet activated. • **startup**—Alarm is waiting for the first sample of the monitored variable. • **object not available**—Monitored variable of that type is not available to the SNMP agent. • **instance not available**—Monitored variable's instance is not available to the SNMP agent. • **object type invalid**—Monitored variable is not a numeric value. • **object processing errored**—An error occurred when the monitored variable was processed. • **unknown**—State is not one of the above. Events: • **active**—Entry has been fully configured and activated. • **under creation**—Entry is being configured and is not yet activated. • **unknown**—State is not one of the above.	All levels
Variable name	Name of the SNMP object instance being monitored.	All levels
Event Index	Event identifier.	All levels
Type	Type of notification made when an event is triggered. It can be one of the following: • **log**—A system log message is generated and an entry is made to the log table. • **snmptrap**—An SNMP trap is sent to the configured destination. • **log and trap**—A system log message is generated, an entry is made to the log table, and an SNMP trap is sent to the configured destination. • **none**—Neither log nor trap will be sent.	**detail**
Last Event	Date and time of the last event. It has the format *yyyy-mm-dd hh:mm:ss timezone*.	**brief**
Community	Identifies the trap group used for sending the SNMP trap.	**detail**
Variable OID	Object ID to which the variable name is resolved. The format is **x.x.x.x**.	**detail**
Sample type	Method of sampling the monitored variable and calculating the value to compare against the upper and lower thresholds. It can have the value of **absolute value** or **delta value**.	**detail**

Table 10: show snmp rmon Output Fields *(continued)*

Field Name	Field Description	Level of Output

Startup alarm	Alarm that might be sent when this entry is first activated, depending on the following criteria:
	• Alarm is sent when one of the following situations exists:
	  ◦ Value of the alarm is above or equal to the rising threshold and the startup type is either **rising alarm** or **rising or falling alarm.**
	  ◦ Value of the alarm is below or equal to the falling threshold and the startup type is either **falling alarm** or **rising or falling alarm**.
	• Alarm is *not* sent when one of the following situations exists:
	  ◦ Value of the alarm is above or equal to the rising threshold and the startup type is **falling alarm**.
	  ◦ Value of the alarm is below or equal to the falling threshold and the startup type is **rising alarm**.
	  ◦ Value of the alarm is between the thresholds.
		detail

Owner	Name of the entry configured by the user. If the entry was created through the CLI, the owner has **monitor** prepended to it.	**detail**
Creator	Mechanism by which the entry was configured (**CLI** or **SNMP**).	**detail**
Sample interval	Time period between samples (in seconds).	**detail**
Rising threshold	Upper limit threshold value configured by the user.	**detail**
Falling threshold	Lower limit threshold value configured by the user.	**detail**
Rising event index	Event triggered when the rising threshold is crossed.	**detail**
Falling event index	Event triggered when the falling threshold is crossed.	**detail**
Current value	Current value of the monitored variable in the most recent sample interval.	**detail**

show snmp rmon

```
user@host> show snmp rmon
Alarm
Index  State                       Variable name
    1  falling threshold crossed   ifInOctets.1

Event
Index  Type                        Last Event
    1  log and trap                2002-01-30 01:13:01 PST
```

show snmp rmon alarms detail

```
user@host> show snmp rmon alarms detail

Alarm Index 1:
  Variable name                     ifInOctets.1
  Variable OID                      1.3.6.1.2.1.2.2.1.10.1
  Sample type                       delta value
  Startup alarm                     rising or falling alarm
```

```
  Owner                              monitor
  Creator                            CLI
  State                              falling threshold crossed
  Sample interval                 60 seconds
  Rising threshold            100000
  Falling threshold            80000
  Rising event index               1
  Falling event index              1
  Current value                    0
```

show snmp rmon events detail

```
user@host> show snmp rmon events detail
Event Index 1:
  Type                               log and trap
  Community                          boy-elroy
  Last event                         2002-01-30 01:13:01 PST
  Creator                            CLI
  State                              active
```

show snmp rmon history

Syntax **show snmp rmon history**
<history-index>
<sample-index>

Release Information Command introduced in Junos OS Release 9.0 for EX Series switches.

Description Display the contents of the RMON history group.

Options none—Display all the entries in the RMON history group.

history-index—(Optional) Display the contents of the specified entry in the RMON history group.

sample-index—(Optional) Display the statistics collected for the specified sample within the specified entry in the RMON history group.

Required Privilege Level view

Related Documentation
- **clear snmp rmon history on page 134**

List of Sample Output
show snmp rmon history 1 on page 157
show snmp rmon history 1 sample 15 on page 158

Output Fields Table 11 on page 156 lists the output fields for the **show smp rmon history** command. Output fields are listed in the approximate order in which they appear.

Table 11: show smp rmon history Output Fields

Field Name	Field Description
History Index	Identifies this RMON history entry within the RMON history group.
Owner	The entity that configured this entry. Range is 0 to 32 alphanumeric characters.
Status	The status of the RMON history entry.
Interface or **Data Source**	The ifndex object that identifies the interface that is being monitored.
Interval	The interval (in seconds) configured for this RMON history entry.
Buckets Requested	The requested number of buckets (**intervals**) configured for this RMON history entry.
Buckets Granted	The number of buckets granted for this RMON history entry.

Table 11: show smp rmon history Output Fields *(continued)*

Field Name	Field Description
Sample Index	The sample statistics taken at the specified interval. • **Drop Events**—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. • **Octets**—Total number of octets and packets. For Gigabit Ethernet IQ PICs, the received octets count varies by interface type. • **Packets**—Total number of packets. • **Broadcast Packets**—Number of broadcast packets. • **Multicast Packets**—Number of multicast packets. • **CRC 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). • **Undersize Pkts**—Number of packets received during this sampling interval that were less than 64 octets long (excluding framing bits but including FCS octets) and were otherwise well formed. • **Oversize Pkts**—Number of packets received during the sampling interval that were longer than 1518 octets (excluding framing bits, but including FCS octets) but were otherwise well formed. • **Fragments**—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. • **Jabbers**—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. • **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. • **Utilization(%)**—The best estimate of the mean physical layer network utilization on this interface during this sampling interval, in hundredths of a percent.

show snmp rmon history 1

```
user@host> show snmp rmon history 1
 History Index 1:
 Interface                              171
 Requested Buckets                      50
 Interval                               10

Sample Index 1: Interval Start: Tue Feb 12 04:12:32 2008
    Drop Events         0
    Octets            486
    Packets             2
    Broadcast Packet    0
    Multicast Packets   2
    CRC errors          0
    Undersize Pkts      0
```

```
    Oversize Pkts       0
    Fragments           0
    Jabbers             0
    Collisions          0
    Utilization(%)      0

Sample Index 2: Interval Start: Tue Feb 12 04:12:42 2008
    Drop Events         0
    Octets            486
    Packets             2
    Broadcast Packet    0
    Multicast Packets   2
    CRC errors          0
    Undersize Pkts      0
    Oversize Pkts       0
    Fragments           0
    Jabbers             0
    Collisions          0
    Utilization(%)      0

Sample Index 3: Interval Start: Tue Feb 12 04:12:52 2008
    Drop Events         0
    Octets            486
    Packets             2
    Broadcast Packet    0
    Multicast Packets   2
    CRC errors          0
    Undersize Pkts      0
    Oversize Pkts       0
    Fragments           0
    Jabbers             0
    Collisions          0
    Utilization(%)      0
```

show snmp rmon history 1 sample 15

```
user@host> show snmp rmon history 1 sample 15
 Index 1
Owner    = monitor
Status    = valid
Data Source  = ifIndex.17
Interval   = 1800
Buckets Requested = 50
Buckets Granted = 50


Sample Index 44: Interval Start: Thu Jan  1 00:08:35 1970
Drop Events   = 0
Octetes   = 0
Packets   = 0
Broadcast Pkts  = 0
Multicast Pkts  = 0
CRC Errors  = 0
Undersize Pkts  = 0
Oversize Pkts  = 0
Fragments  = 0
Jabbers   = 0
Collisions  = 0
Utilization (%)  = 0
```

show snmp statistics

Syntax show snmp statistics

Release Information Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description Display statistics about Simple Network Management Protocol (SNMP) packets sent and received by the router or switch.

Options This command has no options.

Required Privilege Level view

Related Documentation
- **clear snmp statistics on page 135**

List of Sample Output **show snmp statistics on page 162**

Output Fields Table 12 on page 159 describes the output fields for the **show snmp statistics** command. Output fields are listed in the approximate order in which they appear.

Table 12: show snmp statistics Output Fields

Field Name	Field Description
Input	Information about received packets: • **Packets(snmpInPkts)**—Total number of messages delivered to the SNMP entity from the transport service. • **Bad versions—(snmpInBadVersions**) Total number of messages delivered to the SNMP entity that were for an unsupported SNMP version. • **Bad community names—(snmpInBadCommunityNames)** Total number of messages delivered to the SNMP entity that used an SNMP community name not known to the entity. • **Bad community uses—(snmpInBadCommunityUses)** Total number of messages delivered to the SNMP entity that represented an SNMP operation that was not allowed by the SNMP community named in the message. • **ASN parse errors—(snmpInASNParseErrs)** Total number of ASN.1 or BER errors encountered by the SNMP entity when decoding received SNMP messages. • **Too bigs—(snmpInTooBigs)** Total number of SNMP PDUs delivered to the SNMP entity with an error status field of **tooBig**. • **No such names—(snmpInNoSuchNames)**.Total number of SNMP PDUs delivered to the SNMP entity with an error status field of **noSuchName**. • **Bad values—(snmpInBadValues)** Total number of SNMP PDUs delivered to the SNMP entity with an error status field of **badValue**. • **Read onlys—(snmpInReadOnlys)** Total number of valid SNMP PDUs delivered to the SNMP entity with an error status field of **readOnly**. Only incorrect implementations of SNMP generate this error.

Table 12: show snmp statistics Output Fields *(continued)*

Field Name	Field Description
Input (continued)	• **General errors—(snmpInGenErrs)** Total number of SNMP PDUs delivered to the SNMP entity with an error status field of**genErr**. • **Total requests varbinds—(snmpInTotalReqVars)** Total number of MIB objects retrieved successfully by the SNMP entity as a result of receiving valid SNMP **GetRequest** and **GetNext** PDUs. • **Total set varbinds—(snmpInSetVars)** Total number of MIB objects modified successfully by the SNMP entity as a result of receiving valid SNMP **SetRequest** PDUs. • **Get requests—(snmpInGetRequests)** Total number of SNMP**GetRequest** PDUs that have been accepted and processed by the SNMP entity. • **Get nexts—(snmpInGetNexts)** Total number of SNMP **GetNext** PDUs that have been accepted and processed by the SNMP entity. • **Set requests—(snmpInSetRequests)** Total number of SNMP **SetRequest** PDUs that have been accepted and processed by the SNMP entity. • **Get responses—(snmpInGetResponses)** Total number of SNMP **GetResponse** PDUs that have been accepted and processed by the SNMP entity. • **Traps—(snmpInTraps)** Total number of SNMP traps generated by the SNMP entity. • **Silent drops—(snmpSilentDrops)** Total number of **GetRequest**, **GetNextRequest**, **GetBulkRequest**, **SetRequests**, and **InformRequest** PDUs delivered to the SNMP entity that were silently dropped because the size of a reply containing an alternate response PDU with an empty variable-bindings field was greater than either a local constraint or the maximum message size associated with the originator of the requests. • **Proxy drops.—(snmpProxyDrops)** Total number of **GetRequest**, **GetNextRequest**, **GetBulkRequest**, **SetRequests**, and **InformRequest** PDUs delivered to the SNMP entity that were silently dropped because the transmission of the message to a proxy target failed in such a way (other than a timeout) that no response PDU could be returned. • **Commit pending drops**—Number of SNMP packets for**Set** requests dropped because of a previous pending SNMP **Set** request on the committed configuration. • **Throttle drops**—Number of SNMP packets for any requests dropped reaching the throttle limit.

Table 12: show snmp statistics Output Fields *(continued)*

Field Name	Field Description
V3 Input	Information about SNMP version 3 packets: • **Unknown security models—(snmpUnknownSecurityModels)** Total number of packets received by the SNMP engine that were dropped because they referenced a security model that was not known to or supported by the SNMP engine. • **Invalid messages—(snmpInvalidMsgs)** Number of packets received by the SNMP engine that were dropped because there were invalid or inconsistent components in the SNMP message. • **Unknown pdu handlers—(snmpUnknownPDUHandlers)** Number of packets received by the SNMP engine that were dropped because the PDU contained in the packet could not be passed to an application responsible for handling the PDU type. • **Unavailable contexts—(snmpUnavailableContexts)** Number of requests received for a context that is known to the SNMP engine, but is currently unavailable. • **Unknown contexts—(snmpUnknownContexts)** Total number of requests received for a context that is unknown to the SNMP engine. • **Unsupported security levels—(usmStatsUnsupportedSecLevels)** Total number of packets received by the SNMP engine which were dropped because they requested a security level unknown to the SNMP engine (or otherwise unavailable). • **Not in time windows—(usmStatsNotInTimeWindows)** Total number of packets received by the SNMP engine that were dropped because they appeared outside of the authoritative SNMP engine's window. • **Unknown user names—(usmStatsUnknownUserNames)** Total number of packets received by the SNMP engine that were dropped because they referenced a user that was not known to the SNMP engine. • **Unknown engine ids—(usmStatsUnknownEngineIDs)** Total number of packets received by the SNMP engine that were dropped because they referenced an SNMP engine ID that was not known to the SNMP engine. • **Wrong digests—(usmStatsWrongDigests)** Total number of packets received by the SNMP engine that were dropped because they didn't contain the expected digest value. • **Decryption errors—(usmStatsDecryptionErrors)** Total number of packets received by the SNMP engine that were dropped because they could not be decrypted.

Table 12: show snmp statistics Output Fields *(continued)*

Field Name	Field Description
Output	Information about transmitted packets: • **Packets—(snmpOutPkts)** Total number of messages passed from the SNMP entity to the transport service. • **Too bigs—(snmpOutTooBigs)** Total number of SNMP PDUs generated by the SNMP entity with an error status field of **tooBig**. • **No such names—(snmpOutNoSuchNames)** Total number of SNMP PDUs delivered to the SNMP entity with an error status field of **noSuchName**. • **Bad values—(snmpOutBadValues)** Total number of SNMP PDUs generated by the SNMP entity with an error status field of **badValue**. • **General errors—(snmpOutGenErrs)** Total number of SNMP PDUs generated the SNMP entity with an error status field of **genErr**. • **Get requests—(snmpOutGetRequests)** Total number of SNMP **GetRequest** PDUs generated by the SNMP entity. • **Get nexts—(snmpOutGetNexts)** Total number of SNMP **GetNext** PDUs generated by the SNMP entity. • **Set requests—(snmpOutSetRequests)** Total number of SNMP **SetRequest** PDUs generated by the SNMP entity. • **Get responses—(snmpOutGetResponses)** Total number of SNMP **GetResponse** PDUs generated by the SNMP entity. • **Traps—(snmpOutTraps)** Total number of SNMP traps generated by the SNMP entity.

show snmp statistics

```
user@host> show snmp statistics
SNMP statistics:
  Input:
    Packets: 246213, Bad versions: 12, Bad community names: 12,
    Bad community uses: 0, ASN parse errors: 96,
    Too bigs: 0, No such names: 0, Bad values: 0,
    Read onlys: 0, General errors: 0,
    Total request varbinds: 227084, Total set varbinds: 67,
    Get requests: 44942, Get nexts: 190371, Set requests: 10712,
    Get responses: 0, Traps: 0,
    Silent drops: 0, Proxy drops: 0, Commit pending drops: 0,
    Throttle drops: 0,
  V3 Input:
    Unknown security models: 0, Invalid messages: 0
    Unknown pdu handlers: 0, Unavailable contexts: 0
    Unknown contexts: 0, Unsupported security levels: 1
    Not in time windows: 0, Unknown user names: 0
    Unknown engine ids: 44, Wrong digests: 23, Decryption errors: 0
  Output:
    Packets: 246093, Too bigs: 0, No such names: 31561,
    Bad values: 0, General errors: 2,
    Get requests: 0, Get nexts: 0, Set requests: 0,
    Get responses: 246025, Traps: 0
```

show snmp v3

Syntax
show snmp v3
<access <brief | detail> | community | general | groups | notify <filter> | target <address | parameters> | users>

Release Information
Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description
Display the Simple Network Management Protocol version 3 (SNMPv3) operating configuration.

Options
none—Display all of the SNMPv3 operating configuration.

access—(Optional) Display SNMPv3 access information.

brief | detail—(Optional) Display brief or detailed information about SNMPv3 access information.

community—(Optional) Display SNMPv3 community information.

general—(Optional) Display SNMPv3 general information.

groups—(Optional) Display SNMPv3 security-to-group information.

notify <filter>—(Optional) Display SNMPv3 notify and, optionally, notify filter information.

target <address | parameters>—(Optional) Display SNMPv3 target and, optionally, either target address or target parameter information.

users—(Optional) Display SNMPv3 user information.

Additional Information
To edit the default display of the **show snmp v3** command, specify options in the **show** statement at the **[edit snmp v3]** hierarchy level.

Required Privilege Level
view

List of Sample Output
show snmp v3 on page 164

Output Fields
Table 13 on page 164 describes the output fields for the **show snmp v3** command. Output fields are listed in the approximate order in which they appear.

Table 13: show snmp v3 Output Fields

Field Name	Field Description
Access control	Information about access control: • **Group**—Group name for which the configured access privileges apply. The group, together with the context prefix and the security model and security level, forms the index for this table. • **Context prefix**—SNMPv3 context for which the configured access privileges apply. • **Security model/level**—Security model and security level for which the configuration access privileges apply. • **Read view**—Identifies the MIB view applied to SNMPv3 read operations. • **Write view**—Identifies the MIB view applied to SNMPv3 write operations. • **Notify view**—Identifies the MIB view applied to outbound SNMP notifications.
Engine	Information about local engine configuration: • **Local engine ID**—Identifier that uniquely and unambiguously identifies the local SNMPv3 engine. • **Engine boots**—Number of times the local SNMPv3 engine has rebooted or reinitialized since the engine ID was last changed. • **Engine time**—Number of seconds since the local SNMPv3 engine was last rebooted or reinitialized. • **Max msg size**—Maximum message size the sender can accommodate.
Engine ID	Information about engine ID: • **Local engine ID**—Identifier that uniquely and unambiguously identifies the local SNMPv3 engine. • **Engine boots**—Number of times the local SNMPv3 engine has rebooted or reinitialized since the engine ID was last changed. • **Engine time**—Number of seconds since the local SNMPv3 engine was last rebooted or reinitialized. • **Max msg size**—Maximum message size the sender can accommodate. • **Engine ID**—SNMPv3 engine ID associated with each user. • **User**—SNMPv3 user. • **Auth/Priv**—Authentication and encryption algorithm available for use by each user. • **Storage**—Indicates whether a user is saved to the configuration file (nonvolatile) or not (volatile). Applies only to users with active status. • **Status**—Status of the conceptual row. Only rows with an active status are used by the SNMPv3 engine.
Group name	Name of the group to which this entry belongs.
Security model	Identifies the security model context for the security name.
Security name	Used with the security model; identifies a specific security name instance. Each security model/security name combination can be assigned to a specific group.
Storage type	Indicates whether a user is saved to the configuration file (nonvolatile) or not (volatile). Applies only to users with active status.
Status	Status of the conceptual row. Only rows with active status are used by the SNMPv3 engine.

show snmp v3 `user@host> show snmp v3`

```
Local engine ID: 80 00 0a 4c e04 31 32 33 34
Engine boots:          38
Engine time:        64583 seconds
Max msg size:        2048 bytes

Engine ID: local
    User                            Auth/Priv   Storage      Status
    user1                            md5/des    nonvolatile  active
    user2                            sha/none   nonvolatile  active
    user3                           none/none   nonvolatile  active

Engine ID: 81 00 0a 4c 04 64 64 64 64
    User                            Auth/Priv   Storage      Status
    UNEW                             md5/none   nonvolatile  active
Group name           Security  Security              Storage      Status
                     model     name                  type
g1                   usm       user1                 nonvolatile  active
g2                   usm       user2                 nonvolatile  active
g3                   usm       user3                 nonvolatile  active

Access control:
Group                Context Security      Read       Write     Notify
                     prefix  model/level   view       view      view
g1                           usm/privacy   v1         v1
g2                           usm/authent   v1         v1
g3                           usm/none      v1         v1
```

CHAPTER 4

Real-Time Performance Monitoring (RPM)

RPM—Overview

Understanding Real-Time Performance Monitoring on EX Series Switches

Real-time performance monitoring (RPM) enables you to configure active probes to track and monitor traffic across the network and to investigate network problems. You can use RPM with Juniper Networks EX Series Ethernet Switches.

The ways in which you can use RPM include:

- Monitor time delays between devices.
- Monitor time delays at the protocol level.
- Set thresholds to trigger SNMP traps when values are exceeded.

  You can configure thresholds for round-trip time, ingress or egress delay, standard deviation, jitter, successive lost probes, and total lost probes per test. (SNMP trap results are stored in **pingResultsTable**, **jnxPingResultsTable**, **jnxPingProbeHistoryTable**, and **pingProbeHistoryTable**.)
- Determine automatically whether a path exists between a host router or switch and its configured BGP neighbors. You can view the results of the discovery using an SNMP client.
- Use the history of the most recent 50 probes to analyze trends in your network and predict future needs.

RPM provides MIB support with extensions for RFC 2925, *Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations*.

This topic includes:

RPM Packet Collection

Probes collect packets per destination and per application, including ping Internet Control Message Protocol (ICMP) packets, User Datagram Protocol and Transmission Control Protocol (UDP/TCP) packets with user-configured ports, user-configured Differentiated Services code point (DSCP) type-of-service (ToS) packets, and Hypertext Transfer Protocol (HTTP) packets.

Tests and Probe Types

A test can contain multiple probes. The probe type specifies the packet and protocol contents of the probe.

EX Series switches support the following tests and probe types:

- Ping tests:
  - ICMP echo probe

  - ICMP timestamp probe
- HTTP tests:
  - HTTP get probe (not available for BGP RPM services)
  - HTTP get metadata probe
- UDP and TCP tests with user-configured ports:
  - UDP echo probe
  - TCP connection probe
  - UDP timestamp probe

Hardware Timestamps

To account for latency or jitter in the communication of probe messages, you can enable timestamping of the probe packets (hardware timestamps). If hardware timestamps are not configured, then timers are generated at the software level and are less accurate than they would have been with hardware timestamps.

NOTE: EX Series switches support hardware timestamps for UDP and ICMP probes. EX Series switches do not support hardware timestamps for HTTP or TCP probes.

You can timestamp the following RPM probes to improve the measurement of latency or jitter:

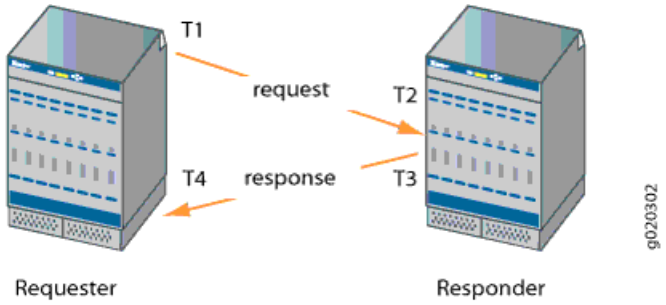
- ICMP ping
- ICMP ping timestamp
- UDP ping
- UDP ping timestamp

You should configure the requester (the RPM client) with hardware timestamps (see Figure 4 on page 170) to get more meaningful results than you would get without the timestamps.The responder (the RPM server) does not need to be configured to support hardware timestamps. If the responder supports hardware timestamps, it timestamps the RPM probes. If the responder does not support hardware timestamps, RPM can only report round-trip measurements that include the processing time on the responder.

NOTE: Hardware timestamps are supported on all EX Series switches.

Figure 4 on page 170 shows the timestamps:

Figure 4: RPM Timestamps



- T1 is the time the packet leaves the requester port.
- T2 is the time the responder receives the packet.
- T3 is the time the responder sends the response.
- T4 is the time the requester receives the response.

The round-trip time is (T2 – T1) + (T4 – T3). If the responder does not support hardware timestamps, then the round-trip time is (T4 – T1) / 2, and thus includes the processing time of the responder.

You can use RPM probes to find the following time measurements:

- Minimum round-trip time
- Maximum round-trip time
- Average round-trip time
- Standard deviation of the round-trip time
- Jitter of the round-trip time—Difference between the minimum and maximum round-trip time

NOTE: See "Configuring the Interface for RPM Timestamping for Client/Server on an EX Series Switch (CLI Procedure)" on page 178 for information on how to configure hardware timestamps on the requester.

The RPM feature provides a configuration option to set one-way hardware timestamps. Use one-way timestamps when you want information about one-way time, rather than round-trip times, for packets to traverse the network between the requester and the responder. As shown in Figure 4 on page 170, one-way timestamps represent the time T2 – T1 and the time from T4 – T3. Use one-way timestamps when you want to gather information about delay in each direction and to find egress and ingress jitter values.

NOTE: For correct one-way measurement, the clocks of the requester and responder must be synchronized. If the clocks are not synchronized, one-way jitter measurements and calculations can include significant variations, in some cases orders of magnitude greater than the round-trip times.

When you enable one-way timestamps in a probe, the following one-way measurements are reported:

- Minimum, maximum, standard deviation, and jitter measurements for egress and ingress times
- Number of probes sent
- Number of probe responses received
- Percentage of lost probes

Limitations of RPM on EX Series Switches

- Two-Way Active Measurement Protocol (TWAMP) is not supported on EX Series switches.
- EX Series switches do not support user-configured class-of-service (CoS) classifiers or prioritization of RPM packets over regular data packets received on an input interface.
- Timestamps:
  - If the responder does not support hardware timestamps, RPM can only report the round-trip measurements and cannot calculate round-trip jitter.
  - EX Series switches do not support hardware timestamps for HTTP and TCP probes.
  - Timestamps apply only to IPv4 traffic.

Related Documentation

- For further details about RPM: *See the Junos OS Services Interfaces Configuration Guide.*
- Configuring the Interface for RPM Timestamping for Client/Server on an EX Series Switch (CLI Procedure) on page 178
- Configuring Real-Time Performance Monitoring (J-Web Procedure) on page 171
- Configuring SNMP (J-Web Procedure) on page 69
- Monitoring Network Traffic Using Traceroute on page 299

Configuring Real-Time Performance Monitoring (RPM)

- Configuring Real-Time Performance Monitoring (J-Web Procedure) on page 171
- Configuring the Interface for RPM Timestamping for Client/Server on an EX Series Switch (CLI Procedure) on page 178

Configuring Real-Time Performance Monitoring (J-Web Procedure)

Real-time performance monitoring (RPM) in EX Series switches enables you to configure and send probes to a specified target and monitor the analyzed results to determine packet loss, round-trip time, and jitter. Jitter is the difference in relative transit time between two consecutive probes. You can set up probe owners and configure one or more performance probe tests under each probe owner.

The ways in which you can use RPM include:

- Monitor time delays between devices.
- Monitor time delays at the protocol level.
- Set thresholds to trigger SNMP traps when threshold values are exceeded. You can configure thresholds for round-trip time, ingress or egress delay, standard deviation, jitter, successive lost probes, and total lost probes per test.
- Determine automatically whether a path exists between a host switch and its configured Border Gateway Protocol (BGP) neighbors. You can view the results of the discovery using an SNMP client.
- Use the history of the most recent 50 probes to analyze trends in your network and predict future needs.

Probes collect packets per destination and per application, including PING Internet Control Message Protocol (ICMP) packets, User Datagram Protocol and Transmission Control Protocol (UDP/TCP) packets with user-configured ports, user-configured Differentiated Services code point (DSCP) type-of-service (ToS) packets, and Hypertext Transfer Protocol (HTTP) packets.

EX Series switches support the following tests and probe types:

- Ping tests:
  - ICMP echo
  - ICMP timestamp
- HTTP tests:
  - HTTP get (not available for BGP RPM services)
- UDP and TCP tests with user-configured ports:
  - UDP echo
  - TCP connection
  - UDP timestamp

To account for latency in the communication of probe messages, you can enable timestamping of the probe packets. You should configure both the requester and the responder to timestamp the RPM packets. The RPM features provides an additional configuration option to set one-way hardware timestamps. Use one-way timestamps when you want information about one-way, rather than round-trip, times for packets to traverse the network between the requester and the responder.

NOTE:

- EX Series switches support hardware timestamps for UDP and ICMP probes. EX Series switches do not support hardware timestamps for HTTP or TCP probes.
- If the responder does not support hardware timestamps, RPM can only report the round-trip measurements, it cannot calculate round-trip jitter.
- In EX Series switches timestamps apply only to IPv4 traffic.

To configure RPM using the J-Web interface:

1. Select **Troubleshoot** > **RPM** > **Configure RPM** .
2. In the **Configure RPM** page, enter information as specified in Table 14 on page 173.
   a. Click **Add** to set up the **Owner Name** and **Performance Probe Tests**.
   b. Select a probe owner from **Probe Owners** list and click **Delete** to remove the selected probe owner
   c. Double-click one of the probe owners in **Probe Owners** list to display the list of performance probe tests.
   d. Double-click one of the performance probe tests to edit the test parameters.
3. Enter the **Maximum Number of Concurrent Probes** and specify the **Probe Servers**.
4. Click **Apply** to apply the RPM probe settings.

Table 14: RPM Probe Owner, Concurrent Probes, and Probe Servers Configuration Fields

Field	Function	Your Action
Probe Owners	Identifies a owner for whom one or more RPM tests are configured. In most implementations, the owner name identifies a network on which a set of tests is being run.	1. Click **Add** and type an owner name. 2. In **Performance Probe Tests**, click **Add** to define the RPM test parameters. See Table 15 on page 174 for information on configuring RPM test parameters. 3. Click **OK** to save the settings or **Cancel** to exit from the window without saving the changes.
Maximum Number of Concurrent Probes	Specifies the maximum number of concurrent probes allowed.	Type a number from 1 through 500.

Table 14: RPM Probe Owner, Concurrent Probes, and Probe Servers Configuration Fields *(continued)*

Field	Function	Your Action
Probe Servers	Specifies the servers that act as receivers and transmitters for the probes.	Set up the following servers: • TCP Probe Server—Specifies the port on which the device is to receive and transmit TCP probes. Type the number 7 (a standard TCP port number) or a port number from 49160 through 65535. • UDP Probe Server—Specifies the port on which the device is to receive and transmit UDP probes. Type the number 7 (a standard TCP port number) or a port number from 49160 through 65535.

Table 15: Performance Probe Tests Configuration Fields

Field	Function	Your Action
Identification		
Test Name	Identifies the RPM test.	Type a test name.
Target (Address or URL)	Specifies the IP address or the URL of the probe target.	Type the IP address in dotted decimal notation or the URL of the probe target. If the target is a URL, type a fully formed URL that includes **http://**.
Source Address	Specifies the IP address to be used as the probe source address.	Type the source address to be used for the probe. If you do not supply this value, the packet uses the outgoing interface's address as the probe source address.
Routing Instance	Specifies the routing instance over which the probe is sent.	Type the routing instance name. The routing instance applies only to **icmp-ping** and **icmp-ping-timestamp** probe types. The default routing instance is **inet.0**.
History Size	Specifies the number of probe results to be saved in the probe history.	Type a number from 0 through 255. The default history size is 50.
Request Information		

Table 15: Performance Probe Tests Configuration Fields *(continued)*

Field	Function	Your Action
Probe Type	Specifies the type of probe to send as part of the test.	Select a probe type from the list: • **http-get** • **http-get-metadata** • **icmp-ping** • **icmp-ping-timestamp** • **tcp-ping** • **udp-ping** • **udp-ping-timestamp**
Interval	Sets the wait time (in seconds) between probe transmissions.	Type a number from 1 through 255 .
Test Interval	Sets the wait time (in seconds) between tests.	Type a number from 0 through 86400 .
Probe Count	Sets the total number of probes to be sent for each test.	Type a number from 1 through 15.
Moving Average Size	Specifies the number of samples to be used in the statistical calculation operations to be performed across a number of the most recent samples.	Type a number from 0 through 255.
Destination Port	Specifies the TCP or UDP port to which probes are sent. To use TCP or UDP probes, you must configure the remote server as a probe receiver. Both the probe server and the remote server must be Juniper Networks network devices configured to receive and transmit RPM probes on the same TCP or UDP port.	Type the number 7 (a standard TCP or UDP port number) or a port number from 49160 through 65535.
DSCP Bits	Specifies the Differentiated Services code point (DSCP) bits. This value must be a valid 6-bit pattern.	Type a valid 6-bit pattern.
Data Size	Specifies the size (in bytes) of the data portion of the ICMP probes.	Type a number from 0 through 65507.
Data Fill	Specifies the hexadecimal value of the data portion of the ICMP probes.	Type a hexadecimal value from 1h through 800h .
Hardware Timestamp		
One Way Hardware Timestamp	Enables one-way hardware timestamp.	To enable timestamping, select the check box.

Table 15: Performance Probe Tests Configuration Fields *(continued)*

Field	Function	Your Action
Destination Interface	Enables hardware timestamp on the specified interface.	Select an interface from the list.
Maximum Probe Thresholds		
Successive Lost Probes	Sets the number of probes that can be lost successively, if exceeded, triggers a probe failure and generates a system log message.	Type a number from 0 through 15.
Lost Probes	Sets the number of probes that can be lost , if exceeded, triggers a probe failure and generates a system log message.	Type a number from 0 through 15.
Round Trip Time	Sets the round-trip time (in microseconds), from the switch to the remote server, if exceeded, triggers a probe failure and generates a system log message.	Type a number from 0 through 60000000.
Jitter	Sets the jitter (in microseconds), if exceeded, triggers a probe failure and generates a system log message.	Type a number from 0 through 60000000.
Standard Deviation	Sets the maximum allowable standard deviation (in microseconds), if exceeded, triggers a probe failure and generates a system log message.	Type a number from 0 through 60000000.
Egress Time	Sets the one-way time (in microseconds), from the switch to the remote server, if exceeded, triggers a probe failure and generates a system log message.	Type a number from 0 through 60000000.
Ingress Time	Sets the one-way time (in microseconds), from the remote server to the switch, if exceeded, triggers a probe failure and generates a system log message.	Type a number from 0 through 60000000 (microseconds).
Jitter Egress Time	Sets the outbound-time jitter (in microseconds), if exceeded triggers a probe failure and generates a system log message.	Type a number from 0 through 60000000.
Jitter Ingress Time	Sets the inbound-time jitter (in microseconds), if exceeded, triggers a probe failure and generates a system log message.	Type a number from 0 and 60000000.

Table 15: Performance Probe Tests Configuration Fields *(continued)*

Field	Function	Your Action
Egress Standard Deviation	Sets the maximum allowable standard deviation of outbound times (in microseconds), if exceeded, triggers a probe failure and generates a system log message.	Type a number from 0 through 60000000.
Ingress Standard Deviation	Sets the maximum allowable standard deviation of inbound times (in microseconds), if exceeded, triggers a probe failure and generates a system log message.	Type a number from 0 through 60000000.
Traps		
Egress Jitter Exceeded	Generates SNMP traps when the threshold for jitter in outbound time is exceeded.	• To enable SNMP traps for this condition, select the check box. • To disable SNMP traps, clear the check box.
Egress Standard Deviation Exceeded	Generates SNMP traps when the threshold for standard deviation in outbound times is exceeded.	• To enable SNMP traps for this condition, select the check box. • To disable SNMP traps, clear the check box.
Egress Time Exceeded	Generates SNMP traps when the threshold for maximum outbound time is exceeded.	• To enable SNMP traps for this condition, select the check box. • To disable SNMP traps, clear the check box.
Ingress Jitter Exceeded	Generates SNMP traps when the threshold for jitter in inbound time is exceeded.	• To enable SNMP traps for this condition, select the check box. • To disable SNMP traps, clear the check box.
Ingress Standard Deviation Exceeded	Generates SNMP traps when the threshold for standard deviation in inbound times is exceeded.	• To enable SNMP traps for this condition, select the check box. • To disable SNMP traps, clear the check box.
Ingress Time Exceeded	Generates SNMP traps when the threshold for maximum inbound time is exceeded.	• To enable SNMP traps for this condition, select the check box. • To disable SNMP traps, clear the check box.
Jitter Exceeded	Generates SNMP traps when the threshold for jitter in round-trip time is exceeded.	• To enable SNMP traps for this condition, select the check box. • To disable SNMP traps, clear the check box.

Table 15: Performance Probe Tests Configuration Fields *(continued)*

Field	Function	Your Action
Probe Failure	Generates SNMP traps when the threshold for the number of successive lost probes is exceeded.	• To enable SNMP traps for this condition, select the check box. • To disable SNMP traps, clear the check box.
RTT Exceeded	Generates SNMP traps when the threshold for maximum round-trip time is exceeded.	• To enable SNMP traps for this condition, select the check box. • To disable SNMP traps, clear the check box.
Standard Deviation Exceeded	Generates SNMP traps when the threshold for standard deviation in round-trip times is exceeded.	• To enable SNMP traps for this condition, select the check box. • To disable SNMP traps, clear the check box.
Test Completion	Generates SNMP traps when a test is completed.	• To enable SNMP traps for this condition, select the check box. • To disable SNMP traps, clear the check box.
Test Failure	Generates SNMP traps when the threshold for the total number of lost probes is exceeded.	• To enable SNMP traps for this condition, select the check box. • To disable SNMP traps, clear the check box.

Related Documentation

- Configuring SNMP (J-Web Procedure) on page 69
- Viewing Real-Time Performance Monitoring Information on page 180

Configuring the Interface for RPM Timestamping for Client/Server on an EX Series Switch (CLI Procedure)

Use real-time performance monitoring (RPM) to configure active probes to track and monitor traffic across the network and to investigate network problems. To configure basic RPM probes on the EX Series switch, you must configure the probe owner, the test, and the specific parameters of the RPM probe.

You can also set a timestamp to improve the measurement of latency or jitter. The probe is timestamped by the device originating the probe (the RPM client). If you do not enable hardware timestamps, the timer values are set. You should configure both the RPM client (the requester) and the RPM server (the responder) to timestamp the RPM packets. However, if the RPM server does not support hardware timestamps, RPM can only report the round-trip measurements.

Timestamps apply only to IPv4 traffic.

You can enable hardware timestamps for the following RPM probe types:

- icmp-ping
- icmp-ping-timestamp
- udp-ping
- udp-ping-timestamp

To configure RPM probes and enable hardware timestamping:

1. Specify the probe owner:

   ```
   [edit services rpm]
   user@switch# set probe owner
   ```

2. Specify a test name. A test represents the range of probes over which the standard deviation, average, and jitter are calculated.

   ```
   [edit services rpm probe owner]
   user@switch# set test test-name
   ```

3. Specify the packet and protocol contents of the probe:

   ```
   [edit services rpm probe owner test test-name]
   user@switch# set probe-type type
   ```

4. Specify the destination IPv4 address to be used for the probes:

   ```
   [edit services rpm probe owner test test-name]
   user@switch# set target address
   ```

5. Specify the number of probes within a test:

   ```
   [edit services rpm probe owner test test-name]
   user@switch# set probe-count count
   ```

6. Specify the time, in seconds, to wait between sending packets:

   ```
   [edit services rpm probe owner test test-name]
   user@switch# set probe-interval interval
   ```

7. Specify the time, in seconds, to wait between tests:

   ```
   [edit services rpm probe owner test test-name]
   user@switch# set test-interval interval
   ```

8. Specify the source IP address to be used for probes. If the source IP address is not one of the switch's assigned addresses, the packet uses the outgoing interface's address as its source.

   ```
   [edit services rpm probe owner test test-name]
   user@switch# set source-address address
   ```

9. Specify the value of the Differentiated Services (DiffServ) field within the IP header. The DiffServ code point (DSCP) bits value must be set to a valid 6-bit pattern.

   ```
   [edit services rpm probe owner test test-name]
   user@switch# set dscp-code-point dscp-bits
   ```

10. If you are using ICMP probes, specify the size of the data portion of ICMP probes:

    ```
    [edit services rpm probe owner test test-name]
    ```

```
user@switch# set data-size size
```

11. Enable hardware timestamping of RPM probe messages:

```
[edit services rpm probe owner test test-name]
user@switch# set hardware-timestamp
```

Related Documentation

- Configuring Real-Time Performance Monitoring (J-Web Procedure) on page 171
- Understanding Real-Time Performance Monitoring on EX Series Switches on page 168

Verifying Real-Time Performance Monitoring

- Viewing Real-Time Performance Monitoring Information on page 180

Viewing Real-Time Performance Monitoring Information

Real-time performance monitoring (RPM) on EX Series switches enables you to configure and send probes to a specified target and monitor the analyzed results to determine packet loss, round-trip time, and jitter. The J-Web interface provides a graphical view of RPM information for EX Series switches.

To view the RPM information using the J-Web interface:

1. Select **Troubleshoot**>**RPM**>**View RPM**.
2. Select the **Round Trip Time** check box to display the graph with round-trip time included. Clear the check-box to view the graph without the round-trip time.
3. From the **Refresh Time** list, select a refresh time interval for the graph.

Related Documentation

- Configuring Real-Time Performance Monitoring (J-Web Procedure) on page 171

Configuration Statements for Real-Time Performance Monitoring

data-fill

Syntax data-fill *data*;

Hierarchy Level [edit services rpm bgp],
[edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the contents of the data portion of Internet Control Message Protocol (ICMP) probes.

Options ***data***—A hexadecimal value; for example, **0-9**, **A-F**.

Usage Guidelines The **data-fill** statement is not valid with the **http-get** or **http-metadata-get** probe types. See Configuring BGP Neighbor Discovery Through RPM or Configuring Real-Time Performance Monitoring.

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

data-size

Syntax data-size *size*;

Hierarchy Level [edit services rpm bgp],
[edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the size of the data portion of ICMP probes.

Options ***data***—The size can be from 0 through 65507

Default: 0

NOTE: If you configure the hardware timestamp feature (see Configuring Real-Time Performance Monitoring), the data-size default value is 32 bytes and 32 is the minimum value for explicit configuration. The UDP timestamp probe type is an exception; it requires a minimum data size of 44 bytes.

Usage Guidelines The **data-size** statement is not valid with the **http-get** or **http-metadata-get** probe type. See Configuring BGP Neighbor Discovery Through RPM or Configuring Real-Time Performance Monitoring.

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

destination-port

Syntax destination-port *port*;

Hierarchy Level [edit services rpm bgp],
[edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the User Datagram Protocol (UDP) or Transmission Control Protocol (TCP) port to which a probe is sent. This statement is used only for TCP or UDP probe types.

Options ***port***—The port number can be **7** or from **49,160** to **65,535**.

Usage Guidelines See Configuring BGP Neighbor Discovery Through RPM or Configuring Real-Time Performance Monitoring.

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

dscp-code-point

Syntax dscp-code-point *dscp-bits*;

Hierarchy Level [edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the value of the Differentiated Services (DiffServ) field within the IP header. The DiffServ code point (DSCP) bits value must be set to a valid 6-bit pattern.

Options ***dscp-bits***—A valid 6-bit pattern; for example, **001111**, or one of the following configured DSCP aliases:

- **af11**—Default: 001010
- **af12**—Default: 001100
- **af13**—Default: 001110
- **af21**—Default: 010010
- **af22**—Default: 010100
- **af23** —Default: 010110
- **af31** —Default: 011010
- **af32** —Default: 011100
- **af33** —Default: 011110
- **af41** —Default: 100010
- **af42** —Default:100100
- **af43** —Default:100110
- **be**—Default: 000000
- **cs1**—Default: 001000
- **cs2**—Default: 010000
- **cs3**—Default: 011000
- **cs4**—Default: 100000
- **cs5**—Default: 101000
- **cs6**—Default: 110000
- **cs7**—Default: 111000
- **ef**—Default: 101110
- **nc1**—Default: 110000
- **nc2**—Default: 111000

Usage Guidelines See Configuring Real-Time Performance Monitoring.

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

hardware-timestamp

Syntax hardware-timestamp;

Hierarchy Level [edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced in Junos OS Release 8.1.
Statement applied to MX Series routers in Junos OS Release 10.0.
Statement introduced in Junos OS Release 10.3 for EX Series switches.

Description On MX Series routers and EX Series switches only, enable timestamping of RPM probe messages in the Packet Forwarding Engine host processor. This feature is supported only with **icmp-ping**, **icmp-ping-timestamp**, **udp-ping**, and **udp-ping-timestamp** probe types.

Usage Guidelines See Configuring RPM Timestamping.

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

history-size

Syntax history-size *size*;

Hierarchy Level [edit services rpm bgp],
[edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the number of stored history entries.

Options ***size***—A value from 0 to 255.
Default: 50

Usage Guidelines See Configuring BGP Neighbor Discovery Through RPM or Configuring RPM Probes.

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

moving-average-size

Syntax moving-average-size *number*;

Hierarchy Level [edit services rpm bgp],
[edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced in Junos OS Release 8.5.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Enable statistical calculation operations to be performed across a configurable number of the most recent samples.

Options ***number***—Number of samples to be used in calculations.
Range: 0 through 255

Usage Guidelines See Configuring RPM Probes.

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

one-way-hardware-timestamp

Syntax one-way-hardware-timestamp;

Hierarchy Level [edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced in Junos OS Release 8.5.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Enable timestamping of RPM probe messages for one-way delay and jitter measurements. You must configure this statement along with the **destination-interface** statement to invoke timestamping. This feature is supported only with **icmp-ping**, **icmp-ping-timestamp**, **udp-ping**, and **udp-ping-timestamp** probe types.

Usage Guidelines See Configuring RPM Timestamping.

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

Related Documentation

- destination-interface, **hardware-timestamp on page 185**

port (RPM)

Syntax port *number*;

Hierarchy Level [edit services rpm **probe-server** (**tcp** | **udp**)]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the port number for the probe server.

Options ***number***—Port number for the probe server. The value can be **7** or **49,160** through **65,535**.

Usage Guidelines See Configuring RPM Receiver Servers.

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

probe

Syntax

```
probe owner {
  test test-name {
    data-fill data;
    data-size size;
    destination-interface interface-name;
    destination-port port;
    dscp-code-point dscp-bits;
    hardware-timestamp;
    history-size size;
    moving-average-size number;
    one-way-hardware-timestamp;
    probe-count count;
    probe-interval seconds;
    probe-type type;
    routing-instance instance-name;
    source-address address;
    target (url | address);
    test-interval interval;
    thresholds thresholds;
    traps traps;
  }
}
```

Hierarchy Level [edit services rpm]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify an owner name. The owner name combined with the test name represent a single RPM configuration instance.

Options *owner*—Specify an owner name up to 32 characters in length.

The remaining statements are explained separately.

Usage Guidelines See Configuring RPM Probes.

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

probe-count

Syntax probe-count *count*;

Hierarchy Level [edit services rpm bgp],
[edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the number of probes within a test.

Options ***count***—A value from 1 through 15.

Usage Guidelines See Configuring BGP Neighbor Discovery Through RPM or Configuring RPM Probes.

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

probe-interval

Syntax probe-interval *interval*;

Hierarchy Level [edit services rpm bgp],
[edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the time to wait between sending packets, in seconds.

Options ***interval***—Number of seconds, from 1 through 255.

Usage Guidelines See Configuring BGP Neighbor Discovery Through RPM or Configuring RPM Probes.

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

probe-limit

Syntax probe-limit *limit;*

Hierarchy Level [edit services rpm]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the maximum number of concurrent probes allowed.

Options ***limit***—A value from 1 through 500.
Default: 100.

Usage Guidelines See Limiting the Number of Concurrent RPM Probes.

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

probe-server

Syntax
```
probe-server {
  tcp {
    destination-interface interface-name;
    port number;
  }
  udp {
    destination-interface interface-name;
    port number;
  }
}
```

Hierarchy Level [edit services rpm]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the server to act as a receiver for the probes.

The remaining statements are explained separately.

Usage Guidelines See Configuring RPM Receiver Servers.

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

probe-type

Syntax probe-type *type*;

Hierarchy Level [edit services rpm bgp],
[edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the packet and protocol contents of a probe.

Options *type*—Specify one of the following probe type values:

- **http-get**—(Not available at the [edit services rpm bgp] hierarchy level.) Sends a Hypertext Transfer Protocol (HTTP) get request to a target URL.
- **http-metadata-get**—(Not available at the [edit services rpm bgp] hierarchy level.) Sends an HTTP get request for metadata to a target URL.
- **icmp-ping**—Sends ICMP echo requests to a target address.
- **icmp-ping-timestamp**—Sends ICMP timestamp requests to a target address.
- **tcp-ping**—Sends TCP packets to a target.
- **udp-ping**—Sends UDP packets to a target.
- **udp-ping-timestamp**—Sends UDP timestamp requests to a target address.

Usage Guidelines See Configuring BGP Neighbor Discovery Through RPM or Configuring RPM Probes.

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

routing-instance

Syntax routing-instance *instance-name*;

Hierarchy Level [edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the routing instance used by the probes.

Options ***instance-name***—A routing instance configured at the **[edit routing-instance]** hierarchy level.
Default: Internet routing table **inet.0**.

Usage Guidelines See Configuring RPM Probes.

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

routing-instances

Syntax routing-instances *instance-name*;

Hierarchy Level [edit services rpm bgp],
[edit services rpm bgp logical-system *logical-system-name*]

Release Information Statement introduced in Junos OS Release 7.6.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the routing instance used by the probes.

Options ***instance-name***—A routing instance configured at the **[edit routing-instances]** hierarchy level.
Default: Internet routing table **inet.0**.

Usage Guidelines See Configuring BGP Neighbor Discovery Through RPM.

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

rpm

Syntax rpm (client | server);

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 8.1.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Associate an RPM client (router or switch that originates RPM probes) or RPM server with a specified interface.

Options ***client***—Identifier for RPM client router or switch.

server—Identifier for RPM server.

Usage Guidelines See Configuring RPM Timestamping.

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

source-address

Syntax source-address *address*;

Hierarchy Level [edit services rpm probe *owner* test *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the source IP address used for probes. If the source IP address is not one of the router's or switch's assigned addresses, the packet will use the outgoing interface's address as its source.

Options ***address***—Valid IP address.

Usage Guidelines See Configuring RPM Probes.

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

target

Syntax target (url *url* | address *address*);

Hierarchy Level [edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the destination address used for the probes.

Options **url** ***url***—For HTTP probe types, specify a fully formed URL that includes **http://** in the URL address.

address ***address***—For all other probe types, specify an IPv4 address for the target host.

Usage Guidelines See Configuring RPM Probes.

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

tcp

Syntax
```
tcp {
  destination-interface interface-name;
  port port;
}
```

Hierarchy Level [edit services rpm **probe-server**]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the port information for the TCP server.

The remaining statements are explained separately.

Usage Guidelines See Configuring RPM Receiver Servers.

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

test

Syntax

```
test test-name {
    data-fill data;
    data-size size;
    destination-interface interface-name;
    destination-port port;
    dscp-code-point dscp-bits;
    hardware-timestamp;
    history-size size;
    moving-average-size number;
    one-way-hardware-timestamp;
    probe-count count;
    probe-interval seconds;
    probe-type type;
    routing-instance instance-name;
    source-address address;
    target (url url | address address);
    test-interval interval;
    thresholds thresholds;
    traps traps;
}
```

Hierarchy Level [edit services rpm probe *owner*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the range of probes over which the standard deviation, average, and jitter are calculated. The test name combined with the owner name represent a single RPM configuration instance.

Options ***test-name***—Specify a test name. The name can be up to 32 characters in length.

The remaining statements are explained separately.

Usage Guidelines See Configuring RPM Probes.

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

test-interval

Syntax test-interval *frequency*;

Hierarchy Level [edit services rpm bgp],
[edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the time to wait between tests, in seconds.

Options ***frequency***—Number of seconds, from 0 through 86400.

Usage Guidelines See Configuring BGP Neighbor Discovery Through RPM or Configuring RPM Probes.

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

thresholds

Syntax thresholds *thresholds*;

Hierarchy Level [edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify thresholds used for the probes. A system log message is generated when the configured threshold is exceeded. Likewise, an SNMP trap (if configured) is generated when a threshold is exceeded.

Options ***thresholds***—Specify one or more threshold measurements. The following options are supported:

- **egress-time**—Measures maximum source-to-destination time per probe.
- **ingress-time**—Measures maximum destination-to-source time per probe.
- **jitter-egress**—Measures maximum source-to-destination jitter per test.
- **jitter-ingress**—Measures maximum destination-to- source jitter per test.
- **jitter-rtt**—Measures maximum jitter per test, from 0 through 60,000,000 microseconds.
- **rtt**—Measures maximum round-trip time per probe, in microseconds.
- **std-dev-egress**—Measures maximum source-to-destination standard deviation per test.
- **std-dev-ingress**—Measures maximum destination-to-source standard deviation per test.
- **std-dev-rtt**—Measures maximum standard deviation per test, in microseconds.
- **successive-loss**—Measures successive probe loss count, indicating probe failure.
- **total-loss**—Measures total probe loss count indicating test failure, from 0 through 15.

Usage Guidelines See Configuring RPM Probes.

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

traps

Syntax traps *traps*;

Hierarchy Level [edit services rpm **probe** *owner* **test** *test-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Set the trap bit to generate traps for probes. Traps are sent if the configured threshold is met or exceeded.

Options ***traps***—Specify one or more traps. The following options are supported:

- **egress-jitter-exceeded**—Generates traps when the jitter in egress time threshold is met or exceeded.
- **egress-std-dev-exceeded**—Generates traps when the egress time standard deviation threshold is met or exceeded.
- **egress-time-exceeded**—Generates traps when the maximum egress time threshold is met or exceeded.
- **ingress-jitter-exceeded**—Generates traps when the jitter in ingress time threshold is met or exceeded.
- **ingress-std-dev-exceeded**—Generates traps when the ingress time standard deviation threshold is met or exceeded.
- **ingress-time-exceeded**—Generates traps when the maximum ingress time threshold is met or exceeded.
- **jitter-exceeded**—Generates traps when the jitter in round-trip time threshold is met or exceeded.
- **probe-failure**—Generates traps for successive probe loss thresholds crossed.
- **rtt-exceeded**—Generates traps when the maximum round-trip time threshold is met or exceeded.
- **std-dev-exceeded**—Generates traps when the round-trip time standard deviation threshold is met or exceeded.
- **test-completion**—Generates traps when a test is completed.
- **test-failure**—Generates traps when the total probe loss threshold is met or exceeded.

Usage Guidelines See Configuring RPM Probes.

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

udp

Syntax

```
udp {
  destination-interface interface-name;
  port port;
}
```

Hierarchy Level [edit services rpm probe-server]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.3 for EX Series switches.

Description Specify the port information for the UDP server.

The remaining statements are explained separately.

Usage Guidelines See Configuring RPM Receiver Servers.

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

Operational Commands for Real-Time Performance Monitoring

show services rpm active-servers

Syntax show services rpm active-servers

Release Information Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description Display the protocols and corresponding ports for which a router or switch is configured as a real-time performance monitoring (RPM) server.

Options This command has no options.

Required Privilege Level view

List of Sample Output **show services rpm active-servers on page 200**

Output Fields Table 16 on page 200 lists the output fields for the **show services rpm active-servers** command. Output fields are listed in the approximate order in which they appear.

Table 16: show services rpm active-servers Output Fields

Field Name	Field Description
Protocol	Protocol configured on the receiving probe server. The protocol can be the User Datagram Protocol (UDP) or the Transmission Control Protocol (TCP).
Port	Port configured on the receiving probe server.
Destination interface name	Output interface name for the probes.

show services rpm active-servers

```
user@host> show services rpm active-servers
    Protocol: TCP, Port: 50000, Destination interface name: lt-0/0/0.0
    Protocol: UDP, Port: 50001, Destination interface name: lt-0/0/0.0
```

show services rpm history-results

Syntax
show services rpm history-results
<brief | detail>
<owner *owner*>
<since *time*>
<test *name*>

Release Information
Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description
Display standard information about the results of the last 50 probes for each real-time performance monitoring (RPM) instance.

Options
none—Display the results of the last 50 probes for all RPM instances.

brief | detail—(Optional) Display the specified level of output.

owner *owner*—(Optional) Display information for the specified probe owner.

since *time*—(Optional) Display information from the specified time. Specify time as ***yyyy-mm-dd.hh:mm:ss***.

test *name*—(Optional) Display information for the specified test.

Required Privilege Level
view

List of Sample Output
show services rpm history-results on page 202
show services rpm history-results detail on page 203

Output Fields
Table 17 on page 201 lists the output fields for the **show services rpm history-results** command. Output fields are listed in the approximate order in which they appear.

Table 17: show services rpm history-results Output Fields

Field Name	Field Description	Level of Output
Owner	Probe owner.	All levels
Test	Name of a test for a probe instance.	All levels
Probe received	Timestamp when the probe result was determined.	All levels
Round trip time	Average ping round-trip time (RTT), in microseconds.	All levels
Probe results	Result of a particular probe performed by a remote host. The following information is contained in the results: • **Response received**—Timestamp when the probe result was determined. • **Rtt**—Average ping round-trip time (RTT), in microseconds.	**detail**

Table 17: show services rpm history-results Output Fields *(continued)*

Field Name	Field Description	Level of Output
Results over current test	Displays the results for the current test by probe at the time each probe was completed, as well as the status of the current test at the time the probe was completed.	**detail**
Probes sent	Number of probes sent with the current test.	**detail**
Probes received	Number of probe responses received within the current test.	**detail**
Loss percentage	Percentage of lost probes for the current test.	**detail**
Measurement	Increment of measurement. Possible values are round-trip time delay and, for the probe type icmp-pin-timestamp, the egress and ingress delay: • **Minimum**—Minimum RTT, ingress delay, or egress delay measured over the course of the current test. • **Maximum**—Maximum RTT, ingress delay, or egress delay measured over the course of the current test. • **Average**—Average RTT, ingress delay, or egress delay measured over the course of the current test. • **Jitter**—Difference, in microseconds, between the maximum and minimum RTT measured over the course of the current test. • **Stddev**—Standard deviation of the round-trip time, in microseconds, measured over the course of the current test.	**detail**

show services rpm history-results

```
user@host> show services rpm history-results
     Owner, Test                 Probe received              Round trip time
     flintstone, 0               Tue Dec 28 15:56:22 2004          158 usec
     flintstone, 0               Tue Dec 28 15:56:23 2004          218 usec
     flintstone, 0               Tue Dec 28 15:56:24 2004          161 usec
     flintstone, 0               Tue Dec 28 15:56:25 2004          184 usec
     flintstone, 0               Tue Dec 28 15:56:30 2004          332 usec
     flintstone, 0               Tue Dec 28 15:56:31 2004          132 usec
     flintstone, 0               Tue Dec 28 15:56:32 2004          226 usec
     flintstone, 0               Tue Dec 28 15:56:33 2004          191 usec
     flintstone, 0               Tue Dec 28 15:56:34 2004          179 usec
     flintstone, 0               Tue Dec 28 15:56:39 2004          217 usec
     flintstone, 0               Tue Dec 28 15:56:40 2004          141 usec
     flintstone, 0               Tue Dec 28 15:56:41 2004          230 usec
     flintstone, 0               Tue Dec 28 15:56:42 2004          248 usec
     flintstone, 0               Tue Dec 28 15:56:43 2004          234 usec
     flintstone, 0               Tue Dec 28 15:56:48 2004          251 usec
     flintstone, 0               Tue Dec 28 15:56:49 2004          134 usec
     flintstone, 0               Tue Dec 28 15:56:50 2004          272 usec
     flintstone, 0               Tue Dec 28 15:56:51 2004          181 usec
     flintstone, 0               Tue Dec 28 15:56:52 2004          216 usec
     flintstone, 0               Tue Dec 28 15:56:57 2004          227 usec
     flintstone, 0               Tue Dec 28 15:56:58 2004          133 usec
```

show services rpm history-results detail

```
user@host> show services rpm history-results detail
Owner: flintstone, Test: 0
     Probe results:
       Response received, Tue Dec 28 15:56:39 2004
       Rtt: 217 usec
     Results over current test:
       Probes sent: 1, Probes received: 1, Loss percentage: 0
       Measurement: Round trip time
         Minimum: 217 usec, Maximum: 217 usec, Average: 217 usec,
         Jitter: 0 usec, Stddev: 0 usec

   Owner: flintstone, Test: 0
     Probe results:
       Response received, Tue Dec 28 15:56:40 2004
       Rtt: 141 usec
     Results over current test:
       Probes sent: 2, Probes received: 2, Loss percentage: 0
       Measurement: Round trip time
         Minimum: 141 usec, Maximum: 217 usec, Average: 179 usec,
         Jitter: 76 usec, Stddev: 38 usec

   Owner: flintstone, Test: 0
     Probe results:
       Response received, Tue Dec 28 15:56:41 2004
       Rtt: 230 usec
     Results over current test:
       Probes sent: 3, Probes received: 3, Loss percentage: 0
       Measurement: Round trip time
         Minimum: 141 usec, Maximum: 230 usec, Average: 196 usec,
         Jitter: 89 usec, Stddev: 39 usec

   Owner: flintstone, Test: 0
     Probe results:
       Response received, Tue Dec 28 15:56:42 2004
       Rtt: 248 usec
     Results over current test:
       Probes sent: 4, Probes received: 4, Loss percentage: 0
       Measurement: Round trip time
         Minimum: 141 usec, Maximum: 248 usec, Average: 209 usec,
         Jitter: 107 usec, Stddev: 41 usec
```

show services rpm probe-results

Syntax
show services rpm probe-results
<owner *owner*>
<test *name*>

Release Information
Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description
Display the results of the most recent real-time performance monitoring (RPM) probes.

Options
none—Display all results of the most recent RPM probes.

owner *owner*—(Optional) Display information for the specified probe owner.

test *name*—(Optional) Display information for the specified test.

Required Privilege Level
view

List of Sample Output
show services rpm probe-results on page 207
show services rpm probe-results (BGP Neighbor Discovery) on page 208

Output Fields
Table 18 on page 204 lists the output fields for the **show services rpm probe-results** command. Output fields are listed in the approximate order in which they appear.

Table 18: show services rpm probe-results Output Fields

Field Name	Field Description
Owner	Owner name. When you configure the probe owner statement at the **[edit services rpm]** hierarchy level, this field displays the configured owner name. When you configure BGP neighbor discovery through RPM, the output for this field is **Rpm-Bgp-Owner.**
Test	Name of a test representing a collection of probes. When you configure the test test-name statement at the **[edit services rpm probe owner]** hierarchy level, the field displays the configured test name. When you configure BGP neighbor discovery through RPM, the output for this field is **Rpm-BGP-Test-***n*, where *n* is a cumulative number.
Target address	Destination address used for the probes.
Source address	Source address used for the probes.
Probe type	Protocol configured on the receiving probe server: **http-get, http-metadata-get, icmp-ping, icmp-ping-timestamp, tcp-ping, udp-ping,** or **udp-ping-timestamp**.
Test size	Number of probes within a test.

Table 18: show services rpm probe-results Output Fields *(continued)*

Field Name	Field Description
Routing Instance Name	(BGP neighbor discovery) Name of the configured (if any) routing instance, logical system name, or both, in which the probe is configured: • When a routing instance is defined within a logical system, the logical system name is followed by the routing instance name. A slash **(/)** is used to separate the two entities. For example, if the routing instance called **R1** is configured within the logical system called **LS**, the name in the output field is **LS/R1**. • When a routing instance is configured but the default logical system is used, the name in the output field is the name of the routing instance. • When a logical system is configured but the default routing instance is used, the name in the output field is the name of the logical system followed by **default**. A slash (**/**) is used to separate the two entities. For example, **LS/default**.
Probe results	Raw measurement of a particular probe sample done by a remote host. This data is provided separately from the calculated results. The following information is contained in the raw measurement: • **Response received**—Timestamp when the probe result was determined. • **Client and server hardware timestamps**—If timestamps are configured, an entry appears at this point. • **Rtt**—Average ping round-trip time (RTT), in microseconds. • **Egress jitter**—Egress jitter, in microseconds. • **Ingress jitter**—Ingress jitter, in microseconds. • **Round trip jitter**—Round-trip jitter, in microseconds. • **Egress interarrival jitter**—Egress interarrival jitter, in microseconds. • **Ingress interarrival jitter**—Ingress interarrival jitter, in microseconds. • **Round trip interarrival jitter**—Round-trip interarrival jitter, in microseconds.
Results over current test	Probes are grouped into tests, and the statistics are calculated for each test. If a test contains 10 probes, the average, minimum, and maximum results are calculated from the results of those 10 probes. If the command is issued while the test is in progress, the statistics use information from the completed probes. • **Probes sent**—Number of probes sent within the current test. • **Probes received**—Number of probe responses received within the current test. • **Loss percentage**—Percentage of lost probes for the current test. • **Measurement**—Measurement type. Possible values are round-trip time, positive round-trip jitter, negative round-trip jitter, egress time, positive egress jitter, negative egress jitter, ingress time, positive ingress jitter, negative ingress jitter, and, for the probe type **icmp-ping-timestamp**, the egress delay and ingress delay. For each measurement type, the following individual calculated results are provided: ◦ **Samples**—Number of probes. ◦ **Minimum**—Minimum RTT, ingress delay, or egress delay measured over the course of the current test. ◦ **Maximum**—Maximum RTT, ingress delay, or egress delay measured over the course of the current test. ◦ **Average**—Average RTT, ingress delay, or egress delay measured over the course of the current test. ◦ **Peak to peak**—Peak-to-peak difference, in microseconds. ◦ **Stddev**—Standard deviation, in microseconds. ◦ **Sum**—Statistical sum.

Table 18: show services rpm probe-results Output Fields *(continued)*

Field Name	Field Description
Results over last test	Results for the most recently completed test. If the command is issued while the first test is in progress, this information is not displayed • **Probes sent**—Number of probes sent for the most recently completed test. • **Probes received**—Number of probe responses received for the most recently completed test. • **Loss percentage**—Percentage of lost probes for the most recently completed test. • **Test completed**—Time the most recent test was completed. • **Measurement**—Measurement type. Possible values are round-trip time, positive round-trip jitter, negative round-trip jitter, egress time, positive egress jitter, negative egress jitter, ingress time, positive ingress jitter, negative ingress jitter, and, for the probe type **icmp-ping-timestamp**, the egress delay and ingress delay. For each measurement type, the following individual calculated results are provided: ◦ **Samples**—Number of probes. ◦ **Minimum**—Minimum RTT, ingress delay, or egress delay measured for the most recently completed test. ◦ **Maximum**—Maximum RTT, ingress delay, or egress delay measured for the most recently completed test. ◦ **Average**—Average RTT, ingress delay, or egress delay measured for the most recently completed test. ◦ **Peak to peak**—Peak-to-peak difference, in microseconds. ◦ **Stddev**—Standard deviation, in microseconds. ◦ **Sum**—Statistical sum.
Results over all tests	Displays statistics made for all the probes, independently of the grouping into tests, as well as statistics for the current test. • **Probes sent**—Number of probes sent in all tests. • **Probes received**—Number of probe responses received in all tests. • **Loss percentage**—Percentage of lost probes in all tests. • **Measurement**—Measurement type. Possible values are round-trip time, positive round-trip jitter, negative round-trip jitter, egress time, positive egress jitter, negative egress jitter, ingress time, positive ingress jitter, negative ingress jitter, and, for the probe types **icmp-ping-timestamp** and **udp-ping-timestamp**, the egress delay and ingress delay. For each measurement type, the following individual calculated results are provided: ◦ **Samples**—Number of probes. ◦ **Minimum**—Minimum RTT, ingress delay, or egress delay measured over the course of the current test. ◦ **Maximum**—Maximum RTT, ingress delay, or egress delay measured over the course of the current test. ◦ **Average**—Average RTT, ingress delay, or egress delay measured over the course of the current test. ◦ **Peak to peak**—Peak-to-peak difference, in microseconds. ◦ **Stddev**—Standard deviation, in microseconds. ◦ **Sum**—Statistical sum.

show services rpm probe-results

```
user@host> show services rpm probe-results
    Owner: ADSN-J4300.ADSN-J2300.D2, Test: 75300002
    Target address: 172.16.54.172, Source address: 10.206.0.1,
    Probe type: udp-ping-timestamp, Test size: 10 probes
    Probe results:
      Response received, Tue Feb  6 14:53:15 2007,
      Client and server hardware timestamps
      Rtt: 575 usec, Egress jitter: 5 usec, Ingress jitter: 8 usec,
      Round trip jitter: 12 usec, Egress interarrival jitter: 8 usec,
     Ingress interarrival jitter: 7 usec, Round trip interarrival jitter: 7 usec,

      Round trip interarrival jitter: 669 usec
    Results over current test:
      Probes sent: 10, Probes received: 10, Loss percentage: 0
      Measurement: Round trip time
        Samples: 10, Minimum: 805 usec, Maximum: 2859 usec, Average: 1644 usec,
        Peak to peak: 2054 usec, Stddev: 738 usec,  Sum: xxxx usec
      Measurement: Positive round trip jitter
        Samples: 5, Minimum: 5 usec, Maximum: 2054 usec, Average: 876 usec,
        Peak to peak: 2049 usec, Stddev: 679 usec, Sum: xxxx usec
      Measurement: Negative round trip jitter
        Samples: 5, Minimum: 5 usec, Maximum: 1812 usec, Average: 926 usec,
        Peak to peak: 1807 usec, Stddev: 665 usec, Sum: xxxx usec
      Measurement: Egress time
        Samples: 10, Minimum: 805 usec, Maximum: 2859 usec, Average: 1644 usec,
        Peak to peak: 2054 usec, Stddev: 738 usec, Sum: xxxx usec
      Measurement: Positive Egress  jitter
        Samples: 5, Minimum: 5 usec, Maximum: 2054 usec, Average: 876 usec,
        Peak to peak: 2049 usec, Stddev: 679 usec, Sum: xxxx usec
      Measurement: Negative Egress  jitter
        Samples: 5, Minimum: 5 usec, Maximum: 1812 usec, Average: 926 usec,
        Peak to peak: 1807 usec, Stddev: 665 usec, Sum: xxxx usec
      Measurement: Ingress time
        Samples: 10, Minimum: 805 usec, Maximum: 2859 usec, Average: 1644 usec,
        Peak to peak: 2054 usec, Stddev: 738 usec, Sum: xxxx usec
      Measurement: Positive Ingress  jitter
        Samples: 5, Minimum: 5 usec, Maximum: 2054 usec, Average: 876 usec,
        Peak to peak: 2049 usec, Stddev: 679 usec, Sum: xxxx usec
      Measurement: Negative Ingress  jitter
        Samples: 5, Minimum: 5 usec, Maximum: 1812 usec, Average: 926 usec,
        Peak to peak: 1807 usec, Stddev: 665 usec, Sum: xxxx usec
    Results over last test:
      Probes sent: 10, Probes received: 10, Loss percentage: 0
      Test completed on Tue Feb  6 14:53:16 2007
      Measurement: Round trip time
        Samples: 10, Minimum: 805 usec, Maximum: 2859 usec, Average: 1644 usec,
        Peak to peak: 2054 usec, Stddev: 738 usec, Sum: xxxx usec
      Measurement: Positive round trip jitter
        Samples: 5, Minimum: 5 usec, Maximum: 2054 usec, Average: 876 usec,
        Peak to peak: 2049 usec, Stddev: 679 usec, Sum: xxxx usec
      Measurement: Negative round trip jitter
        Samples: 5, Minimum: 5 usec, Maximum: 1812 usec, Average: 926 usec,
        Peak to peak: 1807 usec, Stddev: 665 usec, Sum: xxxx usec
      Measurement: Egress time
        Samples: 10, Minimum: 805 usec, Maximum: 2859 usec, Average: 1644 usec,
        Peak to peak: 2054 usec, Stddev: 738 usec, Sum: xxxx usec
      Measurement: Positive Egress  jitter
        Samples: 5, Minimum: 5 usec, Maximum: 2054 usec, Average: 876 usec,
        Peak to peak: 2049 usec, Stddev: 679 usec, Sum: xxxx usec
      Measurement: Negative Egress  jitter
        Samples: 5, Minimum: 5 usec, Maximum: 1812 usec, Average: 926 usec,
```

```
    Peak to peak: 1807 usec, Stddev: 665 usec, Sum: xxxx usec
  Measurement: Ingress time
    Samples: 10, Minimum: 805 usec, Maximum: 2859 usec, Average: 1644 usec,
    Peak to peak: 2054 usec, Stddev: 738 usec, Sum: xxxx usec
  Measurement: Positive Ingress  jitter
    Samples: 5, Minimum: 5 usec, Maximum: 2054 usec, Average: 876 usec,
    Peak to peak: 2049 usec, Stddev: 679 usec, Sum: xxxx usec
  Measurement: Negative Ingress  jitter
    Samples: 5, Minimum: 5 usec, Maximum: 1812 usec, Average: 926 usec,
    Peak to peak: 1807 usec, Stddev: 665 usec, Sum: xxxx usec
Results over all tests:
  Probes sent: 560, Probes received: 560, Loss percentage: 0
  Measurement: Round trip time
    Samples: 560, Minimum: 805 usec, Maximum: 3114 usec, Average: 1756 usec,

    Peak to peak: 2309 usec, Stddev: 519 usec, Sum: xxxx usec
  Measurement: Positive round trip jitter
    Samples: 257, Minimum: 0 usec, Maximum: 2054 usec, Average: 597 usec,
    Peak to peak: 2054 usec, Stddev: 427 usec, Sum: xxxx usec
  Measurement: Negative round trip jitter
    Samples: 302, Minimum: 1 usec, Maximum: 1812 usec, Average: 511 usec,
    Peak to peak: 1811 usec, Stddev: 408 usec, Sum: xxxx usec
  Measurement: Egress time
    Samples: 10, Minimum: 805 usec, Maximum: 2859 usec, Average: 1644 usec,
    Peak to peak: 2054 usec, Stddev: 738 usec, Sum: xxxx usec
  Measurement: Positive Egress  jitter
    Samples: 5, Minimum: 5 usec, Maximum: 2054 usec, Average: 876 usec,
    Peak to peak: 2049 usec, Stddev: 679 usec, Sum: xxxx usec
  Measurement: Negative Egress  jitter
    Samples: 5, Minimum: 5 usec, Maximum: 1812 usec, Average: 926 usec,
    Peak to peak: 1807 usec, Stddev: 665 usec, Sum: xxxx usec
  Measurement: Ingress time
    Samples: 10, Minimum: 805 usec, Maximum: 2859 usec, Average: 1644 usec,
    Peak to peak: 2054 usec, Stddev: 738 usec, Sum: xxxx usec
  Measurement: Positive Ingress  jitter
    Samples: 5, Minimum: 5 usec, Maximum: 2054 usec, Average: 876 usec,
    Peak to peak: 2049 usec, Stddev: 679 usec, Sum: xxxx usec
  Measurement: Negative Ingress  jitter
    Samples: 5, Minimum: 5 usec, Maximum: 1812 usec, Average: 926 usec,
    Peak to peak: 1807 usec, Stddev: 665 usec, Sum: xxxx usec
```

show services rpm probe-results (BGP Neighbor Discovery)

```
user@host> show services rpm probe-results
Owner: Rpm-Bgp-Owner, Test: Rpm-Bgp-Test-1
    Target address: 10.209.152.37, Probe type: icmp-ping, Test size: 5 probes
    Routing Instance Name: LS1/RI1
    Probe results:
      Response received, Fri Oct 28 05:20:23 2005
      Rtt: 662 usec
    Results over current test:
      Probes sent: 5, Probes received: 5, Loss percentage: 0
      Measurement: Round trip time
        Minimum: 529 usec, Maximum: 662 usec, Average: 585 usec,
        Jitter: 133 usec, Stddev: 53 usec
    Results over all tests:
      Probes sent: 5, Probes received: 5, Loss percentage: 0
      Measurement: Round trip time
        Minimum: 529 usec, Maximum: 662 usec, Average: 585 usec,
        Jitter: 133 usec, Stddev: 53 usec
```

CHAPTER 5

Ethernet OAM Link Fault Management

Ethernet OAM Link Fault Management—Overview

Understanding Ethernet OAM Link Fault Management for an EX Series Switch

Juniper Networks Junos operating system (Junos OS) for Juniper Networks EX Series Ethernet Switches allows the Ethernet interfaces on these switches to support the IEEE 802.3ah standard for the Operation, Administration, and Maintenance (OAM) of Ethernet in access networks. 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 even 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.

Ethernet OAM provides the tools that network management software and network managers can use to determine how a network of Ethernet links is functioning. Ethernet OAM should:

- Rely only on the media access control (MAC) address or virtual LAN identifier for troubleshooting.
- Work independently of the actual Ethernet transport and function over physical Ethernet ports or a virtual service such as pseudowire.
- Isolate faults over a flat (or single operator) network architecture or nested or hierarchical (or multiprovider) networks.

The following OAM LFM features are supported on EX Series switches:

- 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. You can specify the discovery mode used for IEEE 802.3ah OAM support. 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 switch 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 are used to convey the following: Link Fault means a loss of signal, Dying Gasp means an unrecoverable condition such as a power failure, and Critical Event means an unspecified vendor-specific critical event. You can specify the periodic OAM PDU sending interval for fault detection.The EX Series switch uses 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 Mode

  Remote loopback mode ensures link quality between the switch 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 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.

Related Documentation

- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213
- Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 211

Example of Ethernet OAM Link Fault Management Configuration

- Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 211

Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches

Junos OS for EX Series switches allows the Ethernet interfaces on these switches to support the IEEE 802.3ah standard for the Operation, Administration, and Maintenance (OAM) of Ethernet in access networks. 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 interface:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 9.4 or later for EX Series switches
- Two EX3200 or EX4200 switches connected directly

Overview and Topology

Junos OS for EX Series switches allows the Ethernet interfaces on these switches to support the IEEE 802.3ah standard for the Operation, Administration, and Maintenance (OAM) of Ethernet in access networks. 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 EX4200 switches connected directly. Before you begin configuring Ethernet OAM LFM on two switches, connect the two switches directly through a trunk interface.

Configuring Ethernet OAM Link Fault Management on Switch 1

CLI Quick Configuration

To quickly configure Ethernet OAM LFM, copy the following commands and paste them into the switch terminal window:

```
[edit protocols oam ethernet link-fault-management]
set interface ge-0/0/0
set interface ge-0/0/0 link-discovery active
set interface ge-0/0/0 pdu-interval 800
set interface ge-0/0/0 remote-loopback
```

Step-by-Step Procedure

To configure Ethernet OAM LFM on switch 1:

1. Enable IEEE 802.3ah OAM support on an interface:

```
[edit protocols oam ethernet link-fault-management]
user@switch1# set interface ge-0/0/0
```

2. Specify that the interface initiates the discovery process by configuring the link discovery mode to **active**:

```
[edit protocols oam ethernet link-fault-management]
user@switch1# set interface ge-0/0/0 link-discovery active
```

3. Set the periodic OAM PDU-sending interval (in milliseconds) to 800 on switch 1:

```
[edit protocols oam ethernet link-fault-management]
user@switch1# set interface pdu-interval 800
```

4. Set a remote interface into loopback mode so that all frames except OAM PDUs are looped back without any changes made to the frames. Ensure that the remote DTE supports remote loopback mode. To set the remote DTE in loopback mode

```
[edit protocols oam ethernet link-fault-management]
user@switch1# set interface ge-0/0/0.0 remote-loopback
```

Results Check the results of the configuration:

```
[edit]
user@switch1# show
```

```
protocols {
    oam {
        ethernet {
            link-fault-management {
                interface ge-0/0/0 {
                    pdu-interval 800;
                    link-discovery active;
                    remote-loopback;
                }
            }
        }
    }
```

Configuring Ethernet OAM Link Fault Management on Switch 2

CLI Quick Configuration To quickly configure Ethernet OAM LFM on switch 2, copy the following commands and paste them into the switch terminal window:

```
[edit protocols oam ethernet link-fault-management ]
set interface ge-0/0/1
set interface ge-0/0/1 negotiation-options allow-remote-loopback
```

Step-by-Step Procedure To configure Ethernet OAM LFM on switch 2:

1. Enable OAM on the peer interface on switch 2:

```
[edit protocols oam ethernet link-fault-management]
user@switch2# set interface ge-0/0/1
```

2. Enable remote loopback support for the local interface:

```
[edit protocols oam ethernet link-fault-management]
user@switch2# set interface ge-0/0/1 negotiation-options allow-remote-loopback
```

Results Check the results of the configuration:

```
[edit]
user@switch2# show


  protocols {
    oam {
      ethernet {
        link-fault-management {
          interface ge-0/0/1 {
            negotiation-options {
              allow-remote-loopback;
            }
          }
        }
      }
    }
```

Verification

Verifying That OAM LFM Has Been Configured Properly

Purpose Verify that OAM LFM has been configured properly.

Action Use the **show oam ethernet link-fault-management** command:

```
user@switch1#show oam ethernet link-fault-management
```

Sample Output

```
Interface: ge-0/0/0.0
Status: Running, Discovery state: Send Any
Peer address: 00:19:e2:50:3b:e1
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 When the output displays the MAC address and the discover state is **Send Any**, it means that OAM LFM has been configured properly.

Related Documentation

- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213
- Understanding Ethernet OAM Link Fault Management for an EX Series Switch on page 209

Configuring Ethernet OAM Link Fault Management

- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

Configuring Ethernet OAM Link Fault Management (CLI Procedure)

Ethernet OAM link fault management (LFM) can be used for physical link-level fault detection and management. The IEEE 802.3ah LFM works across point-to-point Ethernet links either directly or through repeaters.

To configure Ethernet OAM LFM using the CLI:

1. Enable IEEE 802.3ah OAM support on an interface:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name
```

NOTE: The remaining steps are optional. You can choose which of these features to configure for Ethernet OAM LFM on your switch.

2. Specify whether the interface or the peer initiates the discovery process by configuring the link discovery mode to **active** or **passive** (**active** = interface initiates; **passive** = peer initiates):

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name link-discovery active
```

3. Configure a periodic OAM PDU-sending interval (in milliseconds) for fault detection:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface pdu-interval interval
```

4. Specify the number of OAM PDUs that an interface can miss before the link between peers is considered down:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name pdu-threshold threshold-value
```

5. Configure event threshold values on an interface for the local errors that trigger the sending of link event TLVs:

   - Set the threshold value (in seconds) for sending frame-error events or taking the action specified in the action profile:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name event-thresholds frame-error count
```

   - Set the threshold value (in seconds) for sending frame-period events or taking the action specified in the action profile:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name event-thresholds frame-period count
```

   - Set the threshold value (in seconds) for sending frame-period-summary events or taking the action specified in the action profile:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name event-thresholds frame-period-summary
count
```

   - Set the threshold value (in seconds) for sending symbol-period events or taking the action specified in the action profile:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name event-thresholds symbol-period count
```

NOTE: You can disable the sending of link event TLVs.

To disable the sending of link event TLVs:

```
[edit protocols oam ethernet link-fault-management]
user@switch# set interface interface-name negotiation-options no-allow-link-events
```

6. Create an action profile to define event fault flags and thresholds to be taken when the link fault event occurs. Then apply the action profile to one or more interfaces. (You can also apply multiple action profiles to a single interface.)

   a. Name the action profile:

   ```
   [edit protocols oam ethernet link-fault-management]
   user@switch# set action-profile profile-name
   ```

   b. Specify actions to be taken by the system when the link fault event occurs:

   ```
   [edit protocols oam ethernet link-fault-management]
   user@switch# set action-profile profile-name  action syslog

   user@switch# set action-profile profile-name action link-down
   ```

   c. Specify events for the action profile:

   ```
   [edit protocols oam ethernet link-fault-management]
   user@switch# set action-profile profile-name event link-adjacency-loss
   ```

   NOTE: For each action profile, you must specify at least one link event and one action. The actions are taken only when all of the events in the action profile are true. If more than one action is specified, all actions are executed. You can set a low threshold for a specific action such as logging the error and set a high threshold for another action such as system logging.

7. Set a remote interface into loopback mode so that all frames except OAM PDUs are looped back without any changes made to the frames. Set the remote DTE in loopback mode (the remote DTE must support remote-loopback mode) and then enable remote loopback support for the local interface.

   ```
   [edit protocols oam ethernet link-fault-management]
   user@switch# set interface interface-name remote-loopback

   user@switch# set interface interface-name negotiation-options allow-remote-loopback
   ```

Related Documentation

- Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 211
- Understanding Ethernet OAM Link Fault Management for an EX Series Switch on page 209

Configuration Statements for Ethernet OAM Link Fault Management

- [edit protocols] Configuration Statement Hierarchy on page 216

[edit protocols] Configuration Statement Hierarchy

```
protocols {
  connections {
    remote-interface-switch connection-name {
      interface interface-name.unit-number;
      transmit-lsp label-switched-path;
      receive-lsp label-switched-path;
    }
  }
  dot1x {
    authenticator {
      authentication-profile-name profile-name;
      interface (all | [ interface-names ]) {
        disable;
        guest-vlan ( vlan-id | vlan-name);
        mac-radius <restrict>;
        maximum-requests number;
        no-reauthentication;
        quiet-period seconds;
        reauthentication {
          interval seconds;
        }
        retries number;
        server-fail (deny | permit | use-cache | vlan-id | vlan-name);
        server-reject-vlan (vlan-id | vlan-name);
        server-timeout seconds;
        supplicant (multiple | single | single-secure);
        supplicant-timeout seconds;
        transmit-period seconds;
      }
      static mac-address {
        interface interface-name;
        vlan-assignment (vlan-id |vlan-name);
      }
  }
  gvrp {
    <enable | disable>;
    interface (all | [interface-name]) {
      disable;
    }
    join-timer millseconds;
    leave-timer milliseconds;
    leaveall-timer milliseconds;
  }
  igmp-snooping {
    traceoptions {
      file filename <files number> <size size> <world-readable | no-world-readable>
        <match regex>;
      flag flag (detail | disable | receive | send);
    }
```

```
    vlan (vlan-id | vlan-number) {
      data-forwarding {
        source {
          groups group-prefix;
        }
        receiver {
          source-vlans vlan-list;
          install ;
        }
      }
      disable {
        interface interface-name
      }
      immediate-leave;
      interface interface-name {
        group-limit limit;
        multicast-router-interface;
        static (IGMP Snooping) {
          group ip-address;
        }
      }
      proxy ;
      query-interval seconds;
      query-last-member-interval seconds;
      query-response-interval seconds;
      robust-count number;
    }
  }
  lldp {
    disable;
    advertisement-interval seconds;
    hold-multiplier number;
    interface (all | interface-name) {
      disable;
    }
    lldp-configuration-notification-interval seconds;
    management-address ip-management-address;
    ptopo-configuration-maximum-hold-time seconds;
    ptopo-configuration-trap-interval seconds;
    traceoptions {
      file filename <files number> <size size> <world-readable | no-world-readable>
        <match regex>;
      flag flag (detail | disable | receive | send);
    }
  }
  lldp-med {
    disable;
    fast-start number;
    interface (all | interface-name) {
      disable;
      location {
        elin number;
        civic-based {
          what number;
          country-code code;
          ca-type {
```

```
                number {
                    ca-value value;
                }
            }
        }
    }
}
mpls {
    interface ( all | interface-name );
    label-switched-path lsp-name to remote-provider-edge-switch;
    path destination {
        <address | hostname> <strict | loose>
    }
mstp {
    disable;
    bpdu-block-on-edge;
    bridge-priority priority;
    configuration-name name;
    forward-delay seconds;
    hello-time seconds;
    interface (all | interface-name) {
        disable;
        bpdu-timeout-action {
            block;
            log;
        }
        cost  cost;
        edge;
        mode mode;
        no-root-port;
        priority priority;
    }
    max-age seconds;
    max-hops hops;
    msti msti-id {
        vlan (vlan-id | vlan-name);
        interface interface-name {
            disable;
            cost  cost;
            edge;
            mode mode;
            priority priority;
        }
    }
    revision-level revision-level;
    traceoptions {
        file filename <files number > <size size> <no-stamp | world-readable |
            no-world-readable>;
        flag flag;
    }
}
mvrp {
    disable
    interface (all | interface-name) {
        disable;
```

```
    join-timer milliseconds;
    leave-timer milliseconds;
    leaveall-timer milliseconds;
    registration (forbidden | normal);
  }
  no-dynamic-vlan;
  traceoptions {
    file filename <files number > <size size> <no-stamp | world-readable |
      no-world-readable>;
    flag flag;
  }
}
oam {
  ethernet{
    connectivity-fault-management {
      action-profile profile-name {
        default-actions {
          interface-down;
        }
      }
      linktrace {
        age (30m | 10m | 1m | 30s | 10s);
        path-database-size path-database-size;
      }
      maintenance-domain domain-name {
        level number;
        mip-half-function (none | default |explicit);
        name-format (character-string | none | dns | mac+2oct);
        maintenance-association ma-name {
          continuity-check {
            hold-interval minutes;
            interval (10m | 10s | 1m | 1s| 100ms);
            loss-threshold number;
          }
          mep mep-id {
            auto-discovery;
            direction down;
            interface interface-name;
            remote-mep mep-id {
              action-profile profile-name;
            }
          }
        }
      }
    }
    link-fault-management {
      action-profile profile-name;
        action {
          syslog;
          link-down;
        }
        event {
          link-adjacency-loss;
          link-event-rate;
          frame-error count;
          frame-period count;
```

```
            frame-period-summary count;
            symbol-period count;
          }
          interface interface-name {
            link-discovery (active | passive);
            pdu-interval interval;
            event-thresholds threshold-value;
            remote-loopback;
            event-thresholds {
              frame-errorcount;
              frame-period count;
              frame-period-summary count;
              symbol-period count;
            }
          }
          negotiation-options {
            allow-remote-loopback;
            no-allow-link-events;
          }
      }
    }
  }
  rstp {
    disable;
    bpdu-block-on-edge;
    bridge-priority priority;
    forward-delay seconds;
    hello-time seconds;
    interface (all | interface-name) {
      disable;
      bpdu-timeout-action {
        block;
        log;
      }
      cost  cost;
      edge;
      mode mode;
      no-root-port;
      priority priority;
    }
    max-age seconds;
    }
    traceoptions {
      file filename <files number > <size size> <no-stamp | world-readable |
        no-world-readable>;
      flag flag;
    }
  }
  sflow {
    agent-id;
    collector {
      ip-address;
      udp-port port-number;
    }
    disable;
    interfaces interface-name {
```

```
        disable;
        polling-interval seconds;
        sample-rate {
          egress number;
          ingress number;
        }
      }
      polling-interval seconds;
      sample-rate {
        egress number;
        ingress number;
      }
      source-ip;
    }
    stp {
      disable;
      bridge-priority priority;
      forward-delay seconds;
      hello-time seconds;
      interface (all | interface-name) {
        disable;
        bpdu-timeout-action {
          block;
          log;
        }
        cost  cost;
        edge;
        mode mode;
        no-root-port;
        priority priority;
      }
      max-age seconds;
    }
      traceoptions {
        file filename <files number > <size size> <no-stamp | world-readable |
          no-world-readable>;
        flag flag;
      }
    vstp {
      bpdu-block-on-edge;
      disable;
      force-version stp;
      vlan (all | vlan-id | vlan-name) {
        bridge-priority priority;
        forward-delay seconds;
        hello-time seconds;
        interface (all | interface-name) {
          bpdu-timeout-action {
            log;
            block;
          }
          cost  cost;
          disable;
          edge;
          mode mode;
          no-root-port;
```

```
            priority priority;
        }
        max-age seconds;
        traceoptions {
            file filename <files number > <size size> <no-stamp | world-readable |
                no-world-readable>;
            flag flag;
        }
    }
  }
}
```

Related Documentation

- 802.1X for EX Series Switches Overview
- Example: Configure Automatic VLAN Administration Using GVRP
- Understanding Server Fail Fallback and Authentication on EX Series Switches
- IGMP Snooping on EX Series Switches Overview
- Understanding 802.1X and LLDP and LLDP-MED on EX Series Switches
- Understanding MSTP for EX Series Switches
- Understanding Multiple VLAN Registration Protocol (MVRP) on EX Series Switches
- Understanding Ethernet OAM Connectivity Fault Management for an EX Series Switch on page 247
- Understanding Ethernet OAM Link Fault Management for an EX Series Switch on page 209
- Understanding RSTP for EX Series Switches
- Understanding STP for EX Series Switches
- Understanding How to Use sFlow Technology for Network Monitoring on an EX Series Switch on page 41
- Understanding VSTP for EX Series Switches

action

Syntax

```
action {
  syslog;
  link-down;
}
```

Hierarchy Level [edit protocols **oam ethernet link-fault-management**]

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

Description Define the action or actions to be taken when the OAM link fault management (LFM) fault event occurs.

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

- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

action-profile

Syntax

```
action-profile profile-name;
  action {
    syslog;
    link-down;
  }
  event {
    link-adjacency-loss;
    link-event-rate;
    frame-error count;
    frame-period count;
    frame-period-summary count;
    symbol-period count;
  }
}
```

Hierarchy Level [edit protocols **oam ethernet link-fault-management**]

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

Description Configure an Ethernet OAM link fault management (LFM) action profile by specifying a profile name.

The remaining statements are explained separately.

Options *profile-name*—Name of the action profile.

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

Related Documentation

- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

allow-remote-loopback

Syntax allow-remote-loopback;

Hierarchy Level [edit protocols **oam ethernet link-fault-management interface** *interface-name*]

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

Description Advertise that the interface is capable of getting into loopback mode. Enable remote loopback in Ethernet OAM link fault management (LFM) on all Ethernet interfaces or the specified interface on the EX Series switch.

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

Related Documentation

- Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 211
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

ethernet

Syntax

```
ethernet {
  connectivity-fault-management {
    action-profile profile-name {
      default-actions {
        interface-down;
      }
    }
    linktrace {
      age (30m | 10m | 1m | 30s | 10s);
      path-database-size path-database-size;
    }
    maintenance-domain domain-name {
      level number;
      mip-half-function (none | default |explicit);
      name-format (character-string | none | dns | mac+2oct);
      maintenance-association ma-name {
        continuity-check {
          hold-interval minutes;
          interval (10m | 10s | 1m | 1s| 100ms);
          loss-threshold number;
        }
        mep mep-id {
          auto-discovery;
          direction down;
          interface interface-name;
          remote-mep mep-id {
            action-profile profile-name;
          }
        }
      }
    }
  }
  link-fault-management{
    action-profile profile-name;
      action {
        syslog;
        link-down;
      }
      event {
        link-adjacency-loss;
        link-event-rate;
        frame-error count;
        frame-period count;
        frame-period-summary count;
        symbol-period count;
      }
      interface interface-name {
        link-discovery (active | passive);
        pdu-interval interval;
        event-thresholds threshold-value;
        remote-loopback;
        event-thresholds {
```

```
            frame-error count;
            frame-period count;
            frame-period-summary count;
            symbol-period count;
          }
        }
        negotiation-options {
          allow-remote-loopback;
          no-allow-link-events;
        }
    }
}
```

Hierarchy Level [edit protocols oam]

Release Information Statement introduced in Junos OS Release 9.4 for EX Series switches.
connectivity-fault-management introduced in Junos OS Release 10.2 for EX Series switches.

Description Provide IEEE 802.3ah Operation, Administration, and Maintenance (OAM) support for Ethernet interfaces on EX Series switches or configure connectivity fault management (CFM) for IEEE 802.1ag Operation, Administration, and Management (OAM) support on the switches.

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

- Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 211
- Example: Configuring Ethernet OAM Connectivity Fault Management on EX Series Switches on page 249
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213
- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252

event

Syntax

```
event {
  link-adjacency-loss;
  link-event-rate {
  frame-error count;
  frame-period count;
  frame-period-summary count;
  symbol-period count;
  }
}
```

Hierarchy Level [edit protocols **oam ethernet link-fault-management action-profile** *profile-name*]

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

Description Configure link events in an action profile for Ethernet OAM link fault management (LFM).

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
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

event-thresholds

Syntax

```
event-thresholds {
  frame-error count;
  frame-period count;
  frame-period-summary count;
  symbol-period count;
}
```

Hierarchy Level [edit protocols **oam ethernet link-fault-management interface** *interface-name*]

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

Description Configure threshold limit values for link events in periodic OAM PDUs.

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
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

frame-error

Syntax frame-error *count*;

Hierarchy Level [edit protocols **oam ethernet link-fault-management event link-event-rate**],
[edit protocols **oam ethernet link-fault-management interface** *interface-name* **event-thresholds**]

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

Description Configure the threshold value for sending frame error events or taking the action specified in the action profile.

Frame errors occur on the underlying physical layer. The threshold is reached when the number of frame errors reaches the configured value.

Options *count*—Threshold count in seconds for frame error events.

Range: 1 through 100 seconds

Default: 1 second

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

Related Documentation
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

frame-period

Syntax frame-period *count*;

Hierarchy Level [edit protocols **oam ethernet link-fault-management event link-event-rate**],
[edit protocols **oam ethernet link-fault-management interface** *interface-name* **event-thresholds**]

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

Description Configure the number of frame errors within the last N frames that has exceeded a threshold.

Frame errors occur on the underlying physical layer. The threshold is reached when the number of frame errors reaches the configured value.

Options *count*—Threshold count in seconds for frame error events.

Range: 1 through 100 seconds

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

Related Documentation
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

frame-period-summary

Syntax frame-period-summary *count*;

Hierarchy Level [edit protocols **oam ethernet link-fault-management event link-event-rate**],
[edit protocols **oam ethernet link-fault-management interface** *interface-name* **event-thresholds**]

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

Description Configure the threshold value for sending frame period summary error events or taking the action specified in the action profile.

An errored frame second is any 1-second period that has at least one errored frame. This event is generated if the number of errored frame seconds is equal to or greater than the specified threshold for that period.

Options *count*—Threshold count in seconds for frame period summary error events.

Range: 1 through 100 seconds

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

Related Documentation

- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

interface

Syntax

```
interface interface-name {
  link-discovery (active | passive);
  pdu-interval interval;
  event-thresholds threshold-value;
  remote-loopback;
  event-thresholds {
    frame-error count;
    frame-period count;
    frame-period-summary count;
    symbol-period count;
  }
  negotiation-options {
    allow-remote-loopback;
    no-allow-link-events;
  }
}
```

Hierarchy Level [edit protocols oam ethernet link-fault-management]

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

Description Configure Ethernet OAM link fault management (LFM) for all interfaces or for specific interfaces.

The remaining statements are explained separately.

Options *interface-name*—Name of the interface to be enabled for IEEE 802.3ah OAM link fault management (LFM) support.

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

Related Documentation

- Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 211
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

link-adjacency-loss

Syntax link-adjacency-loss;

Hierarchy Level [edit protocols **oam ethernet link-fault-management action-profile event**]

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

Description Configure **loss of adjacency** event with the IEEE 802.3ah link fault management (LFM) peer. When included, the loss of adjacency event triggers the action specified under the **action** statement.

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

Related Documentation

- Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 211
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

link-discovery

Syntax link-discovery (active | passive);

Hierarchy Level [edit protocols **oam ethernet link-fault-management interface** *interface-name*]

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

Description Specify the discovery mode used for IEEE 802.3ah Operation, Administration, and Maintenance (OAM) link fault management (LFM) support. The discovery process is triggered automatically when OAM 802.3ah functionality is enabled on an interface. Link monitoring is done when the interface sends periodic OAM PDUs.

Options *active*—In active mode, the interface discovers and monitors the peer on the link if the peer also supports IEEE 802.3ah OAM functionality.

passive—In passive mode, the peer initiates the discovery process.

Once the discovery process is initiated, both sides participate in discovery.

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

Related Documentation

- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

link-down

Syntax link-down;

Hierarchy Level [edit protocols **oam ethernet link-fault-management action-profile action**]

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

Description Mark the interface as down for transit traffic.

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

Related Documentation
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

link-event-rate

Syntax
```
link-event-rate {
  frame-error count;
  frame-period count;
  frame-period-summary count;
  symbol-period count;
}
```

Hierarchy Level [edit protocols **oam ethernet link-fault-management action-profile event**]

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

Description Configure the number of link fault management (LFM) events per second.

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
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

link-fault-management

Syntax

```
link-fault-management {
  action-profile profile-name;
    action {
      syslog;
      link-down;
    }
    event {
      link-adjacency-loss;
      link-event-rate;
      frame-error count;
      frame-period count;
      frame-period-summary count;
      symbol-period count;
    }
    interface interface-name {
      link-discovery (active | passive);
      pdu-interval interval;
      event-thresholds threshold-value;
      remote-loopback;
      event-thresholds {
        frame-error count;
        frame-period count;
        frame-period-summary count;
        symbol-period count;
      }
    }
    negotiation-options {
      allow-remote-loopback;
      no-allow-link-events;
    }
}
```

Hierarchy Level [edit protocols oam ethernet]

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

Description Configure Ethernet OAM link fault management (LFM) for all interfaces or for 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

- Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 211
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

negotiation-options

Syntax

```
negotiation-options {
    allow-remote-loopback;
    no-allow-link-events;
}
```

Hierarchy Level [edit protocols **oam ethernet link-fault-management interface** *interface-name*]

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

Description Enable and disable IEEE 802.3ah Operation, Administration, and Maintenance (OAM) link fault management (LFM) features for Ethernet 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
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

no-allow-link-events

Syntax no-allow-link-events;

Hierarchy Level [edit protocols **oam ethernet link-fault-management interface** *interface-name* **negotiation-options**]

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

Description Disable the sending of link event TLVs.

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

Related Documentation
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

oam

Syntax

```
oam {
  ethernet {
    connectivity-fault-management {
      action-profile profile-name {
        default-actions {
          interface-down;
        }
      }
      linktrace {
        age (30m | 10m | 1m | 30s | 10s);
        path-database-size path-database-size;
      }
      maintenance-domain domain-name {
        level number;
        mip-half-function (none | default |explicit);
        name-format (character-string | none | dns | mac+2oct);
        maintenance-association ma-name {
          continuity-check {
            hold-interval minutes;
            interval (10m | 10s | 1m | 1s| 100ms);
            loss-threshold number;
          }
          mep mep-id {
            auto-discovery;
            direction down;
            interface interface-name;
            remote-mep mep-id {
              action-profile profile-name;
            }
          }
        }
      }
    }
    link-fault-management {
      action-profile profile-name;
        action {
          syslog;
          link-down;
        }
        event {
          link-adjacency-loss;
          link-event-rate;
          frame-error count;
          frame-period count;
          frame-period-summary count;
          symbol-period count;
        }
        interface interface-name {
          link-discovery (active | passive);
          pdu-interval interval;
          event-thresholds threshold-value;
          remote-loopback;
```

```
            event-thresholds {
              frame-error count;
              frame-period count;
              frame-period-summary count;
              symbol-period count;
            }
          }
          negotiation-options {
            allow-remote-loopback;
            no-allow-link-events;
          }
        }
      }
```

Hierarchy Level [edit protocols]

Release Information Statement introduced in Junos OS Release 9.4 for EX Series switches.
connectivity-fault-management introduced in Junos OS Release 10.2 for EX Series switches.

Description Provide IEEE 802.3ah Operation, Administration, and Maintenance (OAM) link fault management (LFM) support for Ethernet interfaces on EX Series switches or configure connectivity fault management (CFM) for IEEE 802.1ag Operation, Administration, and Management (OAM) support on the switches.

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

- Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 211
- Example: Configuring Ethernet OAM Connectivity Fault Management on EX Series Switches on page 249
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213
- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252

pdu-interval

Syntax pdu-interval *interval*;

Hierarchy Level [edit protocols **oam ethernet link-fault-management interface** *interface-name*]

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

Description Specify the periodic OAM PDU sending interval for fault detection. It is used for IEEE 802.3ah Operation, Administration, and Maintenance (OAM) link fault management (LFM) support.

Options *interval*—Periodic OAM PDU sending interval.
Range: 400 through 1000 milliseconds
Default: 1000 milliseconds

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

Related Documentation
- Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 211
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

pdu-threshold

Syntax pdu-threshold *threshold-value*;

Hierarchy Level [edit protocols **oam ethernet link-fault-management interface** *interface-name*]

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

Description Configure how many protocol data units (PDUs) are missed before declaring the peer lost in Ethernet OAM link fault management (LFM) for all interfaces or for specific interfaces.

Options ***threshold-value*** —Number of PDUs missed before declaring the peer lost.
Range: 3 through 10 PDUs
Default: 3 PDUs

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

Related Documentation
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

remote-loopback

Syntax remote-loopback;

Hierarchy Level [edit protocols **oam ethernet link-fault-management interface** *interface-name*]

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

Description Set the data terminal equipment (DTE) in loopback mode. Remove the statement from the configuration to take the DTE out of loopback mode. It is used for IEEE 802.3ah Operation, Administration, and Maintenance (OAM) link fault management (LFM) support.

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

Related Documentation
- Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 211
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

symbol-period

Syntax symbol-period *count*;

Hierarchy Level [edit protocols **oam ethernet link-fault-management action-profile** *profile-name*; **event link-event-rate**] ,
[edit protocols **oam ethernet link-fault-management interface** *interface-name* **event-thresholds**]

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

Description Configure the threshold for sending symbol period events or taking the action specified in the action profile.

Symbol code errors occur on the underlying physical layer. The symbol period threshold is reached when the number of symbol errors reaches the configured value within the period. You cannot configure the default value to a different value.

Options *count*—Threshold count in seconds for symbol period events.

Range: 1 through 100 seconds

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

Related Documentation
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

syslog

Syntax syslog;

Hierarchy Level [edit protocols **oam ethernet link-fault-management action-profile** *profile-name*; **action**]

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

Description Generate a system log message for the Ethernet Operation, Administration, and Maintenance (OAM) link fault management (LFM) event.

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

Related Documentation
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

Operational Commands for Ethernet OAM Link Fault Management

show oam ethernet link-fault-management

Syntax show oam ethernet link-fault-management
<brief | detail>
<interface-name>

Release Information Command introduced in Junos OS Release 9.4 for EX Series switches.

Description Displays 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
- Example: Configuring Ethernet OAM Link Fault Management on EX Series Switches on page 211
- Configuring Ethernet OAM Link Fault Management (CLI Procedure) on page 213

List of Sample Output
show oam ethernet link-fault-management brief on page 245
show oam ethernet link-fault-management detail on page 245

Output Fields Table 19 on page 241 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 19: show oam ethernet link-fault-management Output Fields

Field Name	Field Description	Level of Output
Status	Indicates the 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
Peer address	Address of the OAM peer.	All levels

Table 19: show oam ethernet link-fault-management Output Fields *(continued)*

Field Name	Field Description	Level of Output
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 of received Information OAM PDUs. **False** indicates that OAM client has not seen remote state information. **True** indicates that the OAM client has seen remote state information.	All levels
Remote loopback status	Indicates the 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 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 a 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	The number of information PDUs received.	**detail**
Event	The number of loopback control PDUs received.	**detail**
Variable request	The number of variable request PDUs received.	**detail**
Variable response	The number of variable response PDUs received.	**detail**
Loopback control	The number of loopback control PDUs received.	**detail**

Table 19: show oam ethernet link-fault-management Output Fields *(continued)*

Field Name	Field Description	Level of Output
Organization specific	The number of vendor organization specific PDUs received.	**detail**
OAM Transmit Statistics		
Information	The number of information PDUs transmitted.	**detail**
Event	The number of event notification PDUs transmitted.	**detail**
Variable request	The number of variable request PDUs transmitted.	**detail**
Variable response	The number of variable response PDUs transmitted.	**detail**
Loopback control	The number of loopback control PDUs transmitted.	**detail**
Organization specific	The number of vendor organization specific PDUs transmitted.	**detail**
OAM Received Symbol Error Event information		
Events	The number of symbol error event TLVs that have been received after the OAM sublayer was reset.	**detail**
Window	The 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	The number of errored symbols in the period required for the event to be generated.	**detail**
Errors in period	The number of symbol errors in the period reported in the received event PDU.	**detail**
Total errors	The 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	The number of errored frame event TLVs that have been received after the OAM sublayer was reset.	**detail**
Window	The duration of the window in terms of the number of 100 ms period intervals.	**detail**
Threshold	The number of detected errored frames required for the event to be generated.	**detail**
Errors in period	The number of detected errored frames in the period.	**detail**

Table 19: show oam ethernet link-fault-management Output Fields *(continued)*

Field Name	Field Description	Level of Output
Total errors	The 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	The number of frame seconds errors event TLVs that have been received after the OAM sublayer was reset.	**detail**
Window	The duration of the frame seconds window.	**detail**
Threshold	The number of frame seconds errors in the period.	**detail**
Errors in period	The number of frame seconds errors in the period.	**detail**
Total errors	The 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	The 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	The number of errored symbols in the period required for the event to be generated.	**detail**
Errors in period	The number of symbol errors in the period reported in the transmitted event PDU.	**detail**
Total errors	The 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	The number of errored frame event TLVs that have been transmitted after the OAM sublayer was reset.	**detail**
Window	The duration of the window in terms of the number of 100 ms period intervals.	**detail**
Threshold	The number of detected errored frames required for the event to be generated.	**detail**
Errors in period	The number of detected errored frames in the period.	**detail**
Total errors	The number of errored frames that have been detected after the OAM sublayer was reset.	**detail**

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: 00:90:69:72:2c:83
  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: 00:90:69:0a:07:14
    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
```


CHAPTER 6

Ethernet OAM Connectivity Fault Management

Ethernet OAM Connectivity Fault Management—Overview

Understanding Ethernet OAM Connectivity Fault Management for an EX Series Switch

Ethernet interfaces on Juniper Networks EX Series Ethernet Switches and Juniper Networks Junos operating system (Junos OS) for EX Series switches support the IEEE 802.1ag standard for Operation, Administration, and Management (OAM). The IEEE 802.1ag specification provides for Ethernet connectivity fault management (CFM). CFM monitors Ethernet networks that might comprise one or more service instances for network-compromising connectivity faults.

The major features of CFM are:

- 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 linktrace protocol.
- Fault isolation using the loopback protocol.

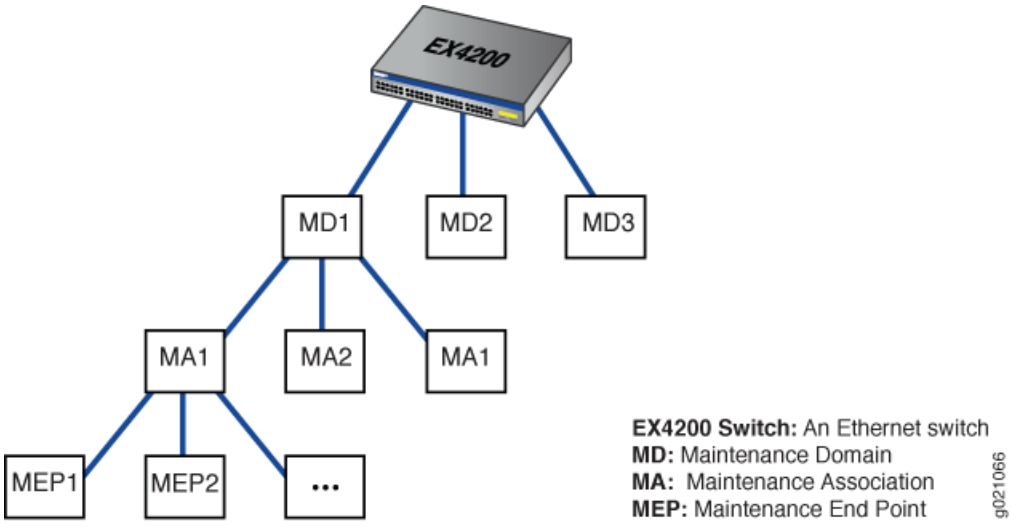
CFM partitions the service network into various administrative domains. For example, operators, providers, and customers might be part of different administrative domains. Each administrative domain is mapped into one maintenance domain providing enough information to perform its own management, thus 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 endpoints (MEPs) having similar characteristics. MEPs are active CFM entities generating and responding to CFM protocol messages. There is also a maintenance 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. 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 maintenance association end points (MEPs). Figure 5 on page 248 shows the relationships among maintenance domains, maintenance association end points (MEPs), and maintenance intermediate points (MIPs) configured on a switch.

Figure 5: Relationship Among MEPs, MIPs, and Maintenance Domain Levels



Related Documentation

- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

Example of Ethernet OAM Connectivity Fault Management Configuration

- Example: Configuring Ethernet OAM Connectivity Fault Management on EX Series Switches on page 249

Example: Configuring Ethernet OAM Connectivity Fault Management on EX Series Switches

Ethernet interfaces on Juniper Networks EX Series Ethernet Switches and Juniper Networks Junos OS for EX Series switches support the IEEE 802.1ag standard for Operation, Administration, and Management (OAM). The IEEE 802.1ag specification provides for Ethernet connectivity fault management (CFM).

This example describes how to enable and configure OAM CFM on a Gigabit Ethernet interface:

Requirements

This example uses the following hardware and software components:

- Junos OS Release 10.2 or later for EX Series switches
- Two EX Series switches connected by a point-to-point Gigabit Ethernet link

Overview and Topology

CFM can be used to monitor the physical link between two switches. In the following example, two switches are connected by a point-to-point Gigabit Ethernet link. The link between these two switches is monitored using CFM.

Configuring Ethernet OAM Connectivity Fault Management on Switch 1

CLI Quick Configuration

To quickly configure Ethernet OAM CFM, copy the following commands and paste them into the switch terminal window:

```
[edit protocols oam ethernet connectivity-fault-management maintenance-domain]set
name-format character-string set maintenance-domain private level 0set
maintenance-association private-maset continuity-check hold-interval 1s
```

Step-by-Step Procedure

To enable and configure OAM CFM on switch 1:

1. Specify the maintenance domain name format:

   ```
   [edit protocols oam ethernet connectivity-fault-management
   maintenance-domain]user@switch1# set name-format character-string
   ```

2. Specify the maintenance domain name and the maintenance domain level:

   ```
   [edit protocols oam ethernet connectivity-fault-management]user@switch1#
   set maintenance-domain private level 0
   ```

3. Create a maintenance association:

   ```
   [edit protocols oam ethernet connectivity-fault-management
   maintenance-domain private]user@switch1# set maintenance-association private-ma
   ```

4. Enable the continuity check protocol and specify the continuity check hold interval:

```
[edit protocols oam ethernet connectivity-fault-management
maintenance-domain private maintenance-association private-ma]user@switch1#
set continuity-check hold-interval 1s
```

5. Configure the maintenance association end point (MEP):

```
[edit protocols oam ethernet connectivity-fault-management
maintenance-domain private maintenance-association private-ma]
user@switch1# set mep 100 interface ge-1/0/1 auto-discovery direction down
```

Results Check the results of the configuration.

```
[edit]
user@switch1# show
```

```
protocols {
    oam {
        ethernet {
            connectivity-fault-management {
                maintenance-domain private {
                    level 0;
                    maintenance-association private-ma {
                        continuity-check {
                            interval 1s;
                        }
                        mep 100 {
                            interface ge-1/0/1;
                            auto-discovery;
                            direction down;
                        }
                    }
                }
            }
        }
    }
```

Configuring Ethernet OAM Connectivity Fault Management on Switch 2

CLI Quick Configuration To quickly configure Ethernet OAM CFM, copy the following commands and paste them into the switch terminal window:

```
[edit protocols oam ethernet connectivity-fault-management maintenance-domain]set
name-format character-string set maintenance-domain private level 0set
maintenance-association private-maset continuity-check hold-interval 1s
```

Step-by-Step Procedure The configuration on switch 2 mirrors that on switch 2.

1. Specify the maintenance domain name format:

```
[edit protocols oam ethernet connectivity-fault-management]user@switch2#
set name-format character-string
```

2. Specify the maintenance domain name and the maintenance domain level:

```
[edit protocols oam ethernet connectivity-fault-management]user@switch2#
set maintenance-domain private level 0
```

3. Create a maintenance association:

```
[edit protocols oam ethernet connectivity-fault-management
maintenance-domain private]user@switch2# set maintenance-association private-ma
```

4. Enable the continuity check protocol and specify the continuity check hold interval:

```
[edit protocols oam ethernet connectivity-fault-management
maintenance-domain private maintenance-association private-ma]user@switch2#
set continuity-check hold-interval 1s
```

5. Configure the maintenance association end point (MEP)

```
[edit protocols oam ethernet connectivity-fault-management
maintenance-domain private maintenance-association private-ma]
user@switch2# set mep 100 interface ge-0/2/5 auto-discovery direction down
```

Results Check the results of the configuration.

```
[edit]
user@switch2# show

  protocols {
    oam {
      ethernet {
        connectivity-fault-management {
          maintenance-domain private {
            level 0;
            maintenance-association private-ma {
              continuity-check {
                interval 1s;
              }
              mep 100 {
                interface ge-0/2/5;
                auto-discovery;
                direction down;
              }
            }
          }
        }
      }
    }
```

Verification

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

- Verifying That OAM CFM Has Been Configured Properly on page 251

Verifying That OAM CFM Has Been Configured Properly

Purpose Verify that OAM CFM has been configured properly.

Action Use the show oam ethernet connectivity-fault-management interfaces detail command:

```
user@switch1# show oam ethernet connectivity-fault-management interfaces detail
```

Sample Output

```
Interface name: ge-1/0/1.0, Interface status: Active, Link status: Up
  Maintenance domain name: private, Format: string, Level: 0
    Maintenance association name: private-ma, Format: string
    Continuity-check status: enabled, Interval: 1ms, Loss-threshold: 3 frames
    MEP identifier: 100, Direction: down, MAC address: 00:90:69:0b:4b:94
    MEP status: running
    Defects:
      Remote MEP not receiving CCM                : no
      Erroneous CCM received                      : yes
```

```
  Cross-connect CCM received                    : no
  RDI sent by some MEP                          : yes
Statistics:
  CCMs sent                                     : 76
  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
Remote MEP count: 2
  Identifier    MAC address        State    Interface
   2001     00:90:69:0b:7f:71       ok    ge-0/2/5.0
```

Meaning When the output displays continuity-check status is **enabled** and displays details of the remote MEP, it means that connectivity fault management (CFM) has been configured properly.

Related Documentation

- Understanding Ethernet OAM Connectivity Fault Management for an EX Series Switch on page 247
- *Junos OS Network Interfaces Configuration Guide*

Configuring Ethernet OAM Connectivity Fault Management

Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure)

Ethernet interfaces on Juniper Networks EX Series Ethernet Switches and Juniper Networks Junos OS for EX Series switches support the IEEE 802.1ag standard for Operation, Administration, and Management (OAM). The IEEE 802.1ag specification provides for Ethernet connectivity fault management (CFM).

This topic describes these tasks:

Creating the Maintenance Domain

A maintenance domain comprises network entities such as operators, providers, and customers. To enable connectivity fault management (CFM) on an Ethernet interface, you must create a maintenance domains, maintenance associations, and MEPs.

To create a maintenance domain:

1. Specify a name for the maintenance domain:

   ```
   [edit protocols oam ethernet connectivity-fault-management]
   user@switch# set maintenance-domain domain-name
   ```

2. Specify a format for the maintenance domain name. If you specify **none**, 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@switch# set name-format format
   ```

   For example, to specify the name format as MAC address plus a two-octet identifier:

   ```
   [edit protocols oam ethernet connectivity-fault-management
   maintenance-domain domain-name]
   user@switch# 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@switch# set level level
   ```

Configuring the Maintenance Domain MIP Half Function

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 loop-back 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@switch# set mip-half-function (none | default | explicit)
```

Creating a Maintenance Association

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@switch# set maintenance-association ma-name
```

Configuring the Continuity Check Protocol

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@switch# 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@switch# 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), 100 milliseconds (100ms), or 10 milliseconds (10ms).

   ```
   [edit protocols oam ethernet connectivity-fault-management
   maintenance-domain domain-name maintenance-association ma-name
   continuity-check]
   user@switch# 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@switch# set loss-threshold number
   ```

Configuring a Maintenance Association End Point

To configure a maintenance association end point:

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@switch# 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@switch# set auto-discovery
```

3. You can specify that CFM packets (CCMs) be transmitted only in one direction for the MEP, that is, the direction be set 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@switch# 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.

NOTE: You cannot associate an access interface that belongs to multiple VLANs with the MEP.

```
[edit protocols oam ethernet connectivity-fault-management
maintenance-domain domain-name maintenance-association ma-name mep mep-id]
user@switch# set interface interface-name
```

5. You can configure a remote MEP from which CCMs are expected. If autodiscovery is not enabled, the remote MEP must be configured under the **mep** statement. If the remote MEP is not configured under the **mep** statement, 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@switch# set remote-mep mep-id
```

Configuring a Connectivity Fault Management Action Profile

You can configure an action profile and specify the action to be taken when any of the configured events occur. Alternatively, you can configure an action profile and specify default actions when connectivity to a remote MEP fails.

To configure an action profile:

1. Specify a name for an action profile:

```
[edit protocols oam ethernet connectivity-fault-management]
user@switch# set action-profile profile-name
```

2. Configure the action of the action profile:

```
[edit protocols oam ethernet connectivity-fault-management action-profile
profile-name]
user@switch# set action interface-down
```

3. Configure one or more events under the action profile, the occurrence of which will trigger the corresponding action to be taken:

```
[edit protocols oam ethernet connectivity-fault-management action-profile
profile-name]
user@switch# set event event
```

See the *Junos OS Network Interfaces Configuration Guide*.

Configuring the Linktrace Protocol

The linktrace protocol is used for path discovery between a pair of maintenance points. Linktrace messages are triggered by an administrator using the **traceroute** command to verify the path between a pair of MEPs under the same maintenance association. Linktrace messages can also be used to verify the path between a MEP and a MIP under the same maintenance domain.

To configure the linktrace protocol:

1. Configure the linktrace path age timer. If no response to a linktrace request is received, the request and response entries are deleted after the age timer expires:

```
[edit protocols oam ethernet connectivity-fault-management]
user@switch# set linktrace age time
```

2. Configure the number of linktrace reply entries to be stored per linktrace request:

```
[edit protocols oam ethernet connectivity-fault-management]
user@switch# set linktrace path-database-size path-database-size
```

Related Documentation

- Example: Configuring Ethernet OAM Connectivity Fault Management on EX Series Switches on page 249
- Understanding Ethernet OAM Connectivity Fault Management for an EX Series Switch on page 247
- *Junos OS Network Interfaces Configuration Guide*

Configuration Statements for Ethernet OAM Connectivity Fault Management

- [edit protocols] Configuration Statement Hierarchy on page 256

[edit protocols] Configuration Statement Hierarchy

```
protocols {
  connections {
    remote-interface-switch connection-name {
      interface interface-name.unit-number;
      transmit-lsp label-switched-path;
      receive-lsp label-switched-path;
    }
  }
```

```
dot1x {
  authenticator {
    authentication-profile-name profile-name;
    interface (all | [ interface-names ]) {
      disable;
      guest-vlan ( vlan-id | vlan-name);
      mac-radius <restrict>;
      maximum-requests number;
      no-reauthentication;
      quiet-period seconds;
      reauthentication {
        interval seconds;
      }
      retries number;
      server-fail (deny | permit | use-cache | vlan-id | vlan-name);
      server-reject-vlan (vlan-id | vlan-name);
      server-timeout seconds;
      supplicant (multiple | single | single-secure);
      supplicant-timeout seconds;
      transmit-period seconds;
    }
    static mac-address {
      interface interface-name;
      vlan-assignment (vlan-id |vlan-name);
    }
}
gvrp {
  <enable | disable>;
  interface (all | [interface-name]) {
    disable;
  }
  join-timer millseconds;
  leave-timer milliseconds;
  leaveall-timer milliseconds;
}
igmp-snooping {
  traceoptions {
    file filename <files number> <size size> <world-readable | no-world-readable>
      <match regex>;
    flag flag (detail | disable | receive | send);
  }
  vlan (vlan-id | vlan-number) {
    data-forwarding {
      source {
        groups group-prefix;
      }
      receiver {
        source-vlans vlan-list;
        install ;
      }
    }
    disable {
      interface interface-name
    }
    immediate-leave;
    interface interface-name {
```

```
        group-limit limit;
        multicast-router-interface;
        static (IGMP Snooping) {
          group ip-address;
        }
      }
      proxy ;
      query-interval seconds;
      query-last-member-interval seconds;
      query-response-interval seconds;
      robust-count number;
    }
  }
  lldp {
    disable;
    advertisement-interval seconds;
    hold-multiplier number;
    interface (all | interface-name) {
      disable;
    }
    lldp-configuration-notification-interval seconds;
    management-address ip-management-address;
    ptopo-configuration-maximum-hold-time seconds;
    ptopo-configuration-trap-interval seconds;
    traceoptions {
      file filename <files number> <size size> <world-readable | no-world-readable>
        <match regex>;
      flag flag (detail | disable | receive | send);
    }
  }
  lldp-med {
    disable;
    fast-start number;
    interface (all | interface-name) {
      disable;
      location {
        elin number;
        civic-based {
          what number;
          country-code code;
          ca-type {
            number {
              ca-value value;
            }
          }
        }
      }
    }
  }
  mpls {
    interface ( all | interface-name );
    label-switched-path lsp-name to remote-provider-edge-switch;
    path destination {
      <address | hostname> <strict | loose>
    }
  mstp {
```

```
    disable;
    bpdu-block-on-edge;
    bridge-priority priority;
    configuration-name name;
    forward-delay seconds;
    hello-time seconds;
    interface (all | interface-name) {
      disable;
      bpdu-timeout-action {
        block;
        log;
      }
      cost  cost;
      edge;
      mode mode;
      no-root-port;
      priority priority;
    }
    max-age seconds;
    max-hops hops;
    msti msti-id {
      vlan (vlan-id | vlan-name);
      interface interface-name {
        disable;
        cost  cost;
        edge;
        mode mode;
        priority priority;
      }
    }
    revision-level revision-level;
    traceoptions {
      file filename <files number > <size size> <no-stamp | world-readable |
        no-world-readable>;
      flag flag;
    }
  }
  mvrp {
    disable
    interface (all | interface-name) {
      disable;
      join-timer milliseconds;
      leave-timer milliseconds;
      leaveall-timer milliseconds;
      registration (forbidden | normal);
    }
    no-dynamic-vlan;
    traceoptions {
      file filename <files number > <size size> <no-stamp | world-readable |
        no-world-readable>;
      flag flag;
    }
  }
  oam {
    ethernet{
      connectivity-fault-management {
```

```
    action-profile profile-name {
      default-actions {
        interface-down;
      }
    }
    linktrace {
      age (30m | 10m | 1m | 30s | 10s);
      path-database-size path-database-size;
    }
    maintenance-domain domain-name {
      level number;
      mip-half-function (none | default |explicit);
      name-format (character-string | none | dns | mac+2oct);
      maintenance-association ma-name {
        continuity-check {
          hold-interval minutes;
          interval (10m | 10s | 1m | 1s| 100ms);
          loss-threshold number;
        }
        mep mep-id {
          auto-discovery;
          direction down;
          interface interface-name;
          remote-mep mep-id {
            action-profile profile-name;
          }
        }
      }
    }
  }
  link-fault-management {
    action-profile profile-name;
      action {
        syslog;
        link-down;
      }
      event {
        link-adjacency-loss;
        link-event-rate;
        frame-error count;
        frame-period count;
        frame-period-summary count;
        symbol-period count;
      }
      interface interface-name {
        link-discovery (active | passive);
        pdu-interval interval;
        event-thresholds threshold-value;
        remote-loopback;
        event-thresholds {
          frame-errorcount;
          frame-period count;
          frame-period-summary count;
          symbol-period count;
        }
      }
```

```
            negotiation-options {
              allow-remote-loopback;
              no-allow-link-events;
            }
        }
    }
}
rstp {
    disable;
    bpdu-block-on-edge;
    bridge-priority priority;
    forward-delay seconds;
    hello-time seconds;
    interface (all | interface-name) {
        disable;
        bpdu-timeout-action {
            block;
            log;
        }
        cost  cost;
        edge;
        mode mode;
        no-root-port;
        priority priority;
    }
    max-age seconds;
    }
    traceoptions {
        file filename <files number > <size size> <no-stamp | world-readable |
            no-world-readable>;
        flag flag;
    }
}
sflow {
    agent-id;
    collector {
        ip-address;
        udp-port port-number;
    }
    disable;
    interfaces interface-name {
        disable;
        polling-interval seconds;
        sample-rate {
            egress number;
            ingress number;
        }
    }
    polling-interval seconds;
    sample-rate {
        egress number;
        ingress number;
    }
    source-ip;
}
stp {
```

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

Related Documentation

- 802.1X for EX Series Switches Overview
- Example: Configure Automatic VLAN Administration Using GVRP

- Understanding Server Fail Fallback and Authentication on EX Series Switches
- IGMP Snooping on EX Series Switches Overview
- Understanding 802.1X and LLDP and LLDP-MED on EX Series Switches
- Understanding MSTP for EX Series Switches
- Understanding Multiple VLAN Registration Protocol (MVRP) on EX Series Switches
- Understanding Ethernet OAM Connectivity Fault Management for an EX Series Switch on page 247
- Understanding Ethernet OAM Link Fault Management for an EX Series Switch on page 209
- Understanding RSTP for EX Series Switches
- Understanding STP for EX Series Switches
- Understanding How to Use sFlow Technology for Network Monitoring on an EX Series Switch on page 41
- Understanding VSTP for EX Series Switches

action-profile (Applying to OAM CFM, for EX Series Switch Only)

Syntax

```
action-profile profile-name {
  default-actions {
    interface-down;
  }
}
```

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management**]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Configure a name and default action for an action profile.

Options

profile-name—Name of the action profile.

default-actions—Defines the action to be taken when connectivity to the remote MEP is lost.

interface-down—Brings the interface down when a remote MEP connectivity failure is detected.

Required Privilege Level

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

Related Documentation

- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

age (EX Series Switch Only)

Syntax age (30m | 10m | 1m | 30s | 10s);

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management linktrace**]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Configure the time to wait (in minutes or seconds) for a response. If no response is received, the request and response entry is deleted from the linktrace database.

Default 10 minutes

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

Related Documentation
- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

auto-discovery (EX Series Switch Only)

Syntax auto-discovery;

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management maintenance-domain** *domain-name* **maintenance-association** *ma-name* **mep** *mep-id*]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Enable the MEP to accept continuity check messages from all remote MEPs.

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

Related Documentation
- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

connectivity-fault-management (EX Series Switch Only)

Syntax

```
connectivity-fault-management {
  action-profile profile-name {
    default-actions {
      interface-down;
    }
  }
  linktrace {
    age (30m | 10m | 1m | 30s | 10s);
    path-database-size path-database-size;
  }
  maintenance-domain domain-name {
    level number;
    mip-half-function (none | default |explicit);
    name-format (character-string | none | dns | mac+2oct);
    maintenance-association ma-name {
      continuity-check {
        hold-interval minutes;
        interval (10m | 10s | 1m | 1s| 100ms);
        loss-threshold number;
      }
      mep mep-id {
        auto-discovery;
        direction down;
        interface interface-name;
        remote-mep mep-id {
          action-profile profile-name;
        }
      }
    }
  }
}
```

Hierarchy Level [edit protocols oam ethernet]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Configure connectivity fault management for IEEE 802.1ag Operation, Administration, and Management (OAM) support.

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

- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

continuity-check (EX Series Switch Only)

Syntax

```
continuity-check {
  hold-interval minutes;
  interval (10m | 10s | 1m | 1s| 100ms);
  loss-threshold number;
}
```

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management maintenance-domain** *domain-name* **maintenance-association** *ma-name*]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Specify continuity check protocol options.

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
- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

direction (EX Series Switch Only)

Syntax direction down;

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management maintenance-domain** *domain-name* **maintenance-association** *ma-name* **mep** *mep-id*]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Specify that connectivity fault management (CFM) packets (CCMs) be transmitted only in one direction for the MEP, that is, the direction be set as **down** so that CCMs are transmitted only out of (not into) the interface configured on this MEP.

Options **down**—Down MEP CCMs are transmitted only out (not into) of the interface configured on this MEP.

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

Related Documentation
- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

hold-interval (OAM CFM, for EX Series Switch Only)

Syntax hold-interval *minutes*;

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management maintenance-domain** *domain-name* **maintenance-association** *ma-name* **continuity-check**]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Configure the time to wait before flushing the maintenance association end point (MEP) database, if no updates occur.

Options ***minutes***—Time to wait, in minutes.

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

Related Documentation
- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

interface (OAM CFM, for EX Series Switch Only)

Syntax interface (*interface-name* | ((ge- | xe-) (*fpc/pic/port* | *fpc/pic/port.unit-number* | *fpc/pic/port.unit-number* vlan *vlan-id*)));

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management maintenance-domain** *domain-name* **maintenance-association** *ma-name* **mep** *mep-id*]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Configure IEEE 802.1ag Operation, Administration, and Management (OAM) Connectivity Fault Management (CFM) support for the specified interface.

Options ***interface-name***—Interface to which the MEP is attached. It can be a physical Ethernet interface or a logical interface. If the interface is a trunk interface, the VLAN associated with the interface must have a VLAN ID.

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

Related Documentation
- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

interval (EX Series Switch Only)

Syntax interval (10m | 10s | 1m | 1s | 100ms | 10ms);

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management maintenance-domain** *domain-name* **maintenance-association** *ma-name* **continuity-check**]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Configure the time between continuity check messages.

Options

10m—10 minutes.

10s—10 seconds.

1m—1 minute.

1s—1 second.

100ms—100 milliseconds.

10ms—10 milliseconds.

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

Related Documentation

- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

level (EX Series Switch Only)

Syntax level *number*;

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management maintenance-domain** *domain-name*]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Configure a number to be used in CFM messages to identify the maintenance association.

Options *number*—Number used to identify the maintenance domain to which the CFM message belongs.

Range: 0 through 7

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

Related Documentation

- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

linktrace (EX Series Switch Only)

Syntax

```
linktrace {
  age (30m | 10m | 1m | 30s | 10s);
  path-database-size path-database-size;
}
```

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management**]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Configure connectivity fault management linktrace parameters.

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

- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

loss-threshold (EX Series Switch Only)

Syntax loss-threshold *number*;

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management maintenance-domain** *domain-name* **maintenance-association** *ma-name* **continuity-check**]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Configure the number of continuity check messages that can be lost before the remote MEP is marked as down.

Options ***number***—Number of continuity check messages that can be lost before the remote MEP is marked down.

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

Related Documentation

- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

maintenance-association (EX Series Switch Only)

Syntax

```
maintenance-association ma-name {
  continuity-check {
    hold-interval minutes;
    interval (10m | 10s | 1m | 1s| 100ms);
    loss-threshold number;
  }
  mep mep-id {
    auto-discovery;
    direction down;
    interface interface-name;
    remote-mep mep-id {
      action-profile profile-name;
    }
  }
}
```

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management maintenance-domain** *domain-name*]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Configure the name of the maintenance association in IEEE-compliant format.

Options ***ma-name***—The name of the maintenance association within the maintenance domain.

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

- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

maintenance-domain (EX Series Switch Only)

Syntax

```
maintenance-domain domain-name {
  level number;
  mip-half-function (none | default |explicit);
  name-format (character-string | none | dns | mac+2oct);
  maintenance-association ma-name {
    continuity-check {
      hold-interval minutes;
      interval (10m | 10s | 1m | 1s| 100ms);
      loss-threshold number;
    }
    mep mep-id {
      auto-discovery;
      direction down;
      interface interface-name;
      remote-mep mep-id {
        action-profile profile-name;
      }
    }
  }
}
```

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management**]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Configure the name of the maintenance domain in IEEE-compliant format.

Options ***domain-name***—The name for the maintenance domain.

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

- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

mep (EX Series Switch Only)

Syntax

```
mep mep-id {
  auto-discovery;
  direction down;
  interface interface-name;
  remote-mep mep-id {
    action-profile profile-name;
  }
}
```

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management maintenance-domain** *domain-name* **maintenance-association** *ma-name*]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Configure the numeric identifier of the maintenance association end point (MEP) within the maintenance association.

Options ***mep-id***—Numeric identifier of the MEP.

Range: 1 through 8191

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

- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

mip-half-function (EX Series Switch Only)

Syntax mip-half-function (none | default | explicit);

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management maintenance-domain** *domain-name*]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Specify the OAM Ethernet CFM maintenance domain MIP half functions.

NOTE: Whenever a MIP is configured, the MIP half function value for all maintenance domains and maintenance associations must be the same.

Options **none**—Specify to not use the mip-half-function.

default—Specify to use the default mip-half-function.

explicit—Specify an explicit mip-half-function.

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

Related Documentation

- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

name-format (EX Series Switch Only)

Syntax name-format (character-string | none | dns | mac+2oct);

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management maintenance-domain** *domain-name*]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Specify the format of the maintenance domain name.

Options **character-string**—The name is an ASCII character string.

none—Name format **none** means that maintenance domain name is not used.

dns—Name is in domain name service (DNS) format. For example: www.juniper.net.

mac+2oct—Name is the MAC address plus a two-octet maintenance association identifier. For example: 08:00:22:33:44:55.100.

Default: character-string

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

Related Documentation
- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

path-database-size (EX Series Switch Only)

Syntax path-database-size *path-database-size*;

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management linktrace**]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Specify the number of linktrace reply entries to be stored per linktrace request.

Options ***path-database-size***—Database size (number of entries stored per request).

Range: 1 through 500

Default: 100

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

Related Documentation
- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

remote-mep (EX Series Switch Only)

Syntax

```
remote-mep mep-id {
    action-profile profile-name;
}
```

Hierarchy Level [edit protocols **oam ethernet connectivity-fault-management maintenance-domain** *domain-name* **maintenance-association** *ma-name* **mep** *mep-id*]

Release Information Statement introduced in Junos OS Release 10.2 for EX Series switches.

Description Specify the numeric identifier of the remote maintenance association end point (MEP) within the maintenance association.

Options ***mep-id***—Specify the numeric identifier of the MEP.

Range: 1 through 8191

The remaining statement is explained separately.

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

Related Documentation

- Configuring Ethernet OAM Connectivity Fault Management (CLI Procedure) on page 252
- *Junos OS Network Interfaces Configuration Guide*

Operational Commands for Ethernet OAM Connectivity Fault Management

clear oam ethernet connectivity-fault-management statistics

Syntax clear oam ethernet connectivity-fault-management statistics
<interface *ethernet-interface-name*>
<level *md-level*>

Release Information Command introduced in Junos OS Release 10.2 for EX Series switches.

Description Clear all statistics maintained by CFM.

Options

interface *ethernet-interface-name*—(Optional) Clear CFM statistics only for MEPs attached to the specified Ethernet physical interface.

level *level*—(Optional) Clear CFM statistics only for MEPs within CFM maintenance domains (MDs) of the specified level.

Required Privilege Level clear

Related Documentation

- show oam ethernet connectivity-fault-management interfaces on page 281
- show oam ethernet connectivity-fault-management linktrace path-database on page 287
- show oam ethernet connectivity-fault-management mip on page 295

List of Sample Output clear oam ethernet connectivity-fault-management statistics on page 276

Output Fields When you enter this command, you are provided feedback on the status of your request.

clear oam ethernet connectivity-fault-management statistics

```
user@host> clear oam ethernet connectivity-fault-management statistics
Cleared statistics of all CFM sessions
```

show oam ethernet connectivity-fault-management forwarding-state

Syntax **show oam ethernet connectivity-fault-management forwarding-state <brief | detail | extensive>**

Release Information Command introduced in Junos OS Release 10.2 for EX Series switches.

Description Display IEEE 802.1ag Operation, Administration, and Management (OAM) connectivity fault management forwarding state information for Ethernet interfaces.

Options interface *interface-name*—Display forwarding state information for the specified Ethernet interface only.

brief | detail | extensive—(Optional) Display the specified level of output.

Required Privilege Level view

Related Documentation

- **clear oam ethernet connectivity-fault-management statistics on page 276**
- **show oam ethernet connectivity-fault-management linktrace path-database on page 287**
- **show oam ethernet connectivity-fault-management mip on page 295**

List of Sample Output

show oam ethernet connectivity-fault-management forwarding-state on page 278
show oam ethernet connectivity-fault-management forwarding-state interface on page 278
show oam ethernet connectivity-fault-management forwarding-state interface detail on page 279
show oam ethernet connectivity-fault-management forwarding-state interface interface-name on page 279

Output Fields Table 20 on page 277 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 20: show oam ethernet connectivity-fault-management forwarding-state Output Fields

Field Name	Field Description	Level of Output
Interface name	Interface identifier.	All levels
Filter action	Filter action for messages at the level.	All levels
Nexthop type	Next-hop type.	All levels
Nexthop index	Next-hop index number.	**brief**
Level	Maintenance domain (MD) level.	**detail**

Table 20: show oam ethernet connectivity-fault-management forwarding-state Output Fields *(continued)*

Field Name	Field Description	Level of Output
Direction	MEP direction configured.	none
CEs	Number of customer edge (CE) interfaces.	All levels

show oam ethernet connectivity-fault-management forwarding-state

```
user@host> show oam ethernet connectivity–fault-management forwarding-state
CEs: 3

  Maintenance domain forwarding state:

  Level    Direction      Filter action     Nexthop      Nexthop
                                            type         index
  0                       Drop              none
  1                       Drop              none
  2                       Drop              none
  3                       Drop              none
  4                       Drop              none
  5                       Drop              none
  6                       Drop              none
  7                       Drop              none
```

show oam ethernet connectivity-fault-management forwarding-state interface

```
user@host> show oam ethernet connectivity-fault-management forwarding-state interface
Interface name: ge-3/0/0.0
  Maintenance domain forwarding state:

  Level    Direction      Filter action     Nexthop      Nexthop
                                            type         index
  0                       Drop              none
  1                       Drop              none
  2                       Drop              none
  3                       Drop              none
  4                       Drop              none
  5                       Drop              none
  6                       Drop              none
  7        down           Receive           none

Interface name: xe-0/0/0.0
Instance name: __+bd1__
  Maintenance domain forwarding state:

  Level    Direction      Filter action     Nexthop      Nexthop
                                            type         index
  0                       Drop              none
  1                       Drop              none
  2                       Drop              none
  3                       Drop              none
  4                       Drop              none
  5                       Drop              none
  6                       Drop              none
  7        down           Receive           none
```

show oam ethernet connectivity-fault-management forwarding-state interface detail

```
user@host> show oam ethernet connectivity-fault-management forwarding-state interface
detail
Interface name: ge-3/0/0.0

  Level: 0
  Filter action: Drop
  Nexthop type: none

  Level: 1
  Filter action: Drop
  Nexthop type: none

  Level: 2
  Filter action: Drop
  Nexthop type: none

  Level: 3
  Filter action: Drop
  Nexthop type: none

  Level: 4
  Filter action: Drop
  Nexthop type: none

  Level: 5
  Filter action: Drop
  Nexthop type: none

  Level: 6
  Filter action: Drop
  Nexthop type: none

  Level: 7
  Direction: down
  Filter action: Receive
  Nexthop type: none

Interface name: xe-0/0/0.0

  Level: 0
  Filter action: Drop
  Nexthop type: none

  Level: 1
  Filter action: Drop
  Nexthop type: none

  ...
```

show oam ethernet connectivity-fault-management forwarding-state interface interface-name

```
user@host> show oam ethernet connectivity-fault-management forwarding-state interface
interface-name ge-3/0/0.0
Interface name: ge-3/0/0.0

  Maintenance domain forwarding state:

  Level    Direction      Filter action     Nexthop      Nexthop
                                            type         index
  0                       Drop              none
  1                       Drop              none
  2                       Drop              none
  3                       Drop              none
```

```
4                   Drop            none
5                   Drop            none
6                   Drop            none
7       down        Receive         none
```

show oam ethernet connectivity-fault-management interfaces

Syntax **show oam ethernet connectivity-fault-management interfaces**
<*ethernet-interface-name*>
<level *md-level*>
<brief | detail | extensive>

Release Information Command introduced in Junos OS Release 10.2 for EX Series switches.

Description Display IEEE 802.1ag Operation, Administration, and Management (OAM) connectivity fault management (CFM) database information for Ethernet interfaces.

Options brief | detail | extensive—(Optional) Display the specified level of output.

ethernet-interface-name—(Optional) Display CFM information only for CFM entities attached to the specified Ethernet interface.

level *md-level*—(Optional) Display CFM information for CFM identities enclosed within a maintenance domain of the specified level.

Required Privilege Level view

Related Documentation

- **clear oam ethernet connectivity-fault-management statistics on page 276**
- **show oam ethernet connectivity-fault-management linktrace path-database on page 287**
- **show oam ethernet connectivity-fault-management mip on page 295**

List of Sample Output
show oam ethernet connectivity-fault-management interfaces on page 284
show oam ethernet connectivity-fault-management interfaces detail on page 284
show oam ethernet connectivity-fault-management interfacesextensive on page 285
show oam ethernet connectivity-fault-management interfaces level on page 286
show oam ethernet connectivity-fault-management interfaces (Trunk Interfaces) on page 286

Output Fields Table 21 on page 281 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 21: show oam ethernet connectivity-fault-management interfaces Output Fields

Field Name	Field Description	Level of Output
Interface	Interface identifier.	All levels
Interface status	Local interface status.	All levels
Link status	Local link status. **Up**, **down**, or **oam-down**.	All levels

Table 21: show oam ethernet connectivity-fault-management interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
Maintenance domain name	Maintenance domain name.	**detail extensive**
Format (Maintenance domain)	Maintenance domain name format configured.	**detail extensive**
Level	Maintenance domain level configured.	All levels
Maintenance association name	Maintenance association name.	**detail extensive**
Format (Maintenance association)	Maintenance association name format configured.	**detail extensive**
Continuity-check status	Continuity-check status.	**detail extensive**
Interval	Continuity-check message interval.	**detail extensive**
Loss-threshold	Lost continuity-check message threshold.	**detail extensive**
MEP identifier	Maintenance association end point (MEP) identifier.	All levels
Neighbours	Number of MEP neighbors.	All levels
Direction	MEP direction configured.	**detail extensive**
MAC address	MAC address configured for the MEP.	**detail extensive**
MEP status	Indicates the status of the Connectivity Fault Management (CFM) protocol running on the MEP: **Running**, **inactive**, **disabled**, or **unsupported**.	**detail extensive**
Remote MEP not receiving CCM	Whether the remote MEP is not receiving connectivity check messages (CCMs).	**detail extensive**
Erroneous CCM received	Whether erroneous CCMs have been received.	**detail extensive**
Cross-connect CCM received	Whether cross-connect CCMs have been received.	**detail extensive**
RDI sent by some MEP	Whether 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.	**detail extensive**
CCMs sent	Number of CCMs transmitted.	**detail extensive**

Table 21: show oam ethernet connectivity-fault-management interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
CCMs received out of sequence	Number of CCMs received out of sequence.	**detail extensive**
LBMs sent	Number of loopback request messages (LBMs) sent.	**detail extensive**
Valid in-order LBRs received	Number of loopback response messages (LBRs) received that were valid messages and in sequence.	**detail extensive**
Valid out-of-order LBRs received	Number of LBRs received that were valid messages and not in sequence.	**detail extensive**
LBRs received with corrupted data	Number of LBRs received that were corrupted.	**detail extensive**
LBRs sent	Number of LBRs transmitted.	**detail extensive**
LTMs sent	Linktrace messages (LTMs) transmitted.	**detail extensive**
LTMs received	Linktrace messages received.	**detail extensive**
LTRs sent	Linktrace responses (LTRs) transmitted.	**detail extensive**
LTRs received	Linktrace responses received.	**detail extensive**
Sequence number of next LTM request	Sequence number of next LTM request to be transmitted.	**detail extensive**
1DMs sent	If the interface is attached to an initiator MEP for a one-way ETH-DM session: 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**.	**detail extensive**
Valid 1DMs received	If the interface is attached to a receiver MEP for a one-way ETH-DM session: Number of valid 1DM frames received. For all other cases, this field displays **0**.	**detail extensive**
Invalid 1DMs received	If the interface is attached to a receiver MEP for a one-way ETH-DM session: Number of invalid 1DM frames received. For all other cases, this field displays **0**.	**detail extensive**
DMMs sent	If the interface is attached to an initiator MEP for a two-way ETH-DM session: Number of Delay Measurement Message (DMM) PDU frames sent to the peer MEP in this session. For all other cases, this field displays **0**.	**detail extensive**

Table 21: show oam ethernet connectivity-fault-management interfaces Output Fields *(continued)*

Field Name	Field Description	Level of Output
DMRs sent	If the interface is attached to a responder MEP for a two-way ETH-DM session: Number of Delay Measurement Reply (DMR) frames sent. For all other cases, this field displays **0**.	**detail extensive**
Valid DMRs received	If the interface is attached to an initiator MEP for a two-way ETH-DM session: Number of valid DMRs received. For all other cases, this field displays **0**.	**detail extensive**
Invalid DMRs received	If the interface is attached to an initiator MEP for a two-way ETH-DM session: Number of invalid DMRs received. For all other cases, this field displays **0**.	**detail extensive**
Remote MEP count	Number of remote MEPs.	**extensive**
Identifier (remote MEP)	MEP identifier of the remote MEP.	**extensive**
MAC address (remote MEP)	MAC address of the remote MEP.	**extensive**
State (remote MEP)	State of the remote MEP.	**extensive**
Interface (remote MEP)	Interface of the remote MEP.	**extensive**

show oam ethernet connectivity-fault-management interfaces

```
user@host> show oam ethernet connectivity-fault-management interfaces
Interface       Link       Status          Level       MEP          Neighbours
                                                       Identifier
ge-1/1/0.0      Up         Active          0           2            1
ge-1/1/0.1      Up         Active          0           2            1
ge-1/1/0.10     Up         Active          0           2            1
ge-1/1/0.100    Up         Active          0           2            1
ge-1/1/0.101    Up         Active          0           2            1
ge-1/1/0.102    Up         Active          0           2            1
ge-1/1/0.103    Up         Active          0           2            1
ge-1/1/0.104    Up         Active          0           2            1
ge-1/1/0.105    Up         Active          0           2            1
ge-1/1/0.106    Up         Active          0           2            1

...
```

show oam ethernet connectivity-fault-management interfaces detail

```
user@host> show oam ethernet connectivity-fault-management interfaces detail
Interface name: ge-5/2/9.0, Interface status: Active, Link status: Up
  Maintenance domain name: md0, Format: string, Level: 5
    Maintenance association name: ma1, Format: string
    Continuity-check status: enabled, Interval: 100ms, Loss-threshold: 3 frames
    MEP identifier: 1, Direction: down, MAC address: 00:90:69:0b:4b:94
```

```
    MEP status: running
    Defects:
      Remote MEP not receiving CCM                : no
      Erroneous CCM received                      : yes
      Cross-connect CCM received                  : no
      RDI sent by some MEP                        : yes
    Statistics:
      CCMs sent                                   : 76
      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: 2
      Identifier    MAC address        State    Interface
       2001     00:90:69:0b:7f:71       ok    ge-5/2/9.0
       4001     00:90:69:0b:09:c5       ok    ge-5/2/9.0
```

show oam ethernet connectivity-fault-management interfaces extensive

```
user@host> show oam ethernet connectivity-fault-management interfaces extensive
Interface name: ge-5/2/9.0, Interface status: Active, Link status: Up
  Maintenance domain name: md0, Format: string, Level: 5
    Maintenance association name: ma1, Format: string
    Continuity-check status: enabled, Interval: 100ms, Loss-threshold: 3 frames
    MEP identifier: 1, Direction: down, MAC address: 00:90:69:0b:4b:94
    MEP status: running
    Defects:
      Remote MEP not receiving CCM                : no
      Erroneous CCM received                      : yes
      Cross-connect CCM received                  : no
      RDI sent by some MEP                        : yes
    Statistics:
      CCMs sent                                   : 76
      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: 2
    Identifier    MAC address        State    Interface
     2001     00:90:69:0b:7f:71       ok    ge-5/2/9.0
     4001     00:90:69:0b:09:c5       ok    ge-5/2/9.0
```

show oam ethernet connectivity-fault-management interfaces level

```
user@host> show oam ethernet connectivity-fault-management interfaces level 7
Interface       Link       Status           Level       MEP          Neighbours
                                                        Identifier
ge-3/0/0.0      Up         Active           7           201          0
xe-0/0/0.0      Up         Active           7           203          1
```

show oam ethernet connectivity-fault-management interfaces (Trunk Interfaces)

```
user@host> show oam ethernet connectivity-fault-management interfaces

Interface                   Link      Status       Level  MEP          Neighbours
                                                          Identifier
ge-4/0/1.0, vlan 100        Up        Active       5      100          0
ge-10/3/10.4091, vlan 4091  Down      Inactive     4      400          0
ge-4/0/0.0                  Up        Active       6      200          0

user@host> show oam ethernet connectivity-fault-management interfaces ge-4/0/0.0

Interface                   Link      Status       Level  MEP          Neighbours
                                                          Identifier
ge-4/0/0.0                  Up        Active       6      200          0

user@host> show oam ethernet connectivity-fault-management interfaces ge-4/0/1.0 vlan 100

Interface                   Link      Status       Level  MEP          Neighbours
                                                          Identifier
ge-4/0/1.0, vlan 100        Up        Active       5      100          0

user@host> show oam ethernet connectivity-fault-management interfaces ge-10/3/10.4091
vlan 4091

Interface                   Link      Status       Level  MEP          Neighbours
                                                          Identifier
ge-10/3/10.4091, vlan 4091  Down      Inactive     4      400          0
```

show oam ethernet connectivity-fault-management linktrace path-database

Syntax **show oam ethernet connectivity-fault-management path-database *host* maintenance-association *ma-name* maintenance-domain *md-name mac-address***

Release Information Command introduced in Junos OS Release 10.2 for EX Series switches.

Description Display IEEE 802.1ag Operation, Administration, and Management (OAM) connectivity fault management maintenance linktrace database information.

Options mac-address—Display connectivity fault management path database information for the specified MAC address of the remote host.

maintenance-association *ma-name*—Display connectivity fault management path database information for the specified maintenance association.

maintenance-domain *md-name*—Display connectivity fault management path database information for the specified maintenance domain.

Required Privilege Level view

Related Documentation

- **clear oam ethernet connectivity-fault-management statistics on page 276**
- **show oam ethernet connectivity-fault-management interfaces on page 281**
- **show oam ethernet connectivity-fault-management mip on page 295**

List of Sample Output **show oam ethernet connectivity-fault-management path-database on page 288**
show oam ethernet connectivity-fault-management linktrace path-database (Two traceroute Commands) on page 288

Output Fields Table 22 on page 287 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 22: show oam ethernet connectivity-fault-management linktrace path-database Output Fields

Field Name	Field Description
Linktrace to	MAC address of the 802.1ag node to which the linktrace message is targeted.
Interface	Interface used by the local MEP to send the linktrace message (LTM).
Maintenance Domain	Maintenance domain identifier specified in the traceroute command.
Maintenance Association	Maintenance association identifier specified in the traceroute command.
Level	Maintenance domain level configured for the maintenance domain.

Table 22: show oam ethernet connectivity-fault-management linktrace path-database Output Fields *(continued)*

Field Name	Field Description
Local Mep	MEP identifier of the local MEP originating the linktrace.
Hop	Sequential hop count of the linktrace path.
TTL	Number of hops remaining in the linktrace message (LTM). The time to live (TTL) is decremented at each hop.
Source MAC address	MAC address of the 802.1ag maintenance intermediate point (MIP) that is forwarding the LTM.
Next hop MAC address	MAC address of the 802.1ag node that is the next hop in the LTM path.
Transaction Identifier	4-byte 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 linktrace responses (LTR), with a previously sent LTM.

show oam ethernet connectivity-fault-management path-database

```
user@host> show oam ethernet connectivity-fault-management path-database
maintenance-domain MD1 maintenance-association MA1 00:01:02:03:04:05
Linktrace to 00:01:02:03:04:05, Interface : ge-5/0/0.0
       Maintenance Domain: MD1, Level: 7
       Maintenance Association: MA1, Local Mep: 1

       Hop     TTL      Source MAC address        Next hop MAC address
       Transaction Identifier:100001
       1       63       00:00:aa:aa:aa:aa         00:00:bb:bb:bb:bb
       2       62       00:00:bb:bb:bb:bb         00:00:cc:cc:cc:cc
       3       61       00:00:cc:cc:cc:cc         00:01:02:03:04:05
       4       60       00:01:02:03:04:05         00:00:00:00:00:00
```

show oam ethernet connectivity-fault-management linktrace path-database (Two traceroute Commands)

```
user@host> show oam ethernet connectivity-fault-management path-database
maintenance-domain MD2 maintenance-association MA2 00:06:07:08:09:0A
Linktrace to 00:06:07:08:09:0A, Interface : ge-5/0/1.0
       Maintenance Domain: MD2, Level: 6
       Maintenance Association: MA2, Local Mep: 10

       Hop     TTL      Source MAC address        Next hop MAC address
       Transaction Identifier:100002
       1       63       00:00:aa:aa:aa:aa         00:00:bb:bb:bb:bb
       2       62       00:00:bb:bb:bb:bb         00:00:cc:cc:cc:cc
       3       61       00:00:cc:cc:cc:cc         00:06:07:08:09:0A
       4       60       00:06:07:08:09:0A         00:00:00:00:00:00
       Transaction Identifier:100003
       1       63       00:00:aa:aa:aa:aa         00:00:bb:bb:bb:bb
       2       62       00:00:bb:bb:bb:bb         00:00:cc:cc:cc:cc
       3       61       00:00:cc:cc:cc:cc         00:06:07:08:09:0A
       4       60       00:06:07:08:09:0A         00:00:00:00:00:00
```

show oam ethernet connectivity-fault-management mep-database

Syntax **show oam ethernet connectivity-fault-management mep-database**
maintenance-domain *domain-name*
maintenance-association *ma-name*
<local-mep *local-mep-id*>
<remote-mep *remote-mep-id*>

Release Information Command introduced in Junos OS Release 10.2 for EX Series switches.

Description Display IEEE 802.1ag Operation, Administration, and Management (OAM) connectivity fault management (CFM) database information for CFM maintenance association end points (MEPs) in a CFM session.

Options
maintenance-association *ma-name*—Display connectivity fault management information for the specified maintenance association.

maintenance-domain *domain-name*—Display connectivity fault management information for the specified maintenance domain.

local-mep *local-mep-id*—(Optional) Display connectivity fault management information for the specified local MEP only.

remote-mep *remote-mep-id*—(Optional) Display connectivity fault management information for the specified remote MEP only.

Required Privilege Level view

Related Documentation
- **clear oam ethernet connectivity-fault-management statistics on page 276**
- **show oam ethernet connectivity-fault-management interfaces on page 281**
- **show oam ethernet connectivity-fault-management mip on page 295**

List of Sample Output
show oam ethernet connectivity-fault-management mep-database on page 293
show oam ethernet connectivity-fault-management mep-database local-mep remote-mep on page 293
show oam ethernet connectivity-fault-management mep-database remote-mep (Action Profile Event) on page 293

Output Fields Table 23 on page 289 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 23: show oam ethernet connectivity-fault-management mep-database Output Fields

Field Name	Field Description
Maintenance domain name	Maintenance domain name.

Table 23: show oam ethernet connectivity-fault-management mep-database Output Fields *(continued)*

Field Name	Field Description
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 interval.
MEP identifier	Maintenance association end point (MEP) identifier.
Direction	MEP direction configured.
MAC address	MAC address configured for the MEP.
Auto-discovery	Whether automatic discovery is enabled or disabled.
Priority	Priority used for CCMs and linktrace messages transmitted by the MEP.
Interface name	Interface identifier.
Interface status	Local interface status.
Link status	Local link status.
Remote MEP not receiving CCM	Whether the remote MEP is not receiving CCMs.
Erroneous CCM received	Whether erroneous CCMs have been received.
Cross-connect CCM received	Whether cross-connect CCMs have been received.
RDI sent by some MEP	Whether 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.

Table 23: show oam ethernet connectivity-fault-management mep-database Output Fields *(continued)*

Field Name	Field Description
LBMs sent	Number of loopback messages (LBMs) sent.
Valid in-order LBRs received	Number of loopback response messages (LBRs) 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	Linktrace messages (LTMs) transmitted.
LTMs received	Linktrace messages received.
LTRs sent	Linktrace responses (LTRs) transmitted.
LTRs received	Linktrace responses received.
Sequence number of next LTM request	Sequence number of the next linktrace message request to be transmitted.
1DMs sent	If the MEP is an initiator for a one-way ETH-DM session: 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: 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: 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: 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: Number of Delay Measurement Reply (DMR) frames sent. For all other cases, this field displays **0**.

Table 23: show oam ethernet connectivity-fault-management mep-database Output Fields *(continued)*

Field Name	Field Description
Valid DMRs received	If the MEP is an initiator for a two-way ETH-DM session: 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: Number of invalid DMRs received. For all other cases, this field displays **0**.
Remote MEP identifier	MEP identifier of the remote MEP.
State (remote MEP)	State of the remote MEP: **idle**, **start**, **ok**, or **failed**.
MAC address	MAC address of the remote MEP.
Type	Whether the remote MEP MAC address was learned using automatic discovery or configured.
Interface	Interface of the remote MEP. A seven-digit number is appended if CFM is configured to run on a routing instance of type VPLS.
Last flapped	Date, time, and how long ago the remote MEP interface went from down to up. The format is **Last flapped: *year-month-day hours:minutes:seconds timezone* (*hours:minutes:seconds* ago)**. For example, **Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)**.
Remote defect indication	Whether the remote defect indication (RDI) bit is set in messages that have been received or transmitted.
Port status TLV	• In the Maintenance domain section, displays the last transmitted port status TLV value. • In the Remote MEP section, displays the last value of port status TLV received from the remote MEP. In the Action profile section, displays, the last occurred event **port-status-tlv blocked** event. This event occurred due to the reception of **blocked** value in the port status TLV from remote MEP.
Interface status TLV	• In the Maintenance domain section, displays the last transmitted interface status TLV value. • In the Remote MEP section, displays the last value of interface status TLV received from the remote MEP. In the Action profile section, if displays, the last occurred event interface-status-tlv event (either **lower-layer-down** or **down**). This event occurred due to the reception of either lower or **down** value in the interface status TLV from remote MEP.
Action profile	Name of the action profile occurrence associated with a remote MEP.
Last event	When an action profile occurs, displays the last event that triggered it.
Last event cleared	When all the configured and occurred events (under action profile) are cleared, then the action taken gets reverted (such as down interface is made up) and the corresponding time is noted and displayed.
Action	Action taken and the corresponding time of the action occurrence.

show oam ethernet connectivity-fault-management mep-database

```
user@host> show oam ethernet connectivity-fault-management mep-database
maintenance-domain vpls-vlan2000 maintenance-association vpls-vlan200
Maintenance domain name: vpls-vlan2000, Format: string, Level: 5
  Maintenance association name: vpls-vlan200, Format: string
  Continuity-check status: enabled, Interval: 100ms, Loss-threshold: 3 frames
  MEP identifier: 200, Direction: up, MAC address: 00:19:e2:b0:74:01
  Auto-discovery: enabled, 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                                    : 1476
    CCMs received out of sequence                : 0
    LBMs sent                                    : 85
    Remote MEP count: 1
    Identifier    MAC address        State    Interface
      100     00:19:e2:b2:81:4b       ok  vt-0/1/10.1049088
```

show oam ethernet connectivity-fault-management mep-database local-mep remote-mep

```
user@host> show oam ethernet connectivity-fault-management mep-database
maintenance-domain vpls-vlan2000 maintenance-association vpls-vlan200 local-mep 200
remote-mep 100
Maintenance domain name: vpls-vlan2000, Format: string, Level: 5
  Maintenance association name: vpls-vlan200, Format: string
  Continuity-check status: enabled, Interval: 100ms, Loss-threshold: 3 frames
  MEP identifier: 200, Direction: up, MAC address: 00:19:e2:b0:74:01
  Auto-discovery: enabled, Priority: 0
  Interface name: ge-0/0/1.0, Interface status: Active, Link status: Up

  Remote MEP identifier: 100, State: ok
    MAC address: 00:19:e2:b2:81:4b, Type: Learned
    Interface: vt-0/1/10.1049088
    Last flapped: Never
    Remote defect indication: false
    Port status TLV: none
    Interface status TLV: none
```

show oam ethernet connectivity-fault-management mep-database remote-mep (Action Profile Event)

```
user@host> show oam ethernet connectivity-fault-management mep-database
maintenance-domain md5 maintenance-association ma5 remote-mep 200
Maintenance domain name: md5, Format: string, Level: 5
  Maintenance association name: ma5, Format: string
  Continuity-check status: enabled, Interval: 1s, Loss-threshold: 3 frames
  MEP identifier: 100, Direction: down, MAC address: 00:05:85:73:e8:ad
  Auto-discovery: enabled, Priority: 0
  Interface status TLV: none, Port status TLV: none
  Interface name: ge-1/0/8.0, Interface status: Active, Link status: Up

  Remote MEP identifier: 200, State: ok
    MAC address: 00:05:85:73:96:1f, Type: Configured
    Interface: ge-1/0/8.0
    Last flapped: Never
    Remote defect indication: false
    Port status TLV: none
    Interface status TLV: lower-layer-down
    Action profile: juniper
```

```
Last event: Interface-status-tlv lower-layer-down
Action: Interface-down, Time: 2009-03-27 14:25:10 PDT (00:00:02 ago)
```

show oam ethernet connectivity-fault-management mip

Syntax show oam ethernet connectivity-fault-management mip
<qualifier>

Release Information Command introduced in Junos OS Release 10.2 for EX Series switches.

Description Display all the maintenance association intermediate points (MIPs) created in the system. Specify qualifiers to display specific MIPs.

Options ***qualifier***—(Optional) Display the specified MIP.

Required Privilege Level view

Related Documentation

- **show oam ethernet connectivity-fault-management interfaces on page 281**
- **show oam ethernet connectivity-fault-management linktrace path-database on page 287**

List of Sample Output **show oam ethernet connectivity-fault-management mip on page 295**

Output Fields Table 24 on page 295 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 24: show oam ethernet connectivity-fault-management mip Output Fields

Field Name	Field Description
MIP information for instance	Header for the MIP information showing the MIP name.
Interface	Interface type-dpc/pic/port.unit-number.
Level	MIP level configured.

show oam ethernet connectivity-fault-management mip

```
user@host> show oam ethernet connectivity-fault-management mip
MIP information for  __mip_name__

MIP information for  default-switch bd1

  Interface       Level
  ge-3/0/0.0          7
  ge-3/0/1.0          6
  ge-3/0/3.0          6
```

CHAPTER 7

Monitoring General Network Traffic and Hosts

Monitoring Hosts Using the J-Web Ping Host Tool

Purpose Use the J-Web ping host tool to verify that the host can be reached over the network. The output is useful for diagnosing host and network connectivity problems. The switch sends a series of ICMP echo (ping) requests to a specified host and receives ICMP echo responses.

Action To use the J-Web ping host tool:

1. Select **Troubleshoot>Ping Host**.
2. Next to Advanced options, click the expand icon.
3. Enter information into the Ping Host page, as described in Table 25 on page 297.

   The Remote Host field is the only required field.
4. Click **Start**.

   The results of the ping operation are displayed in the main pane . If no options are specified, each ping response is in the following format:

   ```
   bytes bytes from ip-address: icmp_seq=number ttl=number time=time
   ```
5. To stop the ping operation before it is complete, click **OK**.

Meaning Table 25 on page 297 lists the fields.

Table 25: J-Web Ping Host Field Summary

Field	Function	Your Action
Remote Host	Identifies the host to ping.	Type the hostname or IP address of the host to ping.
Advanced Options		

Table 25: J-Web Ping Host Field Summary *(continued)*

Field	Function	Your Action
Don't Resolve Addresses	Determines whether to display hostnames of the hops along the path.	• To suppress the display of the hop hostnames, select the check box. • To display the hop hostnames, clear the check box.
Interface	Specifies the interface on which the ping requests are sent.	Select the interface on which ping requests are sent from the list. If you select **any**, the ping requests are sent on all interfaces.
Count	Specifies the number of ping requests to send.	Select the number of ping requests to send from the list.
Don't Fragment	Specifies the Don't Fragment (DF) bit in the IP header of the ping request packet.	• To set the DF bit, select the check box. • To clear the DF bit, clear the check box.
Record Route	Sets the record route option in the IP header of the ping request packet. The path of the ping request packet is recorded within the packet and displayed in the main pane.	• To record and display the path of the packet, select the check box. • To suppress the recording and display of the path of the packet, clear the check box.
Type-of-Service	Specifies the type-of-service (TOS) value in the IP header of the ping request packet.	Select the decimal value of the TOS field from the list.
Routing Instance	Name of the routing instance for the ping attempt.	Select the routing instance name from the list.
Interval	Specifies the interval, in seconds, between transmissions of individual ping requests.	Select the interval from the list.
Packet Size	Specifies the size of the ping request packet.	Type the size, in bytes, of the packet. The size can be from 0 through 65468. The switch adds 8 bytes of ICMP header to the size.
Source Address	Specifies the source address of the ping request packet.	Type the source IP address.
Time-to-Live	Specifies the time-to-live (TTL) hop count for the ping request packet.	Select the TTL value from the list.
Bypass Routing	Determines whether ping requests are routed by means of the routing table. If the routing table is not used, ping requests are sent only to hosts on the interface specified in the Interface box. If the host is not on that interface, ping responses are not sent.	• To bypass the routing table and send the ping requests to hosts on the specified interface only, select the check box. • To route the ping requests using the routing table, clear the check box.

Related Documentation

- Monitoring Interface Status and Traffic

Monitoring Network Traffic Using Traceroute

Purpose Use the Traceroute page in the J-Web interface to trace a route between the switch and a remote host. You can use a traceroute task to display a list of waypoints between the switch and a specified destination host. The output is useful for diagnosing a point of failure in the path from the switch platform to the destination host and addressing network traffic latency and throughput problems.

Action To use the traceroute tool:

1. Select **Troubleshoot>Traceroute**.
2. Next to **Advanced options**, click the expand icon.
3. Enter information into the Traceroute page.

   The **Remote Host** field is the only required field.
4. Click **Start**.
5. To stop the traceroute operation before it is complete, click **OK** while the results of the traceroute operation are being displayed.

Meaning The switch generates the list of waypoints by sending a series of ICMP traceroute packets in which the time-to-live (TTL) value in the messages sent to each successive waypoint is incremented by 1. (The TTL value of the first traceroute packet is set to 1.) In this manner, each waypoint along the path to the destination host replies with a Time Exceeded packet from which the source IP address can be obtained.

The results of the traceroute operation are displayed in the main pane. If no options are specified, each line of the traceroute display is in the following format:

hop-number host (ip-address) [as-number] time1 time2 time3

The switch sends a total of three traceroute packets to each waypoint along the path and displays the round-trip time for each traceroute operation. If the switch times out before receiving a **Time Exceeded** message, an asterisk (*) is displayed for that round-trip time.

Table 26: Traceroute field summary

Field	Function	Your Action
Remote Host	Identifies the destination host of the traceroute.	Type the hostname or IP address of the destination host.
Advanced Options		
Don't Resolve Addresses	Determines whether hostnames of the hops along the path are displayed, in addition to IP addresses.	To suppress the display of the hop hostnames, select the check box.
Gateway	Specifies the IP address of the gateway to route through.	Type the gateway IP address.

Table 26: Traceroute field summary *(continued)*

Field	Function	Your Action
Source Address	Specifies the source address of the outgoing traceroute packets.	Type the source IP address.
Bypass Routing	Determines whether traceroute packets are routed by means of the routing table. If the routing table is not used, traceroute packets are sent only to hosts on the interface specified in the Interface box. If the host is not on that interface, traceroute responses are not sent.	To bypass the routing table and send the traceroute packets to hosts on the specified interface only, select the check box.
Interface	Specifies the interface on which the traceroute packets are sent.	From the list, select the interface on which traceroute packets are sent. If you select any, the traceroute requests are sent on all interfaces.
Time-to-live	Specifies the maximum time-to-live (TTL) hop count for the traceroute request packet.	From the list, select the TTL.
Type-of-Service	Specifies the type-of-service (TOS) value to include in the IP header of the traceroute request packet.	From the list, select the decimal value of the TOS field.
Resolve AS Numbers	Determines whether the autonomous system (AS) number of each intermediate hop between the router and the destination host is displayed.	To display the AS numbers, select the check box.

Related Documentation

- Connecting and Configuring an EX Series Switch (CLI Procedure)
- Connecting and Configuring an EX Series Switch (J-Web Procedure)
- Configuring Gigabit Ethernet Interfaces (J-Web Procedure)
- Monitoring Interface Status and Traffic

CHAPTER 8

Configuration Statements for General Network Management and Monitoring

archive-sites

Syntax

```
archive-sites {
    site-name;
}
```

Hierarchy Level [edit accounting-options file *filename*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Configure an archive site. If more than one site name is configured, an ordered list of archive sites for the accounting-data log files is created. When a file is archived, the router or switch attempts to transfer the file to the first URL in the list, moving to the next site only if the transfer does not succeed. The log file is stored at the archive site with a filename of the format ***router-name_log-filename_timestamp***.

Options ***site-name***—Any valid FTP URL to a destination. For information about specifying valid FTP URLs, see the *Junos System Basics Configuration Guide*.

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

Related Documentation

- Configuring Archive Sites

class-usage-profile

Syntax

```
class-usage-profile profile-name {
    file filename;
    interval minutes;
    source-classes {
        source-class-name;
    }
    destination-classes {
        destination-class-name;
    }
}
```

Hierarchy Level [edit accounting-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Create a class usage profile, which is used to log class usage statistics to a file in the **/var/log** directory. The class usage profile logs class usage statistics for the configured source classes on every interface that has **destination-class-usage** configured.

For information about configuring source classes, see the *Junos Routing Protocols Configuration Guide*. For information about configuring source class usage, see the *Junos Network Interfaces Configuration Guide*.

Options ***profile-name***—Name of the destination class profile.

The remaining statements are explained separately.

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

Related Documentation

- Configuring Class Usage Profiles

counters

Syntax

```
counters {
  counter-name;
}
```

Hierarchy Level [edit accounting-options **filter-profile** *profile-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Names of counters for which filter profile statistics are collected. The packet and byte counts for the counters are logged to a file in the **/var/log** directory.

Options ***counter-name***—Name of the counter.

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

Related Documentation
- Configuring the Counters

destination-classes

Syntax

```
destination-classes {
  destination-class-name;
}
```

Hierarchy Level [edit accounting-options **class-usage-profile** *profile-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the destination classes for which statistics are collected.

Options ***destination-class-name***—Name of the destination class to include in the source class usage profile.

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

Related Documentation
- Configuring a Class Usage Profile

fields (for Interface Profiles)

Syntax

```
fields {
  field-name;
}
```

Hierarchy Level [edit accounting-options **interface-profile** *profile-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Statistics to collect in an accounting-data log file for an interface.

Options ***field-name***—Name of the field:

- **input-bytes**—Input bytes
- **input-errors**—Generic input error packets
- **input-multicast**—Input packets arriving by multicast
- **input-packets**—Input packets
- **input-unicast**—Input unicast packets
- **output-bytes**—Output bytes
- **output-errors**—Generic output error packets
- **output-multicast**—Output packets sent by multicast
- **output-packets**—Output packets
- **output-unicast**—Output unicast packets

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

Related Documentation

- Configuring the Interface Profile

file (Associating with a Profile)

Syntax file *filename*;

Hierarchy Level [edit accounting-options **class-usage-profile** *profile-name*],
[edit accounting-options **filter-profile** *profile-name*],
[edit accounting-options **interface-profile** *profile-name*],
[edit accounting-options **mib-profile** *profile-name*],
[edit accounting-options **routing-engine-profile** *profile-name*]

Release Information Statement introduced before Junos OS Release 7.4.
The **[edit accounting-options mib-profile *profile-name*]** hierarchy added in Junos OS Release 8.2.
Statement introduced in Junos OS Release 9.0 for EX Series Switches.

Description Specify the accounting log file associated with the profile.

Options ***filename***—Name of the log file. You must specify a filename already configured in the **file** statement at the **[edit accounting-options]** hierarchy level.

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

Related Documentation

- Configuring the Interface Profile
- Configuring the Filter Profile
- Configuring the MIB Profile
- Configuring the Routing Engine Profile

file (Configuring a Log File)

Syntax

```
file filename {
  archive-sites {
    site-name;
  }
  files number;
  nonpersistent;
  size bytes;
  source-classes time;
  transfer-interval minutes;
}
```

Hierarchy Level [edit accounting-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify a log file to be used for accounting data.

Options ***filename***—Name of the file in which to write accounting data.

The remaining statements are explained separately.

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

Related Documentation

- Configuring Accounting-Data Log Files

files

Syntax files *number*;

Hierarchy Level [edit accounting-options **file** *filename*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the maximum number of log files to be used for accounting data.

Options ***number***—The maximum number of files. When a log file (for example, **profilelog**) reaches its maximum size, it is renamed **profilelog.0**, then **profilelog.1**, and so on, until the maximum number of log files is reached. Then the oldest log file is overwritten. The minimum value for ***number*** is 3 and the default value is 10.

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

Related Documentation
- Configuring Accounting-Data Log Files

filter-profile

Syntax

```
filter-profile profile-name {
    counters {
        counter-name;
    }
    file filename;
    interval minutes;
}
```

Hierarchy Level [edit accounting-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Create a profile to filter and collect packet and byte count statistics and write them to a file in the **/var/log** directory. To apply the profile to a firewall filter, you include the **accounting-profile** statement at the **[edit firewall filter *filter-name*]** hierarchy level. For more information about firewall filters, see the *Junos Network Interfaces Configuration Guide*.

Options ***profile-name***—Name of the filter profile.

The remaining statements are explained separately.

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

Related Documentation

- Configuring the Filter Profile

interface-profile

Syntax

```
interface-profile profile-name {
  fields {
    field-name;
  }
  file filename;
  interval minutes;
}
```

Hierarchy Level [edit accounting-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Create a profile to filter and collect error and packet statistics and write them to a file in the **/var/log** directory. You can specify an interface profile for either a physical or a logical interface.

Options ***profile-name***—Name of the interface profile.

The remaining statements are explained separately.

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

Related Documentation

- Configuring the Interface Profile

interval

Syntax interval *minutes*;

Hierarchy Level [edit accounting-options **class-usage-profile** *profile-name*],
[edit accounting-options **filter-profile** *profile-name*],
[edit accounting-options **interface-profile** *profile-name*],
[edit accounting-options **mib-profile** *profile-name*],
[edit accounting-options **routing-engine-profile** *profile-name*]

Release Information Statement introduced before Junos OS Release 7.4.
The **[edit accounting-options mib-profile *profile-name*]** hierarchy level added in Junos OS Release 8.2.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify how often statistics are collected for the accounting profile.

Options ***minutes***—Length of time between each collection of statistics.

Range: 1 through 2880 minutes

Default: 30 minutes

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

Related Documentation

- Configuring the Interface Profile
- Configuring the Filter Profile
- Configuring the MIB Profile
- Configuring the Routing Engine Profile

mib-profile

Syntax

```
mib-profile profile-name {
    file filename;
    interval minutes;
    object-names {
        mib-object-name;
    }
    operation operation-name;
}
```

Hierarchy Level [edit accounting-options]

Release Information Statement introduced in Junos OS Release 8.2.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Create a MIB profile to collect selected MIB statistics and write them to a file in the **/var/log** directory.

Options ***profile-name***—Name of the MIB statistics profile.

The remaining statements are explained separately.

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

Related Documentation

- Configuring the MIB Profile

object-names

Syntax
```
object-names {
  mib-object-name;
}
```

Hierarchy Level [edit accounting-options **mib-profile** *profile-name*]

Release Information Statement introduced in Junos OS Release 8.2.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the name of each MIB object for which MIB statistics are collected for an accounting-data log file.

Options ***mib-object-name***—Name of a MIB object. You can specify more than one MIB object name.

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

Related Documentation
- Configuring the MIB Profile

operation

Syntax operation *operation-name*;

Hierarchy Level [edit accounting-options **mib-profile** *profile-name*]

Release Information Statement introduced in Junos OS Release 8.2.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the name of the operation used to collect MIB statistics for an accounting-data log file.

Options ***operation-name***—Name of the operation to use. You can specify a **get**, **get-next**, or **walk** operation.

Default: walk

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

Related Documentation
- Configuring the MIB Profile

routing-engine-profile

Syntax

```
routing-engine-profile profile-name {
  fields {
    field-name;
  }
  file filename;
  interval minutes;
}
```

Hierarchy Level [edit accounting-options]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Create a Routing Engine profile to collect selected Routing Engine statistics and write them to a file in the **/var/log** directory.

Options ***profile-name***—Name of the Routing Engine statistics profile.

The remaining statements are explained separately.

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

Related Documentation

- Configuring the Routing Engine Profile

size

Syntax size *bytes*;

Hierarchy Level [edit accounting-options **file** *filename*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify attributes of an accounting-data log file.

Options ***bytes***—Maximum size of each log file, in bytes, kilobytes (KB), megabytes (MB), or gigabytes (GB). When a log file (for example, **profilelog**) reaches its maximum size, it is renamed **profilelog.0**, then **profilelog.1**, and so on, until the maximum number of log files is reached. Then the oldest log file is overwritten. If you do not specify a size, the file is closed, archived, and renamed when the time specified for the transfer interval is exceeded.

Syntax: ***x*** to specify bytes, ***x***k to specify KB, ***x***m to specify MB, ***x***g to specify GB

Range: 256 KB through 1 GB

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

Related Documentation
- Configuring the Maximum Size of the File

source-classes

Syntax
```
source-classes {
  source-class-name;
}
```

Hierarchy Level [edit accounting-options **class-usage-profile** *profile-name*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the source classes for which statistics are collected.

Options ***source-class-name***—Name of the source class to include in the class usage profile.

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

Related Documentation
- Configuring a Class Usage Profile

start-time

Syntax start-time *time*;

Hierarchy Level [edit accounting-options file *filename*]

Release Information Statement introduced in Junos OS Release 8.2.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the start time for transfer of an accounting-data log file.

Options ***time***—Start time for file transfer.

Syntax: *YYYY-MM-DD.hh:mm*

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

Related Documentation

- Configuring the Start Time for File Transfer

transfer-interval

Syntax transfer-interval *minutes*;

Hierarchy Level [edit accounting-options file *filename*]

Release Information Statement introduced before Junos OS Release 7.4.
Statement introduced in Junos OS Release 9.0 for EX Series switches.

Description Specify the length of time the file remains open and receives new statistics before it is closed and transferred to an archive site.

Options ***minutes***—Time the file remains open and receives new statistics before it is closed and transferred to an archive site.

Range: 5 through 2880 minutes

Default: 30 minutes

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

Related Documentation

- Configuring the Transfer Interval of the File

CHAPTER 9

Operational Commands for General Network Management and Monitoring

monitor traffic

Syntax

monitor traffic
<absolute-sequence>
<brief | detail | extensive>
<count *count*>
<interface *interface-name*>
<layer2-headers>
<matching *matching*>
<no-domain-names>
<no-promiscuous>
<no-resolve>
<no-timestamp>
<print-ascii>
<print-hex>
<resolve-timeout>
<size *size*>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Display packet headers or packets received and sent from the Routing Engine.

NOTE:

- Using the **monitor-traffic** command can degrade router or switch performance.
- Delays from DNS resolution can be eliminated by using the **no-resolve** option.

Options

none—(Optional) Display packet headers transmitted through fxp0. On a TX Matrix Plus router, display packet headers transmitted through **em0**.

brief | detail | extensive—(Optional) Display the specified level of output.

absolute-sequence—(Optional) Display absolute TCP sequence numbers.

count *count*—(Optional) Specify the number of packet headers to display (0 through 1,000,000). The monitor traffic command quits automatically after displaying the number of packets specified.

interface *interface-name*—(Optional) Specify the interface on which the **monitor traffic** command displays packet data. If no interface is specified, the **monitor traffic** command displays packet data arriving on the lowest-numbered interface.

layer2-headers—(Optional) Display the link-level header on each line.

matching *matching*—(Optional) Display packet headers that match a regular expression. Use matching expressions to define the level of detail with which the **monitor traffic** command filters and displays packet data.

no-domain-names—(Optional) Suppress the display of the domain portion of hostnames. With the **no-domain-names** option enabled, the **monitor traffic** command displays only team for the hostname **team.company.net**.

no-promiscuous—(Optional) Do not put the interface into promiscuous mode.

no-resolve—(Optional) Suppress reverse lookup of the IP addresses.

no-timestamp—(Optional) Suppress timestamps on displayed packets.

print-ascii—(Optional) Display each packet in ASCII format.

print-hex—(Optional) Display each packet, except the link-level header, in hexadecimal format.

resolve-timeout *timeout*—(Optional) Amount of time the router or switch waits for each reverse lookup before timing out. You can set the timeout for between 1 and 4,294,967,295 seconds. The default is 4 seconds. To display each packet, use the **print-ascii**, **print-hex**, or **extensive** option.

size *size*—(Optional) Read but not display up to the specified number of bytes for each packet. When set to **brief** output, the default packet size is 96 bytes and is adequate for capturing IP, ICMP, UDP, and TCP packet data. When set to **detail** and **extensive** output, the default packet size is 1514. The **monitor traffic** command truncates displayed packets if the matched data exceeds the configured size.

Additional Information

In the **monitor traffic** command, you can specify an expression to match by using the **matching** option and including the expression in quotation marks:

```
monitor traffic matching "expression"
```

Replace ***expression*** with one or more of the match conditions listed in Table 27 on page 320.

Table 27: Match Conditions for the monitor traffic Command

Match Type	Condition	Description
Entity	**host** {*address* | *hostname*]	Matches packets that contain the specified address or hostname. The **host** match condition can be prepended with the protocol match conditions **arp**, **ip**, or **rarp**, or any of the directional match conditions.
	net *address*	Matches packets with source or destination addresses containing the specified network address.
	net *address***mask** *mask*	Matches packets containing the specified network address and subnet mask.
	port [*port-number* | *port-name*]	Matches packets containing the specified source or destination TCP or UDP port number or port name. In place of the numeric port address, you can specify a text synonym, such as **bgp** (179), **dhcp** (67), or **domain** (53) (the port numbers are also listed).
Directional	**dst**	Matches packets going to the specified destination. This match condition can be prepended to any of the entity type match conditions.
	src	Matches packets from a specified source. This match condition can be prepended to any of the entity type match conditions.
	src and **dst**	Matches packets that contain the specified source and destination addresses. This match condition can be prepended to any of the entity type match conditions.
	src or **dst**	Matches packets containing either of the specified addresses. This match condition can be prepended to any of the entity type match conditions.
Packet Length	**less** *value*	Matches packets shorter than or equal to the specified value, in bytes.
	greater *value*	Matches packets longer than or equal to the specified value, in bytes.

Table 27: Match Conditions for the monitor traffic Command *(continued)*

Match Type	Condition	Description
Protocol	**amt**	Matches all AMT packets. Use the extensive level of output to decode the inner IGMP packets in addition to the AMT outer packet.
	arp	Matches all ARP packets.
	ether	Matches all Ethernet packets.
	ether [broadcast | multicast]	Matches broadcast or multicast Ethernet frames. This match condition can be prepended with**src** and **dst**.
	ether *protocol* **[***address* **| (arp | ip | rarp)]**	Matches packets with the specified Ethernet address or Ethernet packets of the specified protocol type. The **ether protocol** arguments **arp**, **ip**, and **rarp** are also independent match conditions, so they must be preceded by a backslash (\) when used in the **ether protocol** match condition.
	icmp	Matches all ICMP packets.
	ip	Matches all IP packets.
	ip [broadcast | multicast]	Matches broadcast or multicast IP packets.
	ip protocol [*address* **| (icmp | igrp | tcp | udp)]**	Matches packets with the specified address or protocol type. The **ip protocol** arguments **icmp**, **tcp**, and **udp** are also independent match conditions, so they must be preceded by a backslash (\) when used in the **ip protocol** match condition.
	isis	Matches all IS-IS routing messages.
	rarp	Matches all RARP packets.
	tcp	Matches all TCP datagrams.
	udp	Matches all UDP datagrams.

To combine expressions, use the logical operators listed in Table 28 on page 321.

Table 28: Logical Operators for the monitor traffic Command

Logical Operator (Highest to Lowest Precedence)	Description
!	Logical NOT. If the first condition does not match, the next condition is evaluated.

Table 28: Logical Operators for the monitor traffic Command *(continued)*

Logical Operator (Highest to Lowest Precedence)	Description
&&	Logical AND. If the first condition matches, the next condition is evaluated. If the first condition does not match, the next condition is skipped.
||	Logical OR. If the first condition matches, the next condition is skipped. If the first condition does not match, the next condition is evaluated.
( )	Group operators to override default precedence order. Parentheses are special characters, each of which must be preceded by a backslash (\).

You can use relational operators to compare arithmetic expressions composed of integer constants, binary operators, a length operator, and special packet data accessors. The arithmetic expression matching condition uses the following syntax:

```
monitor traffic matching "ether[0] & 1 != 0""arithmetic_expression relational_operator
  arithmetic_expression"
```

The packet data accessor uses the following syntax:

```
protocol [byte-offset <size>]
```

The optional *size* field represents the number of bytes examined in the packet header. The available values are **1, 2,** or **4** bytes.The following sample command captures all multicast traffic:

```
user@host> monitor traffic matching "ether[0] & 1 != 0"
```

To specify match conditions that have a numeric value, use the arithmetic and relational operators listed in Table 29 on page 323.

NOTE: Because the Packet Forwarding Engine removes Layer 2 header information before sending packets to the Routing Engine:

- The monitor traffic command cannot apply match conditions to inbound traffic.
- The monitor traffic interface command also cannot apply match conditions for Layer 3 and Layer 4 packet data, resulting in the match pipe option (| match) for this command for Layer 3 and Layer 4 packets not working either. Therefore, ensure that you specify match conditions as described in this command summary. For more information about match conditions, see Table 27 on page 320.
- The 802.1Q VLAN tag information included in the Layer 2 header is removed from all inbound traffic packets. As the monitor traffic interface ae[*x*] command for aggregated Ethernet interfaces (such as ae0) only shows inbound traffic data, the command does not show VLAN tag information in the output.

Table 29: Arithmetic and Relational Operators for the monitor traffic Command

Arithmetic or Relational Operator	Description
Arithmetic Operator	
+	Addition operator.
-	Subtraction operator.
/	Division operator.
&	Bitwise AND.
*	Bitwise exclusive OR.
|	Bitwise inclusive OR.
Relational Operator (Highest to Lowest Precedence)	
<=	If the first expression is less than or equal to the second, the packet matches.
>=	If the first expression is greater than or equal to the second, the packet matches.
<	If the first expression is less than the second, the packet matches.
>	If the first expression is greater than the second, the packet matches.
=	If the compared expressions are equal, the packet matches.
!=	If the compared expressions are unequal, the packet matches.

Required Privilege Level trace and maintenance

List of Sample Output

monitor traffic count on page 323
monitor traffic detail count on page 324
monitor traffic extensive (Absolute Sequence) on page 324
monitor traffic extensive (Relative Sequence) on page 324
monitor traffic extensive count on page 324
monitor traffic interface on page 325
monitor traffic matching on page 325
monitor traffic (TX Matrix Plus Router) on page 325

Output Fields When you enter this command, you are provided feedback on the status of your request.

monitor traffic count

```
user@host> monitor traffic count 2
listening on fxp0
04:35:49.814125  In my-server.home.net.1295 > my-server.work.net.telnet: . ack
```

```
4122529478 win 16798 (DF)
04:35:49.814185
Out my-server.work.net.telnet > my-server.home.net.1295: P
1:38(37) ack 0 win 17680 (DF) [tos 0x10]
```

monitor traffic detail count

```
user@host> monitor traffic detail count 2
listening on fxp0
04:38:16.265864  In my-server.home.net.1295 > my-server.work.net.telnet: . ack
4122529971 win 17678 (DF) (ttl 121, id 6812)
04:38:16.265926
Out my-server.work.net.telnet.telnet > my-server.home.net.1295: P 1:38(37) ack 0
 win 17680 (DF) [tos 0x10]  (ttl 6)
```

monitor traffic extensive (Absolute Sequence)

```
user@host> monitor traffic extensive no-domain-names no-resolve no-timestamp count 20
matching "tcp" absolute-sequence
listening on fxp0
 In 207.17.136.193.179 > 192.168.4.227.1024: . 4042780859:4042780859(0)
ack 1845421797 win 16384 <nop,nop,timestamp 4935628 965951> [tos 0xc0]  (ttl )
 In 207.17.136.193.179 > 192.168.4.227.1024: P 4042780859:4042780912(53)
ack 1845421797 win 16384
<nop,nop,timestamp 4935628 965951>:
BGP [|BGP UPDAT)
In 192.168.4.227.1024 > 207.17.136.193.179:
P 1845421797:1845421852(55) ack 4042780912 win 16384 <nop,nop,timestamp 965951
4935628>: BGP [|BGP UPDAT)
...
```

monitor traffic extensive (Relative Sequence)

```
user@host> monitor traffic extensive no-domain-names no-resolve no-timestamp count 20
matching "tcp"
listening on fxp0
 In 172.24.248.221.1680 > 192.168.4.210.23: . 396159737:396159737(0)
ack 1664980689 win 17574 (DF) (ttl 121, id 50003)
Out 192.168.4.210.23 > 172.24.248.221.1680: P 1:40(39)
ack 0 win 17680 (DF) [tos 0x10]  (ttl 64, id 5394)
 In 207.17.136.193.179 > 192.168.4.227.1024: P 4042775817:4042775874(57)
ack 1845416593 win 16384 <nop,nop,timestamp 4935379 965690>: BGP [|BGP UPDAT)
...
```

monitor traffic extensive count

```
user@host>  monitor traffic extensive count 5 no-domain-names no-resolve
listening on fxp013:18:17.406933
In 192.168.4.206.2723610880 > 172.17.28.8.2049:
40 null (ttl 64, id 38367)13:18:17.407577
In 172.17.28.8.2049 > 192.168.4.206.2723610880:
reply ok 28 null (ttl 61, id 35495)13:18:17.541140
In 0:e0:1e:42:9c:e0 0:e0:1e:42:9c:e0 9000 60:
0000 0100 0000 0000
0000 0000 0000 0000
0000 0000 0000 0000
0000 0000 0000 0000
0000 0000 0000 0000
0000 0000 000013:18:17.591513
In 172.24.248.156.4139 > 192.168.4.210.23: .
3556964918:3556964918(0)
ack 295526518 win 17601 (DF)
(ttl 121, id 14)13:18:17.591568
Out 192.168.4.210.23 >
172.24.248.156.4139: P 1:40(39)
```

```
ack 0 win 17680 (DF) [tos 0x10]
(ttl 64, id 52376)
```

monitor traffic interface

```
user@host> monitor traffic interface fxp0
listening on fxp0.0
18:17:28.800650  In server.home.net.723 > host1-0.lab.home.net.log
18:17:28.800733 Out host2-0.lab.home.net.login > server.home.net.7
18:17:28.817813  In host30.lab.home.net.syslog > host40.home0
18:17:28.817846  In host30.lab.home.net.syslog > host40.home0
...
```

monitor traffic matching

```
user@host> monitor traffic matching "net 192.168.1.0/24"
verbose output suppressed, use <detail> or <extensive> for full protocol decode
Address resolution is ON. Use <no-resolve> to avoid any reverse lookup delay.
Address resolution timeout is 4s.
Listening on fxp0, capture size 96 bytes

Reverse lookup for 192.168.1.255 failed (check DNS reachability).
Other reverse lookup failures will not be reported.
Use no-resolve to avoid reverse lookups on IP addresses.

21:55:54.003511  In IP truncated-ip - 18 bytes missing!
192.168.1.17.netbios-ns > 192.168.1.255.netbios-ns: UDP, length 50
21:55:54.003585 Out IP truncated-ip - 18 bytes missing!
192.168.1.17.netbios-ns > 192.168.1.255.netbios-ns: UDP, length 50
21:55:54.003864  In arp who-has 192.168.1.17 tell 192.168.1.9
...
```

monitor traffic (TX Matrix Plus Router)

```
user@host> monitor traffic
verbose output suppressed, use <detail> or <extensive> for full protocol decode
Address resolution is ON. Use <no-resolve> to avoid any reverse lookup delay.
Address resolution timeout is 4s.
Listening on em0, capture size 96 bytes
04:11:59.862121 Out IP truncated-ip - 25 bytes missing!
summit-em0.englab.juniper.net.syslog > sv-log-01.englab.juniper.net.syslog:
SYSLOG kernel.info, length: 57
04:11:59.862303
Out IP truncated-ip - 25 bytes missing!
summit-em0.englab.juniper.net.syslog >
sv-log-02.englab.juniper.net.syslog: SYSLOG kernel.info, length: 57
04:11:59.923948
In IP aj-em0.englab.juniper.net.65235 >
summit-em0.englab.juniper.net.telnet: .
ack 1087492766 win 33304 <nop,nop,timestamp 42366734 993490>
04:11:59.923983 Out IP truncated-ip - 232 bytes missing!
summit-em0.englab.juniper.net.telnet > aj-em0.englab.juniper.net.65235: P
1:241(240) ack 0 win 33304
<nop,nop,timestamp 993590 42366734>
04:12:00.022900
In IP aj-em0.englab.juniper.net.65235 >
summit-em0.englab.juniper.net.telnet: . ack 241 win 33304 <nop,nop,timestamp
42366834 993590>
04:12:00.141204
In IP truncated-ip - 40 bytes missing!
ipg-lnx-shell1.juniper.net.46182 > summit-em0.englab.juniper.net.telnet: P
2950530356:2950530404(48) ack 485494987 win 63712
<nop,nop,timestamp 1308555294 987086>
04:12:00.141345
Out IP summit-em0.englab.juniper.net.telnet >
ipg-lnx-shell1.juniper.net.46182: P 1:6(5)
```

```
ack 48 win 33304
<nop,nop,timestamp 993809 1308555294>
04:12:00.141572
In IP ipg-lnx-shell1.juniper.net.46182 >
summit-em0.englab.juniper.net.telnet: .
ack 6 win 63712
<nop,nop,timestamp 1308555294 993809>
04:12:00.141597
Out IP summit-em0.englab.juniper.net.telnet >
ipg-lnx-shell1.juniper.net.46182: P 6:10(4) ack 48 win 33304
<nop,nop,timestamp 993810 1308555294>
04:12:00.141821
In IP ipg-lnx-shell1.juniper.net.46182 >
summit-em0.englab.juniper.net.telnet: .
ack 10 win 63712 <nop,nop,timestamp 1308555294 993810>
04:12:00.141837 Out IP truncated-ip - 2 bytes missing!
summit-em0.englab.juniper.net.telnet >
ipg-lnx-shell1.juniper.net.46182: P 10:20(10) ack 48 win 33304
<nop,nop,timestamp 993810 1308555294>
04:12:00.142072
In IP ipg-lnx-shell1.juniper.net.46182 >
summit-em0.englab.juniper.net.telnet: . ack 20 win 63712
<nop,nop,timestamp 1308555294 993810>
04:12:00.142089 Out IP summit-em0.englab.juniper.net.telnet >
ipg-lnx-shell1.juniper.net.46182: P 20:28(8) ack 48 win 33304 <nop,nop,timestamp
 993810 1308555294>
04:12:00.142321
In IP ipg-lnx-shell1.juniper.net.46182 >
summit-em0.englab.juniper.net.telnet: .
ack 28 win 63712 <nop,nop,timestamp 1308555294 993810>
04:12:00.142337
Out IP truncated-ip - 1 bytes missing!
summit-em0.englab.juniper.net.telnet >
ipg-lnx-shell1.juniper.net.46182: P 28:37(9) ack 48 win 33304 <nop,nop,timestamp
 993810 1308555294>
...
```

ping

Syntax

ping *host*
<bypass-routing>
<count *requests*>
<detail>
<do-not-fragment>
<inet | inet6>
<interface *source-interface*>
<interval *seconds*>
<logical-system (all | *logical-system-name*)>
<loose-source *value*>
<no-resolve>
<pattern *string*>
<rapid>
<record-route>
<routing-instance *routing-instance-name*>
<size *bytes*>
<source *source-address*>
<strict strict-source *value*>
<tos *type-of-service*>
<ttl *value*>
<verbose>
<wait *seconds*>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.

Description

Check host reachability and network connectivity. The **ping** command sends Internet Control Message Protocol (ICMP) ECHO_REQUEST messages to elicit ICMP ECHO_RESPONSE messages from the specified host. Type Ctrl+c to interrupt a ping command.

Options

host—IP address or hostname of the remote system to ping.

bypass-routing—(Optional) Bypass the normal routing tables and send ping requests directly to a system on an attached network. If the system is not on a directly attached network, an error is returned. Use this option to ping a local system through an interface that has no route through it.

count *requests*—(Optional) Number of ping requests to send. The range of values is **1** through **2,000,000,000**. The default value is an unlimited number of requests.

detail—(Optional) Include in the output the interface on which the ping reply was received.

do-not-fragment—(Optional) Set the do-not-fragment (DF) bit in the IP header of the ping packets.

inet—(Optional) Ping Packet Forwarding Engine IPv4 routes.

inet6—(Optional) Ping Packet Forwarding Engine IPv6 routes.

interface *source-interface*—(Optional) Interface to use to send the ping requests.

interval *seconds*—(Optional) How often to send ping requests. The range of values, in seconds, is **1** through infinity. The default value is **1**.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

loose-source *value*—(Optional) Intermediate loose source route entry (IPv4). Open a set of values.

no-resolve—(Optional) Do not attempt to determine the hostname that corresponds to the IP address.

pattern *string*—(Optional) Specify a hexadecimal fill pattern to include in the ping packet.

rapid—(Optional) Send ping requests rapidly. The results are reported in a single message, not in individual messages for each ping request. By default, five ping requests are sent before the results are reported. To change the number of requests, include the count option.

record-route—(Optional) Record and report the packet's path (IPv4).

routing-instance *routing-instance-name*—(Optional) Name of the routing instance for the ping attempt.

size *bytes*—(Optional) Size of ping request packets. The range of values, in bytes, is **0** through **65,468**. The default value is **56**, which is effectively 64 bytes because 8 bytes of ICMP header data are added to the packet.

source *source-address*—(Optional) IP address of the outgoing interface. This address is sent in the IP source address field of the ping request. If this option is not specified, the default address is usually the loopback interface (**lo.0**).

strict—(Optional) Use the strict source route option (IPv4).

strict-source *value*—(Optional) Intermediate strict source route entry (IPv4). Open a set of values.

tos *type-of-service*—(Optional) Set the type-of-service (ToS) field in the IP header of the ping packets. The range of values is **0** through **255**.

ttl *value*—(Optional) Time-to-live (TTL) value to include in the ping request (IPv6). The range of values is **0** through **255**.

verbose—(Optional) Display detailed output.

wait *seconds*—(Optional) Delay, in seconds, after sending the last packet. If this option is not specified, the default delay is **10** seconds. If this option is used without the count option, a default count of **5** packets is used.

Required Privilege Level network

List of Sample Output **ping hostname on page 329**

ping hostname size count on page 329
ping hostname rapid on page 329

Output Fields When you enter this command, you are provided feedback on the status of your request. An exclamation point (**!**) indicates that an echo reply was received. A period (**.**) indicates that an echo reply was not received within the timeout period. An **x** indicates that an echo reply was received with an error code these packets are not counted in the received packets count. They are accounted for separately.

ping hostname

```
user@host> ping skye
PING skye.net (192.168.169.254): 56 data bytes
64 bytes from 192.168.169.254: icmp_seq=0 ttl=253 time=1.028 ms
64 bytes from 192.168.169.254: icmp_seq=1 ttl=253 time=1.053 ms
64 bytes from 192.168.169.254: icmp_seq=2 ttl=253 time=1.025 ms
64 bytes from 192.168.169.254: icmp_seq=3 ttl=253 time=1.098 ms
64 bytes from 192.168.169.254: icmp_seq=4 ttl=253 time=1.032 ms
64 bytes from 192.168.169.254: icmp_seq=5 ttl=253 time=1.044 ms
^C [abort]
```

ping hostname size count

```
user@host> ping skye size 200 count 5
PING skye.net (192.168.169.254): 200 data bytes
208 bytes from 192.168.169.254: icmp_seq=0 ttl=253 time=1.759 ms
208 bytes from 192.168.169.254: icmp_seq=1 ttl=253 time=2.075 ms
208 bytes from 192.168.169.254: icmp_seq=2 ttl=253 time=1.843 ms
208 bytes from 192.168.169.254: icmp_seq=3 ttl=253 time=1.803 ms
208 bytes from 192.168.169.254: icmp_seq=4 ttl=253 time=17.898 ms

--- skye.net ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 1.759/5.075/17.898 ms
```

ping hostname rapid

```
user@host> ping skye rapid
PING skye.net (192.168.169.254): 56 data bytes
!!!!!
--- skye.net ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max/stddev = 0.956/0.974/1.025/0.026 ms
```

show snmp mib

Syntax show snmp mib (get | get-next | walk) (ascii | decimal) *object-id* .

Release Information Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
ascii and **decimal** options introduced in Junos OS Release 9.6.
ascii and **decimal** options introduced in Junos OS Release 9.6 for EX Series switches.

Description Display local Simple Network Management Protocol (SNMP) Management Information Base (MIB) object values.

Options get—Retrieve and display one or more SNMP object values.

get-next—Retrieve and display the next SNMP object values.

walk—Retrieve and display the SNMP object values that are associated with the requested object identifier (OID). When you use this option, the Junos OS displays the objects below the subtree that you specify.

ascii—Display the SNMP object's string indices as an ascii-key representation.

decimal—Display the SNMP object values in the decimal (default) format. The **decimal** option is the default option for this command. Therefore, issuing the **show snmp mib (get | get-next | walk) decimal object-id** and the **show snmp mib (get | get-next | walk) object-id** commands display the same output.

object-id—The object can be represented by a sequence of dotted integers (such as **1.3.6.1.2.1.2**) or by its subtree name (such as **interfaces**). When entering multiple objects, enclose the objects in quotation marks.

Required Privilege Level snmp—To view this statement in the configuration.

List of Sample Output
show snmp mib get on page 331
show snmp mib get (Multiple Objects) on page 331
show snmp mib get-next on page 331
show snmp mib get-next (Specify an OID) on page 331
show snmp mib walk on page 331
show snmp mib walk decimal on page 331
show snmp mib walk (ASCII) on page 331
show snmp mib walk (Multiple Indices) on page 331
show snmp mib walk decimal (Multiple Indices) on page 331

Output Fields Table 30 on page 331 describes the output fields for the **show snmp mib** command. Output fields are listed in the approximate order in which they appear.

Table 30: show snmp mib Output Fields

Field Name	Field Description
name	Object name and numeric instance value.
object value	Object value. The Junos OS translates OIDs into the corresponding object names.

show snmp mib get

```
user@host> show snmp mib get sysObjectID.0
sysObjectID.0 = jnxProductNameM20
```

show snmp mib get (Multiple Objects)

```
user@host> show snmp mib get ?sysObjectID.0 sysUpTime.0?
sysObjectID.0 = jnxProductNameM20
sysUpTime.0 = 1640992
```

show snmp mib get-next

```
user@host> show snmp mib get-next jnxMibs
jnxBoxClass.0 = jnxProductLineM20.0
```

show snmp mib get-next (Specify an OID)

```
user@host> show snmp mib get-next 1.3.6.1
sysDescr.0    = Juniper Networks, Inc. m20 internet router, kernel
Junos OS Release: 2004-1 Build date: build date UTC Copyright (c) 1996-2004 Juniper
 Networks, Inc.
```

show snmp mib walk

```
user@host> show snmp mib walk system
sysDescr.0    = Juniper Networks, Inc. m20 internet router, kernel
Junos OS Release #0: 2004-1 Build date: build date UTC Copyright (c) 1996-2004
Juniper Networks, Inc.
sysObjectID.0 = jnxProductNameM20
sysUpTime.0 = 1640992
sysContact.0 = Your contact
sysName.0 = my router
sysLocation.0 = building 1
sysServices.0 = 4
```

show snmp mib walk decimal

```
user@host show snmp mib walk decimal jnxUtilData
jnxUtilCounter32Value.102.114.101.100 = 100
```

show snmp mib walk (ASCII)

```
show snmp mib walk ascii jnxUtilData
jnxUtilCounter32Value."fred" = 100
```

show snmp mib walk (Multiple Indices)

```
show snmp mib walk ascii jnxFWCounterByteCount
jnxFWCounterByteCount."fe-1/3/0.0-i"."CLASS_BE-fe-1/3/0.0-i".2 = 0
jnxFWCounterByteCount."fe-1/3/0.0-i"."CLASS_CC-fe-1/3/0.0-i".2 = 0
jnxFWCounterByteCount."fe-1/3/0.0-i"."CLASS_RT-fe-1/3/0.0-i".2 = 0
.......
```

show snmp mib walk decimal (Multiple Indices)

```
show snmp mib walk ascii jnxFWCounterByteCount
jnxFWCounterByteCount."fe-1/3/0.0-i"."CLASS_BE-fe-1/3/0.0-i".2 = 0
jnxFWCounterByteCount."fe-1/3/0.0-i"."CLASS_CC-fe-1/3/0.0-i".2 = 0
jnxFWCounterByteCount."fe-1/3/0.0-i"."CLASS_RT-fe-1/3/0.0-i".2 = 0
.......
```

traceroute

Syntax

traceroute *host*
<as-number-lookup>
<bypass-routing>
<clns>
<gateway *address*>
<inet | inet6>
<interface *interface-name*>
<logical system (all | *logical-system-name*)>
<mpls (ldp *FEC address* | rsvp *label-switched-path-name*)>
<no-resolve>
<routing-instance *routing-instance-name*>
<source *source-address*>
<tos *value*>
<ttl *value*>
<wait *seconds*>

Release Information

Command introduced before Junos OS Release 7.4.
Command introduced in Junos OS Release 9.0 for EX Series switches.
mpls option introduced in Junos OS Release 9.2.

Description

Display the route packets take to a specified network host. Use **traceroute** as a debugging tool to locate points of failure in a network.

Options

host—IP address or name of remote host.

as-number-lookup—(Optional) Display the autonomous system (AS) number of each intermediate hop on the path from the host to the destination.

bypass-routing—(Optional) Bypass the normal routing tables and send requests directly to a system on an attached network. If the system is not on a directly attached network, an error is returned. Use this option to display a route to a local system through an interface that has no route through it.

clns—(Optional) Trace the route belonging to Connectionless Network Service (CLNS).

gateway *address*—(Optional) Address of a router or switch through which the route transits.

inet | inet6—(Optional) Trace the route belonging to IPv4 or IPv6, respectively.

interface *interface-name*—(Optional) Name of the interface over which to send packets.

logical-system (all | *logical-system-name*)—(Optional) Perform this operation on all logical systems or on a particular logical system.

mpls (ldp *FEC address* | rsvp *label-switched-path name*)—(Optional) Analyze the status of LDP-signaled or RSVP-signaled MPLS label-switched paths (LSPs). You can optionally specify the forward equivalence class (FEC) address for the LDP LSP or the LSP name for RSVP. You can also analyze a specific LSP by issuing the **traceroute**

mpls rsvp *lsp-name* command. You can only analyze IPv4 point-to-point LSPs. IPv6 is not supported.

no-resolve—(Optional) Do not attempt to determine the hostname that corresponds to the IP address.

routing-instance *routing-instance-name*—(Optional) Name of the routing instance for the traceroute attempt.

source *source-address*—(Optional) Source address of the outgoing traceroute packets.

tos *value*—(Optional) Value to include in the IP type-of-service (ToS) field. The range of values is **0** through **255**.

ttl *value*—(Optional) Maximum time-to-live value to include in the traceroute request. The range of values is **0** through **128**.

wait *seconds*—(Optional) Maximum time to wait for a response to the traceroute request.

Required Privilege Level network

List of Sample Output
traceroute on page 333
traceroute as-number-lookup host on page 334
traceroute noresolve on page 334
traceroute (Between CE Routers, Layer 3 VPN) on page 334
traceroute (Through an MPLS LSP) on page 334

Output Fields Table 31 on page 333 describes the output fields for the **traceroute** command. Output fields are listed in the approximate order in which they appear.

Table 31: traceroute Output Fields

Field Name	Field Description
traceroute to	IP address of the receiver.
hops max	Maximum number of hops allowed.
byte packets	Size of packets being sent.
number-of-hops	Number of hops from the source to the named router or switch.
router-name	Name of the router or switch for this hop.
address	Address of the router or switch for this hop.
Round trip time	Average round-trip time, in milliseconds (ms).

traceroute

```
user@host> traceroute santacruz
traceroute to green.company.net (10.156.169.254), 30 hops max, 40 byte packets
 1  blue23 (10.168.1.254)    2.370 ms  2.853 ms  0.367 ms
```

```
 2  red14  (10.168.255.250)  0.778 ms  2.937 ms  0.446 ms
 3  yellow (10.156.169.254)  7.737 ms  89.905 ms  0.834 ms
```

traceroute as-number-lookup host

```
user@host> traceroute as-number-lookup 10.100.1.1
traceroute to 10.100.1.1 (10.100.1.1), 30 hops max, 40 byte packets
 1  10.39.1.1 (10.39.1.1)  0.779 ms  0.728 ms  0.562 ms
 2  10.39.1.6 (10.39.1.6) [AS  32]  0.657 ms  0.611 ms  0.617 ms
 3  10.100.1.1 (10.100.1.1) [AS  10, 40, 50]  0.880 ms  0.808 ms  0.774 ms
```

traceroute noresolve

```
user@host> traceroute santacruz noresolve
traceroute to green.company.net (10.156.169.254), 30 hops max, 40 byte packets
 1  10.168.1.254  0.458 ms  0.370 ms  0.365 ms
 2  10.168.255.250  0.474 ms  0.450 ms  0.444 ms
 3  10.156.169.254  0.931 ms  0.876 ms  0.862 ms
```

traceroute (Between CE Routers, Layer 3 VPN)

```
user@host> traceroute vpn09
traceroute to vpn09.skybank.net (10.255.14.179), 30 hops max, 40
      byte packets
       1  10.39.10.21 (10.39.10.21)  0.598 ms  0.500 ms  0.461 ms
       2  10.39.1.13 (10.39.1.13)  0.796 ms  0.775 ms  0.806 ms
           MPLS Label=100006 CoS=0 TTL=1 S=1
       3  vpn09.skybank.net (10.255.14.179)  0.783 ms  0.716 ms  0.686
```

traceroute (Through an MPLS LSP)

```
user@host> traceroute mpls1
traceroute to 10.168.1.224 (10.168.1.224), 30 hops max, 40 byte packets
 1  mpls1-sr0.company.net (10.168.200.101)  0.555 ms  0.393 ms  0.367 ms
     MPLS Label=1024 CoS=0 TTL=1
 2  mpls5-lo0.company.net (10.168.1.224)  0.420 ms  0.394 ms  0.401 ms
```