



Junos[®] OS

Broadband Subscriber Services Feature Guide

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Junos[®] OS Broadband Subscriber Services Feature Guide

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Documentation and Release Notes

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

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

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at <http://www.juniper.net/books>.

Supported Platforms

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

- MX Series

Using the Examples in This Manual

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

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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


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

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

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

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

Documentation Conventions

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

Table 1: Notice Icons

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

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

Table 2: Text and Syntax Conventions

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

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

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

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

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

Documentation Feedback

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

- Online feedback rating system—On any page of the Juniper Networks TechLibrary site at <http://www.juniper.net/techpubs/index.html>, simply click the stars to rate the content, and use the pop-up form to provide us with information about your experience. Alternately, you can use the online feedback form at <http://www.juniper.net/techpubs/feedback/>.
- E-mail—Send your comments to techpubs-comments@juniper.net. Include the document or topic name, URL or page number, and software version (if applicable).

Requesting Technical Support

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

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

Self-Help Online Tools and Resources

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

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

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

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

Opening a Case with JTAC

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

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

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

PART 1

Configuring Dynamic Class of Service

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CHAPTER 1

CoS for Subscriber Access and Interfaces Overview

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CoS for Subscriber Access Overview

This topic describes class-of-service (CoS) functionality for dynamic subscriber access.

Junos CoS enables you to divide traffic into classes and offer various levels of throughput and packet loss when congestion occurs. This functionality allows packet loss to happen according to rules that you configure. The Junos CoS features provide a set of mechanisms that you can use to provide differentiated services when best-effort traffic delivery is insufficient.

In a subscriber access environment, service providers want to provide video, voice, and data services over the same network for subscribers. Subscriber traffic is delivered from the access network, through a router, through a switched Ethernet network, to an Ethernet digital subscriber line access multiplexer (DSLAM). The DSLAM forwards the subscriber's traffic to the residential gateway over a digital subscriber line (DSL). An MX Series router that is installed in a subscriber access network as an edge router can perform subscriber management functions that include subscriber identification and per-subscriber CoS.

In a subscriber access network, a subscriber is an authenticated user—a user that has logged in to the access network at a subscriber interface and then been verified by the configured authentication server and subsequently granted initial CoS services. Subscribers can be identified statically or dynamically. In this network, subscribers are mapped to VLANs, demux, or PPPoE interfaces.

You can configure the router to provide *hierarchical scheduling* or *per-unit scheduling* for subscribers:

- Hierarchical CoS enables you to apply traffic scheduling and queuing parameters (which can include a delay-buffer bandwidth) and packet transmission scheduling parameters (which can include buffer management parameters) to an individual

subscriber interface rather than to all interfaces configured on the port. Hierarchical CoS enables you to dynamically modify queues when subscribers require services.

- Per-unit scheduling enables one set of output queues for each logical interface configured under the physical interface. In per-unit scheduling configurations, each Layer 3 scheduler node is allocated a dedicated set of queues.

Because the interface sets corresponding to VLANs using agent-circuit-identifier information are created dynamically, you can apply CoS attributes, such as shaping, at the household level. You must set and define the CoS policy for the agent-circuit-identifier virtual VLAN interface set using the dynamic profile for the agent-circuit-identifier interface set (not the subscriber profile). CoS on dynamic VLANs includes support for level 3 or level 2 scheduler nodes for a dynamic interface set. You can also configure a traffic-control profile and a remaining traffic-control profile for a dynamic interface set. CoS on dynamic VLANs enables you to configure a dynamic scheduler map for a traffic-control profile that is used by a dynamic interface set. In this case, the dynamic scheduler map must use the unique ID format.

Related Documentation

- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)
- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 33](#)
- [Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 34](#)
- [Configuring Per-Unit Scheduling in a Dynamic Profile on page 80](#)

Guidelines for Configuring Dynamic CoS for Subscriber Access

This topic describes the guidelines for configuring dynamic CoS in a subscriber access environment.

Configuration Guidelines for Hierarchical CoS and Per-Unit Scheduling

You can configure dynamic CoS with one of the following scheduling configurations:

- For hierarchical scheduling configurations, you must enable hierarchical scheduling in the static CLI for the interface referenced in the dynamic profile. If not, the dynamic profile fails.
- For per-unit scheduling configurations, you must enable per-unit scheduling in the static CLI for the interface referenced in the dynamic profile. If not, the dynamic profile fails and schedulers are not attached to the interface.

Junos software supports either per-unit scheduling or hierarchical scheduling on an interface. You cannot run both types of scheduling at the same time. If CoS is active on an interface, and you change the type of scheduling configured on the interface, all traffic is dropped upon egress from the interface.

Configuration Guidelines for Dynamic Scheduling and Queuing

When configuring scheduling and queuing for subscriber access, consider the following guidelines:

- To improve CoS performance in IPv4, IPv6, and dual-stack networks that use a DHCP access model, we recommend that you use the **aggregate-clients replace** statement rather than the **aggregate-clients merge** statement.
- You configure the traffic scheduling and shaping parameters in a traffic-control profile within the dynamic profile. You can configure the scheduler map and schedulers in a dynamic profile or in the **[edit class-of-service]** hierarchy. You must statically configure the remaining CoS parameters, such as hierarchical scheduling, classifiers, drop profiles, and forwarding classes, in the **[edit class-of-service]** hierarchy.
- You can configure only one traffic-control-profile under a dynamic profile.
- You must define the output-traffic-control-profile that binds the traffic-control profile to the interface within the same dynamic profile as the interface.
- We recommend that you provide different names for the schedulers defined in dynamic profiles that are used for access and services. For example, if there are two dynamic profiles, voice-profile and video-profile, provide unique names for the schedulers defined under those profiles.
- You must use a service dynamic profile with a different profile name for each RADIUS CoA request over the same logical interface.
- When you configure scheduler and scheduler map sharing in client profiles, schedulers and scheduler maps must use the unique ID format. If the client profile uses the unique ID format and you want to have either scheduler or scheduler map sharing for service activation, you must configure the service profile in unique ID format.

Configuration Guidelines for Dynamic Classifiers and Rewrite Rules

When you configure classifiers and rewrite rules for subscriber access, consider the following guidelines:

- To apply classifiers and rewrite rules to a subscriber interface in a dynamic profile, you must configure the rewrite rule and classifier definitions in the static **[edit class-of-service]** hierarchy and reference them in the dynamic profile.
 - If a static classifier or a rewrite rule definition that is referenced by a dynamic subscriber interface does not exist, the configuration is invalid and the subscriber cannot log in.
 - If a network administrator changes the static classifiers and rewrite rules definitions that are referenced in a dynamic profile with an active subscriber interface logged in, the changes are applied to the active subscriber interface immediately.
 - If a network administrator deletes a classifier or a rewrite rule definition that is referenced by an active dynamic subscriber interface, the system removes the classifier or rewrite rule binding from the interface. The classifier is replaced by the default classifier. If the network administrator adds the removed classifier or rewrite

rule to the configuration while the dynamic interface is active, the addition does not take effect until the subscriber logs out and then logs in again.

- IP demux interfaces can only instantiate Layer 3 rules (both rewrite rules and classifiers).
 - An IP demux subscriber interface can implicitly inherit a classifier from the underlying interface. If an IP demux interface is created without a classifier and a Layer 2 classifier is attached to the underlying interface, the IP demux interface also inherits the Layer 2 classifier. The `show class-of-service interface interface-name` command does not display this attachment.

[Table 3 on page 6](#) lists the classification rule configuration for an IP demux subscriber interface with a VLAN underlying interface.

Table 3: IP Demux Classification Rules

VLAN Underlying Interface Classifier Configuration	IP Demux Interface Classifier Configuration	Resulting Classifier Configuration
Layer 2	—	VLAN Layer 2
Layer 2	Layer 3	Demux Layer 3
Layer 3	—	Default
Layer 3	Layer 3	Demux Layer 3

- An IP demux subscriber interface explicitly inherits Layer 2 rewrite rules from the underlying interface if a Layer 2 rewrite rule is present. The `show class-of-service interface interface-name` command displays the attachment.

[Table 4 on page 6](#) lists the rewrite rule configuration for an IP demux subscriber interface with a VLAN underlying interface.

Table 4: IP Demux Rewrite Rules

VLAN Underlying Interface Rewrite Rule Configuration	IP Demux Interface Rewrite Rule Configuration	Resulting Rewrite Rule Configuration
Layer 2	—	VLAN Layer 2
Layer 2	Layer 3	VLAN Layer 2 and demux Layer 3
Layer 3	—	Default
Layer 3	Layer 3	Demux Layer 3

- An L2TP subscriber interface can implicitly inherit a classifier from the underlying interface.

[Table 5 on page 7](#) lists the classification rule configuration for an L2TP LAC subscriber interface with a VLAN underlying interface.

Table 5: L2TP Classification Rules

VLAN Underlying Interface Classifier Configuration	L2TP LAC Classifier Configuration	Resulting Classifier Configuration
Layer 2 or Fixed	Layer 2 or Fixed	VLAN Layer 2 or Fixed
Layer 2 or Fixed	Layer 3	Demux/PPPoE Layer 3
Layer 3	Layer 2 or Fixed	VLAN Layer 2 or Fixed
Layer 3	Layer 3	Demux/PPPoE Layer 3

- An L2TP LAC subscriber interface explicitly inherits Layer 2 rewrite rules from the underlying interface if a Layer 2 rewrite rule is present. [Table 6 on page 7](#) lists the rewrite rule configuration for an L2TP LAC subscriber interface with a VLAN underlying interface.

Table 6: L2TP LAC Rewrite Rules

VLAN Underlying Interface Rewrite Rule Configuration	L2TP Interface Rewrite Rule Configuration	Resulting Rewrite Rule Configuration
Layer 2	Layer 2	VLAN Layer 2
Layer 2	Layer 3	VLAN Layer 2 and demux/PPPoE Layer 3
Layer 3	Layer 2	VLAN Layer 2 and demux/PPPoE Layer 3
Layer 3	Layer 3	Demux/PPPoE Layer 3

Related Documentation

- [CoS for Subscriber Access Overview on page 3](#)
- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)
- [Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 33](#)
- [Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 34](#)
- [Configuring Per-Unit Scheduling in a Dynamic Profile on page 80](#)
- [Configuring Static CoS for an L2TP LNS Inline Service](#)

CoS for Aggregated Ethernet Subscriber Interfaces Overview

You can apply static or dynamic hierarchical CoS to a scheduler node at the aggregated Ethernet logical interface, its underlying physical interface, or an interface set.

When you configure CoS for aggregated Ethernet interfaces, consider the following guidelines:

- Configure the aggregated Ethernet logical interface over two physical interfaces capable of performing hierarchical scheduling.
- For VLAN subscriber interfaces over aggregated Ethernet, you must enable link protection on the aggregated Ethernet interface for hierarchical CoS to operate.
- Link protection is not required for IP or demux subscriber interfaces over aggregated Ethernet. We recommend that you enable targeted distribution on the demux interface to provide accurate hierarchical scheduling for these links.
- Keep the following guidelines in mind when configuring interface sets of aggregated Ethernet interfaces:
 - Sets of aggregated Ethernet interfaces are supported on MPC/MIC interfaces on MX Series routers only.
 - The supported logical interfaces for aggregated Ethernet in an interface set include VLAN demux interfaces, IP demux interfaces, and PPPoE logical interfaces over VLAN demux interfaces.
 - The link membership list and scheduler mode of the interface set are inherited from the underlying aggregated Ethernet interface over which the interface set is configured.
 - When an aggregated Ethernet interface operates in link protection mode, or if the scheduler mode is configured to replicate member links, the scheduling parameters of the interface set are copied to each of the member links.
 - If the scheduler mode of the aggregated Ethernet interface is set to scale member links, the scheduling parameters are scaled based on the number of active member links and applied to each of the aggregated interface member links.

Related Documentation

- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)
- For hardware requirements, see [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- For configuration instructions, see [Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links on page 36](#) and [Configuring an Interface Set of Subscribers in a Dynamic Profile on page 204](#)
- For additional information about subscribers over aggregated Ethernet, see *Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview*, [Distribution](#)

of [Demux Subscribers in an Aggregated Ethernet Interface on page 145](#), and *Static and Dynamic VLAN Subscriber Interfaces over Aggregated Ethernet Overview*.

CoS for PPPoE Subscriber Interfaces Overview

You can configure CoS functionality for static and dynamic PPPoE subscriber interfaces configured on Gigabit Ethernet Intelligent Queuing 2 (IQ2) and Ethernet Enhanced IQ2 (IQ2E) PICs on the M120 and M320 routers, and on MPCs on the MX Series 3D Universal Edge Router.

For all supported hardware platforms, you can attach an output traffic-control profile that contains basic shaping and scheduling properties directly to a PPPoE interface. In this type of scenario, you can use each PPPoE interface to represent a household and shape all of the household traffic to an aggregate rate. Each forwarding class is mapped to a queue, and represents one type of services provided to a household customer.

Both the IQ2E PIC and MPC Q line cards support hierarchical scheduling functionality that is not available on the IQ2 PIC. To shape customer or DSLAM traffic at different levels of the PPPoE interface hierarchy, you can attach traffic-control profiles to interface sets that contain PPPoE members.

MPCs support subscriber interfaces with PPPoE encapsulation over aggregated Ethernet interfaces. These PPPoE subscriber interfaces are configured over VLAN demux interfaces, which are also configured over Aggregated Ethernet interfaces.

You can configure 802.3ad link aggregation group (LAG) stateful port and dense port concentrator (DPC) redundancy. This provides targeted distribution of non-replicated (stacked) PPPoE or IP demux links over VLAN demux links, which in turn are over an aggregated Ethernet (AE) logical interface. Service providers with PPPoE or IP demux interfaces for CoS configurations can provide DPC and port redundancy to subscribers.



NOTE: For static PPPoE underlying logical interfaces, use PPPoE interface sets.

Related Documentation

- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)
- [Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 33](#)
- [Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 34](#)
- [Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 37](#)
- [CoS on Enhanced IQ2 PICs Overview](#)

CHAPTER 2

Configuring Scheduling and Queuing on a Port

- [Configuring Traffic Scheduling and Shaping for Subscriber Access on page 11](#)
- [Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13](#)
- [Configuring Scheduler and Scheduler Map Sharing on page 19](#)
- [Example: Providing Unique Rate Configurations for Schedulers in a Dynamic Profile on page 21](#)
- [Example: Configuring Aggregate Scheduling of Queues for Residential Subscribers on Static IP Demux Interfaces on page 21](#)
- [Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 23](#)

Configuring Traffic Scheduling and Shaping for Subscriber Access

You use traffic-control profiles to configure traffic shaping and scheduling properties.

You can choose to configure static values or dynamic variables for the shaping parameters. The values for the dynamic variables are obtained from RADIUS when a subscriber logs in or when a subscriber changes services.

You cannot configure a traffic-control profile that contains a combination of static and dynamic parameters.

This topic includes the following tasks:

- [Configuring Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile on page 11](#)
- [Configuring Dynamic Traffic Shaping and Scheduling Parameters in a Dynamic Profile on page 12](#)

Configuring Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile

To configure static traffic shaping and scheduling parameters in a traffic-control profile:

1. Create the traffic-control profile and assign a name.

```
[edit dynamic-profiles business-profile class-of-service]  
user@host# edit traffic-control-profiles profile-name
```

2. Apply a static scheduler map that has been configured in the **[edit class-of-service]** hierarchy.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
  profile-name]
user@host# set scheduler-map map-name
```

3. Configure the shaping rate to be used in the dynamic profile.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
  profile-name]
user@host# set shaping-rate (rate <burst-size bytes>
```

4. Configure the guaranteed rate to be used in the dynamic profile.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
  profile-name]
user@host# set guaranteed-rate (rate <burst-size bytes>
```

5. Configure the delay-buffer rate.

If you do not include this statement, the delay-buffer rate is based on the guaranteed rate if one is configured, or on the shaping rate if no guaranteed rate is configured.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
  profile-name]
user@host# set delay-buffer-rate (percent percentage | rate)
```

Configuring Dynamic Traffic Shaping and Scheduling Parameters in a Dynamic Profile

You can configure variables for the traffic shaping and scheduling parameters. The values for the parameters are dynamically obtained by RADIUS when a subscriber logs in or changes a service.

To configure dynamic traffic-control profiles in a dynamic profile:

1. Create the traffic-control profile.

```
[edit dynamic-profiles business-profile class-of-service]
user@host# edit traffic-control-profiles profile-name
```

2. Reference a dynamic scheduler map.

The scheduler map is dynamically configured in the **[edit dynamic-profiles profile-name class-of-service scheduler-maps]** hierarchy.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
  profile-name]
user@host# set scheduler-map $junos-cos-scheduler-map
```

3. Configure the shaping rate variable.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
  profile-name]
user@host# set shaping-rate $junos-cos-shaping-rate <burst-size bytes>
```

4. Configure the guaranteed rate variable.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
  profile-name]
```



```
user@host# set guaranteed-rate $junos-cos-guaranteed-rate <burst-size [ bytes |
$junos-cos-guaranteed-rate-burst]>
```

5. Configure a variable for the delay-buffer rate.

If you do not include this statement, the delay-buffer rate is based on the guaranteed rate if one is configured, or the shaping rate if no guaranteed rate is configured.

```
[edit dynamic-profiles business-profile class-of-service traffic-control-profiles
profile-name]
user@host# set delay-buffer-rate $junos-cos-delay-buffer-rate
```

Related Documentation

- For hardware requirements and configuration guidelines, see [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [CoS for Subscriber Access Overview on page 3](#)
- [Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 33](#)
- [Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 34](#)
- [Example: Maintaining a Constant Traffic Flow by Configuring a Static VLAN Interface with a Dynamic Profile for Subscriber Access on page 38](#)
- [Example: Configuring Dynamic Hierarchical Scheduling and Queuing for Subscriber Access on page 49](#)
- [Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 23](#)

Configuring Schedulers in a Dynamic Profile for Subscriber Access

You use schedulers to define the parameters of output queues. These properties include the amount of interface bandwidth assigned to the queue, the size of the memory buffer allocated for storing packets, the priority of the queue, and the tail drop profiles associated with the queue.

You can configure up to four schedulers in a dynamic profile.

Within a dynamic profile, you can choose to define schedulers with static values, dynamic variables, or a combination of static values and dynamic variables. The dynamic variables enable RADIUS to provide the value for the scheduler parameter when the subscriber logs in.

- [Configuring Static Schedulers in a Dynamic Profile on page 14](#)
- [Configuring Dynamic Schedulers with Variables in a Dynamic Profile on page 15](#)
- [Configuring a Combination of Static and Dynamic Scheduler Parameters in a Scheduler Definition on page 16](#)

Configuring Static Schedulers in a Dynamic Profile

This topic describes how to configure schedulers with static values in a dynamic profile for subscriber access.

To configure static scheduling and queuing in a dynamic profile:

1. Configure the scheduler and queuing parameters.

- a. Specify the scheduler for which you want to configure parameters.

```
[edit dynamic-profiles profile-name class-of-service]  
user@host# edit schedulers scheduler-name
```

- b. Configure the buffer size.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]  
user@host# set buffer-size remainder
```

- c. Configure the drop-profile map and drop profile.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]  
user@host# set drop-profile-map loss-priority any protocol any drop-profile d3
```

- d. Configure the priority.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]  
user@host# set priority low
```

- e. Configure the transmit rate.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]  
user@host# set transmit-rate percent 40
```

- f. Configure the excess rate.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]  
user@host# set excess-rate percent 90
```

- g. (Optional) Configure the priority value for the excess-rate.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]  
user@host# set excess-priority high
```

2. Associate the scheduler with a scheduler map.

- a. Configure the scheduler map name.

```
[edit dynamic-profiles profile-name class-of-service]  
user@host# set scheduler-maps data-smap
```

- b. Configure the forwarding class.

```
[edit dynamic-profiles profile-name class-of-service scheduler-maps map-name]  
user@host# set forwarding-class be
```

- c. Configure the scheduler.

```
[edit dynamic-profiles profile-name class-of-service scheduler-maps map-name  
forwarding-class forwarding-class-name]
```

```
user@host# set scheduler be_sch
```

Configuring Dynamic Schedulers with Variables in a Dynamic Profile

You can configure variables for the dynamic scheduler parameters. These values are dynamically obtained by RADIUS when a subscriber logs in or changes a service using a RADIUS change of authorization (CoA) message.

To configure dynamic scheduling and queuing in a dynamic profile:

1. Configure the scheduler and queuing parameters.

- a. Specify the scheduler name using a variable.

```
[edit dynamic-profiles profile-name class-of-service]
user@host# edit schedulers $junos-cos-scheduler
```

- b. Configure the variable for the buffer size.

```
[edit dynamic-profiles profile-name class-of-service schedulers]
user@host# set buffer-size (percent $junos-cos-scheduler-bs | temporal
$junos-cos-scheduler-bs)
```

- c. Configure the variables for the drop-profile maps and the drop profile.

```
[edit dynamic-profiles profile-name class-of-service schedulers]
user@host# set drop-profile-map loss-priority low protocol any drop-profile
$junos-cos-scheduler-low
user@host# set drop-profile-map loss-priority medium-low protocol any
drop-profile $junos-cos-scheduler-medium-low
user@host# set drop-profile-map loss-priority medium-high protocol any
drop-profile $junos-cos-scheduler-medium-high
user@host# set drop-profile-map loss-priority high protocol any drop-profile
$junos-cos-scheduler-high
user@host# set drop-profile-map loss-priority any protocol any drop-profile
$junos-cos-scheduler-any
```

- d. Configure the variable for the priority.

```
[edit dynamic-profiles profile-name class-of-service schedulers]
user@host# set priority $junos-cos-scheduler-pri
```

- e. Configure the variable for the transmit rate.

```
[edit dynamic-profiles profile-name class-of-service schedulers]
user@host# set transmit-rate $junos-cos-scheduler-tx
```

- f. Configure the variable for the excess rate.

```
[edit dynamic-profiles profile-name class-of-service schedulers]
user@host# set excess-rate percent $junos-cos-scheduler-excess-rate
```

- g. Configure the variable for the priority of the excess-rate.

```
[edit dynamic-profiles profile-name class-of-service schedulers]
user@host# set excess-priority $junos-cos-scheduler-excess-priority
```

2. Associate the scheduler with a scheduler map.

- a. Configure the scheduler map name.

```
[edit dynamic-profiles profile-name class-of-service]  
user@host# edit scheduler-maps scheduler-map-name
```

- b. Configure the forwarding class.

```
[edit dynamic-profiles profile-name class-of-service scheduler-maps  
  scheduler-map-name]  
user@host# set forwarding-class be
```

- c. Configure the scheduler.

```
[edit dynamic-profiles profile-name class-of-service scheduler-maps  
  scheduler-map-name]  
user@host# set scheduler $junos-cos-scheduler
```

Configuring a Combination of Static and Dynamic Scheduler Parameters in a Scheduler Definition

Within a dynamic profile, you can choose to configure one dynamic scheduler definition, or combine static and dynamic scheduler parameters in many static scheduler definitions.

Combining static and dynamic scheduler parameters enables you to provide subscribers with unique rate configurations that the RADIUS definitions for predefined variables do not allow.

To configure a scheduler definition that contains static and dynamic scheduling and queuing parameters:

1. Configure the scheduler definition.

- a. Specify the scheduler name.



NOTE: To configure a static scheduler that contains both static and dynamic parameters, you must specify a unique scheduler name, not the `$junos-cos-scheduler` variable.

```
[edit dynamic-profiles profile-name class-of-service]  
user@host# edit schedulers scheduler-name
```

- b. Configure the buffer size.

Do either of the following:

- Configure a static value.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]  
user@host# set buffer-size (percent percentage | remainder | temporal  
  (microseconds))
```

- Configure a variable.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
```

```
user@host# set buffer-size (percent $junos-cos-scheduler-bs | temporal
$junos-cos-scheduler-bs)
```

- c. Configure the drop-profile maps, the drop profile, and the priority.

Do either of the following:

- Configure static values.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set drop-profile-map loss-priority any protocol any drop-profile d3
```

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set priority low
```

- Configure variables.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set drop-profile-map loss-priority low protocol any drop-profile
$junos-cos-scheduler-low
```

```
user@host# set drop-profile-map loss-priority medium-low protocol any
drop-profile $junos-cos-scheduler-medium-low
```

```
user@host# set drop-profile-map loss-priority medium-high protocol any
drop-profile $junos-cos-scheduler-medium-high
```

```
user@host# set drop-profile-map loss-priority high protocol any drop-profile
$junos-cos-scheduler-high
```

```
user@host# set drop-profile-map loss-priority any protocol any drop-profile
$junos-cos-scheduler-any
```

- d. Configure the priority.

Do either of the following:

- Configure a static value.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set excess-priority high
```

- Configure a variable.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set excess-priority $junos-cos-scheduler-excess-priority
```

- e. Configure the transmit rate.

Do either of the following:

- Configure a static value.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set transmit-rate
```

- Configure a variable.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set transmit-rate $junos-cos-scheduler-tx
```

- f. Configure the excess rate.

Do either of the following:

- Configure a static value.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]  
user@host# set excess-rate percent 250
```

- Configure a variable.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]  
user@host# set excess-rate percent $junos-cos-scheduler-excess-rate
```

- g. Configure the priority for the excess-rate.

Do either of the following:

- Configure a static value.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]  
user@host# set excess-priority high
```

- Configure a variable.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]  
user@host# set excess-priority percent $junos-cos-scheduler-excess-priority
```

2. Associate the scheduler with a scheduler map.

- a. Configure the scheduler map name.

```
[edit dynamic-profiles profile-name class-of-service]  
user@host# edit scheduler-maps scheduler-map-name
```

- b. Configure the forwarding class.

```
[edit dynamic-profiles profile-name class-of-service scheduler-maps  
  scheduler-map-name]  
user@host# set forwarding-class be
```

- c. Configure the scheduler.

```
[edit dynamic-profiles profile-name class-of-service scheduler-maps  
  scheduler-map-name]  
user@host# set scheduler $junos-cos-scheduler
```

Related Documentation

- For hardware requirements and configuration guidelines, see [Guidelines for Configuring Dynamic CoS for Subscriber Access](#) on page 4
- [Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access](#) on page 34
- [Verifying the Scheduling and Shaping Configuration for Subscriber Access](#) on page 23
- [Changing CoS Services Overview](#) on page 167

Configuring Scheduler and Scheduler Map Sharing

The system generates unique identifiers (IDs) in dynamic profiles created for services. The generated unique IDs enable you to identify and configure separate parameter values with the same variable name. When applied to CoS, you can configure scheduler and scheduler map sharing. In client-access profiles, schedulers and scheduler maps must use the unique ID format. If the client-access profile uses the unique ID format and you want to have either scheduler or scheduler map sharing for service activation, you must configure the service profile in unique ID format. Generating unique IDs based on schedulers and scheduler maps eliminates duplication and improves router performance and scalability. You can configure scheduler and scheduler map sharing by including the variables for CoS in the client access or service dynamic profile. All scheduler maps and schedulers must be in the unique ID format.

Before you configure variables for the client access or service dynamic profile:

- Create a basic dynamic profile.

See *Configuring a Basic Dynamic Profile*.

To configure variables for the client access or service dynamic profile:

1. Configure the variables for the dynamic client access profile.

```
[edit dynamic-profiles client-profile variables]
user@host# set smap_data uid
user@host# set data_sched uid
```

2. Configure the CoS parameters for the variables in the scheduler profile.

```
[edit dynamic-profiles client-profile class-of-service]
user@host# edit schedulers "$data_sched"
user@host# set transmit-rate percent 10
user@host# set buffer-size remainder
user@host# set priority low
```

3. Configure the CoS parameters for the variables in the scheduler maps profile.

```
[edit dynamic-profiles client-profile class-of-service]
user@host# edit scheduler-maps "$smap_data"
user@host# edit forwarding-class be scheduler "$data_sched"
```

For example, you can configure scheduler maps and schedulers for a client access profile:

```
dynamic-profiles {
  cos-para {
    variables {
      data_smap uid;
      data_video_smap uid;
      voice_smap uid;
      data_sched uid;
      video_sched uid;
      voice_sched uid;
    }
  }
  ...
}
```

```
class-of-service {
  traffic-control-profiles {
    tcp1 {
      scheduler-map "$junos-cos-scheduler-map";
      shaping-rate "$junos-cos-shaping-rate";
      guaranteed-rate 10m;
      delay-buffer-rate "$junos-cos-delay-buffer-rate";
    }
  }
  interfaces {
    "$junos-interface-ifd-name" {
      unit "$junos-underlying-interface-unit" {
        output-traffic-control-profile tcp1;
      }
    }
  }
  scheduler-maps {
    "$data_smap" {
      forwarding-class be scheduler "$data_sched";
    }
    "$data_video_smap" {
      forwarding-class be scheduler "$data_sched";
      forwarding-class af scheduler "$video_sched";
    }
    "$voice_smap" {
      forwarding-class ef scheduler "$voice_sched";
    }
  }
  schedulers {
    "$data_sched" {
      transmit-rate "$junos-cos-scheduler-tx";
      inactive: buffer-size percent "$junos-cos-scheduler-bs";
      priority "$junos-cos-scheduler-pri";
    }
    "$video_sched" {
      transmit-rate "$junos-cos-scheduler-tx";
      inactive: buffer-size percent "$junos-cos-scheduler-bs";
      priority "$junos-cos-scheduler-pri";
    }
    "$voice_sched" {
      transmit-rate percent 10;
      buffer-size remainder;;
      priority low;
    }
  }
}
```

**Related
Documentation**

- *Access Profiles and Service Profiles Overview*
- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)

Example: Providing Unique Rate Configurations for Schedulers in a Dynamic Profile

Combining static and dynamic schedulers in a dynamic profile enables you to provide subscribers with services that have unique scheduler definitions.

In this example, the network administrator configures the data service with a **transmit-rate** that is rate controlled using the **\$junos-cos-scheduler-tx** predefined variable. RADIUS dynamically supplies the percentage value for the transmission rate that is specified in the RADIUS VSA to the data scheduler when the subscriber logs in.

For the best-effort service, the network administrator assigns the remaining transmission rate that is available.

```
schedulers {
  data-scheduler {
    transmit-rate percent rate-limit $junos-cos-scheduler-tx;
    buffer-size percent $junos-cos-scheduler-bs;
    priority $junos-cos-scheduler-pri;
    drop-profile-map loss-priority low protocol any drop-profile d0;
    drop-profile-map loss-priority medium-low protocol any drop-profile d1;
    drop-profile-map loss-priority medium-high protocol any drop-profile d2;
    drop-profile-map loss-priority high protocol any drop-profile d3;
    drop-profile-map loss-priority any protocol any drop-profile all;
  }
  best-effort-scheduler {
    transmit-rate remainder;
    buffer-size percent $junos-cos-scheduler-bs;
    priority medium-high;
    drop-profile-map loss-priority low protocol any drop-profile
      $junos-cos-scheduler-dropfile-low;
    drop-profile-map loss-priority medium-low protocol any drop-profile d1;
    drop-profile-map loss-priority medium-high protocol any drop-profile
      $junos-cos-scheduler-dropfile-medium-high;
    drop-profile-map loss-priority high protocol any drop-profile d3;
    drop-profile-map loss-priority any protocol any drop-profile
      $junos-cos-scheduler-dropfile-any;
  }
}
```

Related Documentation • [Configuring a Combination of Static and Dynamic Scheduler Parameters in a Scheduler Definition on page 16](#)

Example: Configuring Aggregate Scheduling of Queues for Residential Subscribers on Static IP Demux Interfaces

In this example, scheduling is configured for a residential subscriber. Each forwarding class represents a multiplay service (voice, video, and data), and is equivalent to a queue.

An interface set of IP demux interfaces represents a DSLAM, and provides shaping of subscribers services to a DSLAM aggregate rate.

```
[edit]
interfaces {
```

```
interface-set demux-set {
  interface demux0 {
    unit 0;
    unit 1;
  }
}
ge-2/0/1 {
  vlan-tagging;
  unit 1 {
    per-session-scheduler;
    vlan-id 1;
    demux-source inet;
    family inet {
      address 4.4.4./24;
    }
  }
}
demux0 {
  unit 0 {
    demux-options {
      underlying-interface ge-2/0/1.1;
    }
    family inet {
      address 1.1.1./24;
      demux-source {
        1.1.1.0/24;
      }
    }
  }
  unit 1 {
    demux-options {
      underlying-interface ge-2/0/1.1;
    }
    family inet {
      address 1.1.2./24;
      demux-source {
        1.1.2.0/24;
      }
    }
  }
}
}
class-of-service {
  traffic-control-profiles {
    T1 {
      scheduler-map m1;
      shaping-rate 5m;
    }
    T2 {
      shaping-rate 60m;
    }
  }
}
interfaces {
  interface-set demux-set {
    output-traffic-control-profile T2;
  }
}
```

```

demux0 {
  unit 0 {
    output-traffic-control-profile T1;
  }
  unit 1 {
    output-traffic-control-profile T1;
  }
}
scheduler-maps {
  m1 {
    forwarding-class best-effort scheduler s0;
    forwarding-class expedited-forwarding scheduler s1;
    forwarding-class assured-forwarding scheduler s2;
    forwarding-class network-control scheduler s3;
  }
}
schedulers {
  s0 {
    transmit-rate percent 10;
    buffer-size percent 10;
  }
  s1 {
    transmit-rate percent 20;
    buffer-size percent 20;
  }
  s2 {
    transmit-rate percent 30;
    buffer-size percent 30;
  }
  s3 {
    transmit-rate percent 40;
    buffer-size percent 40;
  }
}
}

```

Related Documentation

- *Configuring Static Subscriber Interfaces Using IP Demux Interfaces*

Verifying the Scheduling and Shaping Configuration for Subscriber Access

Purpose View the class-of-service (CoS) configurations that are referenced in a dynamic profile for subscriber access.

Action • To display the entire CoS configuration, including static and dynamic parameters:

```
user@host> show class-of-service
```

- To display the CoS configuration for a subscriber interface:

```
user@host> show class-of-service interface
```

- To display traffic shaping and scheduling profiles:

```
user@host> show class-of-service traffic-control-profile
```

- To display the mapping of schedulers to forwarding classes and a summary of scheduler parameters for each entry:

```
user@host> show class-of-service scheduler-map
```

CHAPTER 3

Managing Different Types of Service Traffic for a Household Using Hierarchical Scheduling and Queueing

- Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25
- Hardware Requirements for Dynamic Hierarchical CoS on page 31
- Configuring Static Hierarchical Scheduling and Queueing in a Dynamic Profile for Subscriber Access on page 33
- Configuring Dynamic Hierarchical Scheduling and Queueing in a Dynamic Profile for Subscriber Access on page 34
- Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links on page 36
- Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 37
- Example: Maintaining a Constant Traffic Flow by Configuring a Static VLAN Interface with a Dynamic Profile for Subscriber Access on page 38
- Example: Configuring Dynamic Hierarchical Scheduling and Queueing for Subscriber Access on page 49
- Example: Configuring Hierarchical Scheduling and Queueing for a Static PPPoE Subscriber Interface on page 56
- Example: Configuring Hierarchical Scheduling and Queueing for an Underlying Static PPPoE Subscriber Interface on page 59
- Example: Configuring Hierarchical Scheduling and Queueing for an Interface Set of Static PPPoE Subscriber Interfaces on page 61

Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces

Hierarchical CoS enables you to apply traffic scheduling and queueing parameters and packet transmission scheduling parameters to an individual subscriber interface rather than to all interfaces configured on a port. Hierarchical CoS enables you to dynamically modify queues when subscribers require services.

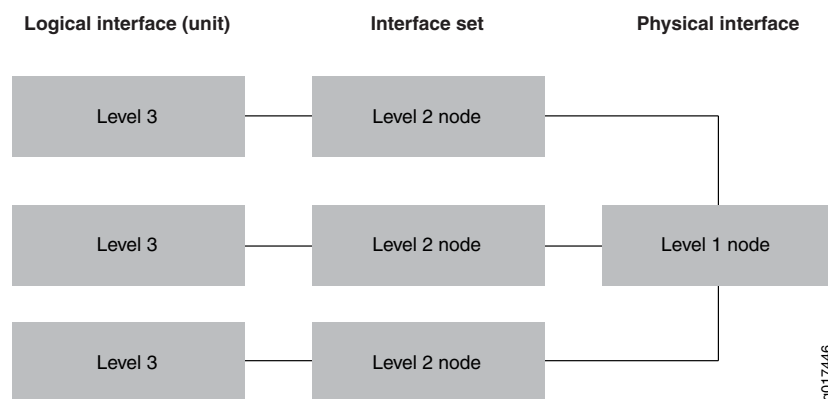
Hierarchical CoS is supported on MX Series routers with either EQ DPCs or MPC-Q/MICs installed.

Interfaces support a four-level CoS scheduling hierarchy that, when fully configured, consists of the physical interface (level 1), an interface set or underlying interface (level 2), one or more logical interfaces (level 3), and one or more queues (level 4). Although all CoS scheduling hierarchies are four-level, level 1 is always the physical interface and level 4 is always the queue. Hierarchical scheduling configurations consist of the type of interfaces you configure; for example, a logical interface or an interface set and where those interfaces reside in the scheduling hierarchy, either level 2 or level 3. Because many hierarchical scheduling configurations are possible, we use the terms *two-level hierarchical scheduling* and *three-level hierarchical scheduling* in this discussion.

Two-Level Hierarchical Scheduling

Two-level hierarchical scheduling limits the number of hierarchical levels in the scheduling hierarchy to two (level 2 and level 3) as shown in [Figure 1 on page 26](#). In this configuration, interface sets are not configured and only the logical interfaces have traffic-control profiles.

Figure 1: Two-Level Hierarchical Scheduling



In a two-level scheduling hierarchy, all logical interfaces and interface sets share a single level 2 node; no hierarchical relationship is formed.

You control two-level hierarchical scheduling by including the **maximum-hierarchy-levels** option under the **[edit interfaces *interface-name* hierarchical-scheduler]** statement:

- When the **maximum-hierarchy-levels** option is not set, interface sets can be at either level 2 or level 3, depending on whether the member logical interfaces within the interface set have a traffic-control profile.
- If any member logical interface has a traffic-control profile, then the interface set is always a level 2 CoS scheduler node.
- If no member logical interface has a traffic-control profile, the interface set is always a level 3 CoS scheduler node.
- If the **maximum-hierarchy-levels** option is set, then the interface set can only be at level 3; it cannot be at level 2. In this case, if you configure a level 2 interface set, you generate Packet Forwarding Engine errors.

Table 7 on page 27 summarizes the interface hierarchy and the CoS scheduler node levels for two-level hierarchical scheduling.

Table 7: Two-Level Hierarchical Scheduling—Interface Hierarchy Versus Scheduling Nodes

Level 1	Level 2	Level 3	Level 4
Physical interface	–	Logical interfaces	One or more queues
Physical interface	–	Interface set	One or more queues
Physical interface	–	Logical interfaces	One or more queues

To configure two-level hierarchical scheduling, include the **hierarchical-scheduler** statement at the **[edit interfaces *interface-name*]** hierarchy level. You can optionally include the **maximum-hierarchy-levels** option. If you choose to set this option, the only supported value is 2.

```
[edit interfaces]
xe-2/0/0 {
  hierarchical-scheduler {
    maximum-hierarchy-levels 2;
  }
}
```

Three-Level Hierarchical Scheduling

Three-level hierarchical scheduling is supported only on MX Series routers running MPC/MIC interfaces. Three-level hierarchical scheduling has up to eight class of service queues. You can configure many different three-level scheduling hierarchies, depending on the location of the interface set and the use of underlying interfaces. In all variations, the physical interface is a level 1 CoS scheduler node and the queues reside at level 4.



NOTE: Three-level hierarchical scheduling is supported only on subscriber interfaces and interface sets running over aggregated Ethernet interfaces on MPC/MIC interfaces in MX Series routers.

When you use three-level hierarchical scheduling, interface sets can reside at either level 2 or level 3. You can also configure an underlying logic interface at level 2 and a logical interface at level 3. Table 8 on page 27 summarizes the most common cases of the interface hierarchy and the CoS scheduler node levels for three-level hierarchical scheduling.

Table 8: Three-Level Hierarchical Scheduling—Interface Hierarchy Versus CoS Scheduling Node Levels

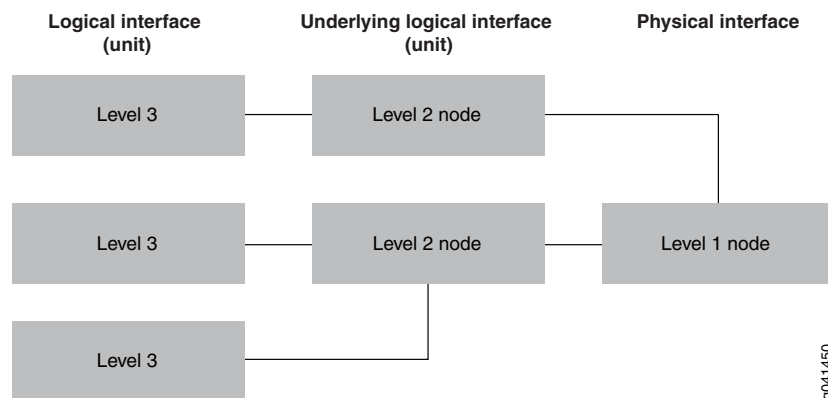
Level 1	Level 2	Level 3	Level 4
Physical interface	Interface set	Logical interfaces	One or more queues

Table 8: Three-Level Hierarchical Scheduling—Interface Hierarchy Versus CoS Scheduling Node Levels (*continued*)

Level 1	Level 2	Level 3	Level 4
Physical interface	Logical interface	Interface set	One or more queues
Physical interface	Underlying logical interface	Logical interfaces	One or more queues

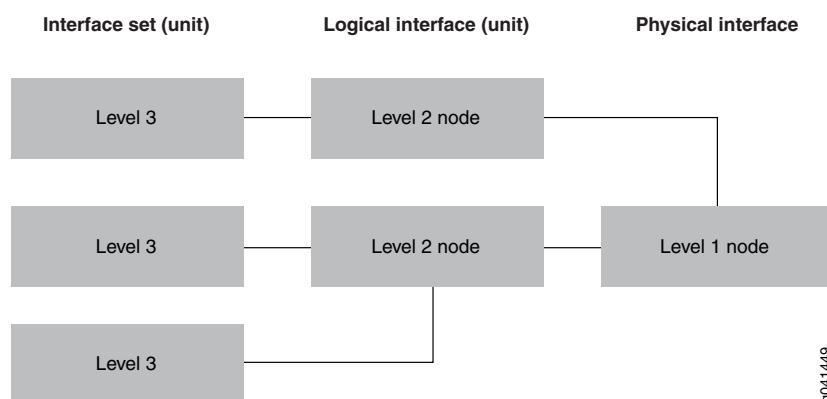
In three-level hierarchical scheduling, the CoS scheduler nodes at level 1, level 2, and level 3 form a hierarchical relationship; this differs from two-level hierarchical scheduling where no hierarchical relationship is formed.

With a three-level hierarchical scheduling, logical interfaces can reside at level 2, or they can reside at level 3, if the logical interface at level 2 is an underlying logical interface. This is shown in [Figure 2 on page 28](#).

Figure 2: Three-Level Hierarchical Scheduling: Logical Interfaces at Level 3 with Underlying Logical Interfaces at Level 2

Another possible configuration for three-level hierarchical scheduling is shown in [Figure 3 on page 29](#). In this configuration, the logical interfaces are located at level 2 and the interface sets are located at level 3.

Figure 3: Three-Level Hierarchical Scheduling: Logical Interfaces at Level 2 with Interface Sets at Level 3



To configure three-level hierarchical scheduling, include the **implicit-hierarchy** option at the `[edit interfaces interface-name hierarchical-scheduler]` hierarchy level.

```
[edit interfaces]
xe-2/0/0 {
  hierarchical-scheduler {
    implicit-hierarchy;
  }
}
```

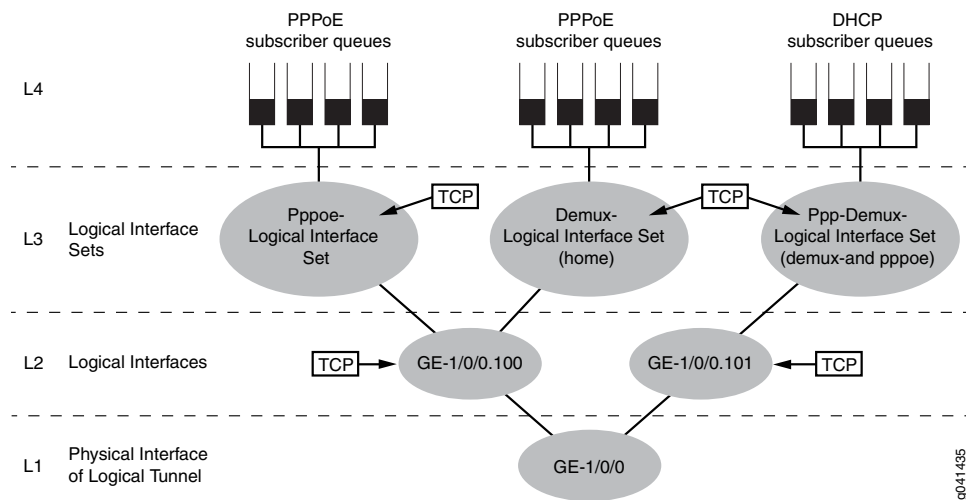
Interface Hierarchy Versus CoS Hierarchy

An interface hierarchy and a CoS scheduling hierarchy are distinctly different. Interface hierarchy refers to the relationship between the various interfaces; for example, the relationship between logical interfaces and an interface set, the relationship between a logical interface and an underlying logical interface, or the relationship between the physical interface and logical interface. CoS scheduling hierarchy refers to the hierarchical relationship between the CoS scheduler nodes. In two-level hierarchical scheduling, no hierarchy is formed between the CoS scheduler nodes; all logical interfaces and interface sets share a single level 2 scheduler node. However, when you use the **implicit-hierarchy** option for three-level hierarchical scheduling, the CoS scheduler nodes form a scheduling hierarchy.

Figure 4 on page 30 and Figure 5 on page 31 provide two scenarios for this discussion. Figure 4 on page 30 shows an interface hierarchy where a Gigabit Ethernet interface (GE-1/0/0) is the physical interface. Two logical interfaces (GE-1/0/0.100 and GE-1/0/0.101) are configured on the physical interface:

- Logical interface GE-1/0/0.100 is a member of a PPPoE interface set and a Demux interface set.
- Logical interface GE-1/0/0.101 is a member of a demux interface set.

Figure 4: Logical Interfaces at Level 2 and Interface Sets at Level 3

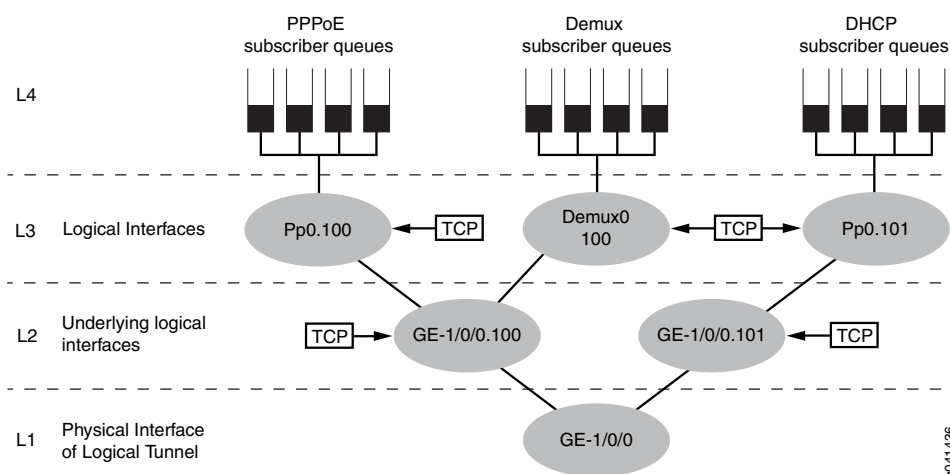


Each interface set has a dedicated queue. The CoS scheduler nodes at level 1 (physical interface), level 2 (underlying logical interfaces), and level 3 (interface sets) form a scheduling hierarchy.

To configure this scenario, you must include the **implicit-hierarchy** option under the **hierarchical-scheduler** statement on physical interface GE-1/0/0 and configure and apply traffic-control profiles on each interface set and underlying logical interface.

Figure 5 on page 31 shows an interface hierarchy where Gigabit Ethernet interface GE-1/0/0 is the physical interface. Three logical interfaces are configured:

- Two logical interfaces (Pp0.100 and Demux0.100) reside on the underlying logical interface GE-1/0/0.100.
- A third logical interface (Pp0.101) resides on the underlying logical interface GE-1/0/0.101.

Figure 5: Logical Interfaces at Level 3 and Underlying Logical Interfaces at Level 2

Each logical interface has a dedicated queue. The CoS scheduler nodes at level 1 (physical interface), level 2 (underlying logical interfaces), and level 3 (logical interfaces) form a scheduling hierarchy.

To configure this scenario, you must include the **implicit-hierarchy** option under the **hierarchical-scheduler** statement on physical interface GE-1/0/0 and configure and apply traffic-control profiles on each logical interface and underlying logical interface.

You can configure many different three-level scheduling hierarchies; [Figure 4 on page 30](#) and [Figure 5 on page 31](#) present just two possible scenarios. [Table 8 on page 27](#) summarizes the possible interface locations and CoS scheduler nodes.

Related Documentation

- [Configuring Hierarchical Schedulers for CoS](#)
- [Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links on page 36](#)
- [Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 37](#)
- [CoS Three-Level Hierarchical Scheduling on MPLS Pseudowire Subscriber Interfaces on page 68](#)
- [hierarchical-scheduler \(Subscriber Interfaces on MX Series Routers\) on page 576](#)

Hardware Requirements for Dynamic Hierarchical CoS

[Table 9 on page 32](#) lists the hardware requirements based on subscriber interface type for hierarchical scheduling in dynamic CoS configurations.

Table 9: Hardware Required for Dynamic Hierarchical CoS Configurations

Dynamic CoS Configuration	Subscriber Interface Type	EQ DPCs on MX Series Routers	MPC Q/MIC Modules on MX Series Routers	IQ2 PICs on M120 and M320 Routers	IQ2E PICs on M120 and M320 Routers
Hierarchical CoS	Static and dynamic VLANs	Yes	Yes	No	No
	Static and dynamic VLANs over aggregated Ethernet	Yes	Yes	No	No
	Static or dynamic IP demux interfaces	Yes	Yes	No	No
	Static or dynamic IP demux interfaces over aggregated Ethernet	Yes	Yes	No	No
	Static or dynamic VLAN demux interfaces	No	Yes	No	No
	Static or dynamic VLAN demux interfaces over aggregated Ethernet	No	Yes	No	No
	Static PPPoE interfaces	No	Yes	Yes	Yes
	Dynamic PPPoE interfaces	No	Yes	No	Yes
	Static or dynamic PPPoE interfaces over aggregated Ethernet	No	Yes	No	No
	L2TP LAC tunnel over PPP	No	Yes	No	No
	L2TP LNS inline service over PPP	No	Yes	No	No

- Related Documentation**
- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)
 - [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)

Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access

You configure static scheduling and queuing in a dynamic profile for subscriber access. To configure CoS in a dynamic profile for subscriber access using static scheduling and queuing parameters:

1. Configure the static CoS parameters in the **[edit class-of-service]** hierarchy.
 - a. Enable the hierarchical scheduler for the interface.

See [“Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces” on page 25](#).
 - b. Configure the scheduler map and schedulers.

When you configure static scheduling and queuing in a dynamic profile, you reference the scheduler map in the dynamic profile.

See *Configuring Schedulers*.
 - c. Configure the drop profiles.

See *Configuring RED Drop Profiles*.
 - d. Configure the forwarding classes.

See *Configuring Forwarding Classes*.
 - e. Configure the rewrite-rules and classifier definitions.

See *Configuring Rewrite Rules and Defining Classifiers*.

See *Junos CoS Components* for information about configuring the remaining CoS parameters.
2. Configure a static or dynamic subscriber interface that can be referenced in the dynamic profile.
 - For static VLAN interfaces, see *Configuring Static Subscriber Interfaces in Dynamic Profiles*.
 - For dynamic VLAN interfaces, see *Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet*.
 - For dynamic IP demux interfaces, see *Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles* and *Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet*.
 - For dynamic VLAN demux interfaces, see *Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles*.
 - For dynamic PPPoE interfaces, see *Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles*.

3. Configure CoS parameters in a dynamic profile.

- a. Configure the dynamic profile.

See *Configuring a Basic Dynamic Profile*.

- b. Configure traffic shaping and scheduling parameters in the dynamic profile using a traffic-control profile. Reference the scheduler map you configured in the static **[edit class-of-service]** hierarchy.

See “[Configuring Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile](#)” on page 11.

- c. Apply CoS parameters to a subscriber interface by referencing an interface in the dynamic profile.

See “[Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile](#)” on page 223.

4. To configure default values for subscribers on login, and enable subscribers to replace other CoS parameters when replacing services, configure variables in the dynamic profile.

See “[Configuring User-Defined CoS Variables in a Dynamic Service Profile](#)” on page 174.

Related Documentation

- [Guidelines for Configuring Dynamic CoS for Subscriber Access](#) on page 4
- [CoS for Subscriber Access Overview](#) on page 3
- [Example: Maintaining a Constant Traffic Flow by Configuring a Static VLAN Interface with a Dynamic Profile for Subscriber Access](#) on page 38

Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access

You can configure dynamic scheduling and queuing in dynamic profile for subscriber access.

To configure dynamic scheduling and queuing for subscriber access using dynamic scheduling and queuing parameters:

1. Configure the static CoS parameters in the **[edit class-of-service]** hierarchy.

- a. Enable the hierarchical scheduler for the interface.

See “[Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces](#)” on page 25 and [hierarchical-scheduler](#).

- b. Configure the drop profiles.

See *Configuring RED Drop Profiles*.

- c. Configure the forwarding classes.

See *Configuring Forwarding Classes*.

- d. Configure the rewrite-rules and classifier definitions.

See *Configuring Rewrite Rules and Defining Classifiers*.

See *Junos CoS Components* for information about configuring the remaining CoS parameters.

2. Configure a static or dynamic subscriber interface that can be referenced in the dynamic profile.
 - For static VLAN interfaces, see *Configuring Static Subscriber Interfaces in Dynamic Profiles*.
 - For dynamic VLAN interfaces, see *Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet*.
 - For dynamic IP demux interfaces, see *Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles* and *Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet*.
 - For dynamic VLAN demux interfaces, see *Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles*.
 - For dynamic PPPoE interfaces, see *Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles*.
3. Configure CoS parameters in a dynamic profile.
 - a. Configure the dynamic profile.

See *Configuring a Basic Dynamic Profile*.
 - b. Configure traffic shaping and scheduling parameters in the dynamic profile using a traffic-control profile.

See [“Configuring Traffic Scheduling and Shaping for Subscriber Access” on page 11](#).
 - c. Configure the schedulers and scheduler map in the dynamic profile.

You can configure the schedulers using dynamic variables or a combination of both static values and dynamic variables.

See [“Configuring Schedulers in a Dynamic Profile for Subscriber Access” on page 13](#).
 - d. Apply CoS parameters to a subscriber interface by referencing an interface in the dynamic profile.
 - For traffic shaping and scheduling, see [“Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile” on page 223](#).
 - For rewrite-rules, see [“Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile” on page 225](#).

- For classifiers, see [“Applying a Classifier to a Subscriber Interface in a Dynamic Profile” on page 226](#).
4. (Optional) Configure variables in access and service profiles to enable RADIUS to activate subscriber and upgrade services through CoA.



NOTE: Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.

- a. Configure user-defined CoS variables in a dynamic profile.

See [“Configuring User-Defined CoS Variables in a Dynamic Service Profile” on page 174](#)

- b. (Optional) Enable multiple clients for the same subscriber (logical interface) to aggregate attributes by configuring the **aggregate-clients** option for the dynamic profile attached to a DHCP subscriber interface.

See *Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces*.

Because you have configured the scheduler map in the dynamic profile, queues are merged when subscribers change services. Other CoS parameters are replaced.

When multiple subscribers are enabled on a DHCP subscriber interface, and the dynamic profile referenced by DHCP does not have the **replace** keyword configured, the system does not replace the parameters. Instead, it combines the values of the parameters to their maximum scalar value.

**Related
Documentation**

- [hierarchical-scheduler on page 576](#)
- For hardware requirements and configuration guidelines, see [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [CoS for Subscriber Access Overview on page 3](#)
- [Example: Configuring Dynamic Hierarchical Scheduling and Queuing for Subscriber Access on page 49](#)

Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links

You can enable hierarchical CoS on a subscriber interface with an underlying aggregated Ethernet interface.

Before you begin, configure the subscriber interface with aggregated Ethernet.

- To configure a VLAN interface over aggregated Ethernet with link protection, see *Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet* and *Configuring Link Protection for Aggregated Ethernet Interfaces*.
- To configure a demux subscriber interface:

For static and dynamic IP demux interfaces, see *Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet*.

For static and dynamic VLAN demux interfaces, see *Configuring a Static or Dynamic VLAN Demux Subscriber Interface over Aggregated Ethernet*.



BEST PRACTICE: Link protection is not required for IP or demux subscriber interfaces. We recommend that you enable targeted distribution on the demux interface to provide accurate hierarchical scheduling for these links. See [“Providing Accurate Scheduling for a Demux Subscriber Interface of Aggregated Ethernet Links” on page 148](#).

To configure hierarchical CoS on the link aggregation (LAG) bundle:

1. Specify that you want to access the LAG bundle.

```
user@host# edit interfaces aex
```

2. Configure the link aggregation (LAG) bundle with hierarchical scheduler mode.

```
[edit interfaces aex]
```

```
user@host# set hierarchical-scheduler
```

You can then attach static or dynamic traffic shaping and scheduling parameters at the aggregated Ethernet logical interface or its underlying physical interface. See:

- [Configuring Traffic Scheduling and Shaping for Subscriber Access on page 11](#)
- [Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13](#)
- [Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile on page 223](#)

Related Documentation

- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 23](#)
- [CoS for Subscriber Access Overview on page 3](#)
- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)

Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface

You can configure hierarchical CoS on a static PPPoE subscriber interface.

Before you begin:

- Configure the static PPPoE subscriber interface.

See *Configuring PPPoE*.

To configure hierarchical CoS on a static PPPoE subscriber interface:

1. Specify the PPPoE interface that you want to configure.

```
user@host# edit interfaces pppoe-interface-name
```

2. Configure the hierarchical scheduler for the interface.

```
[edit interfaces interface-name]  
user@host# set hierarchical-scheduler
```

3. (Optional) Group the PPPoE interfaces in an interface set.

```
[edit]  
user@host# edit interfaces interface-set interface-set-name
```

You can now configure static traffic and scheduling parameters for each traffic-control profile, and attach each traffic-control profile to the PPPoE interface or the PPPoE interface set. For more information, see *Using the CLI to Modify Traffic-Control Profiles That Are Currently Applied to Subscribers*.

Related Documentation

- For hardware requirements and configuration guidelines, see [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [CoS for PPPoE Subscriber Interfaces Overview on page 9](#)
- [Example: Configuring Hierarchical Scheduling and Queuing for a Static PPPoE Subscriber Interface on page 56](#)
- [Example: Configuring Hierarchical Scheduling and Queuing for an Underlying Static PPPoE Subscriber Interface on page 59](#)
- [Example: Configuring Hierarchical Scheduling and Queuing for an Interface Set of Static PPPoE Subscriber Interfaces on page 61](#)
- [Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 23](#)
- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)

Example: Maintaining a Constant Traffic Flow by Configuring a Static VLAN Interface with a Dynamic Profile for Subscriber Access

This example shows how to configure a static VLAN interface with a dynamic profile using static schedulers and CoS parameters for subscriber access to maintain a constant traffic flow. The CoS parameters configure a best-effort data service for subscribers.

- [Requirements on page 39](#)
- [Overview on page 39](#)
- [Configuration on page 39](#)
- [Verification on page 48](#)

Requirements

Before you begin, be sure that your environment meets the following requirements:

- The interface is hosted on an MX Series router.
- For hierarchical scheduling configurations, hierarchical scheduling is enabled in the static CLI for the interface referenced in the dynamic profile. If not, the dynamic profile fails.
- Only one traffic-control-profile is configured under a dynamic profile.
- The output-traffic-control-profile that binds the traffic-control profile to the interface is defined within the same dynamic profile as the interface.

Overview

In a dynamic profile, you can configure VLAN subscriber interfaces over the following statically created logical interface types:

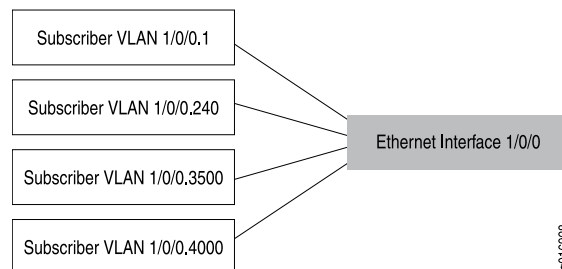
- GE—Gigabit Ethernet
- XE—10-Gigabit Ethernet
- AE—Aggregated Ethernet

Topology

We recommend that you configure each subscriber on a statically created VLAN.

Figure 6 on page 39 shows an example of subscriber interfaces on an individual VLAN.

Figure 6: VLAN Subscriber Interfaces



You can further separate VLANs on subscriber interfaces by configuring a VLAN interface as the underlying interface for a set of IP demux interfaces.

Configuration

To configure a static VLAN interface with a dynamic profile for subscriber access, perform these tasks:

- [Configuring a Subscriber Interface with a Static VLAN on page 41](#)
- [Associating the Dynamic Profile with a Statically Created Interface on page 42](#)

- [Configuring the Firewall Filter on page 43](#)
- [Configuring Static Schedulers in a Dynamic Profile on page 44](#)
- [Associating the Scheduler with a Scheduler Map on page 46](#)
- [Configuring and Applying Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile on page 47](#)

**CLI Quick
Configuration**

To quickly configure this example, copy the following configuration commands into a text file, remove any line breaks, and then paste the commands into the CLI at the [edit] hierarchy level.

```
set interfaces ge-2/2/0
set interfaces ge-2/2/0 hierarchical-scheduler
set interfaces ge-2/2/0 vlan-tagging
set interfaces ge-2/2/0 vlan-tagging unit 100 vlan-id 100
set interfaces ge-2/2/0 vlan-tagging unit 100 vlan-id 100 family inet
set interfaces ge-2/2/0 vlan-tagging unit 100 vlan-id 100 family inet unnumbered-address
  lo0.0 preferred-source-address 100.0.0.1
set dynamic-profiles data-service
set dynamic-profiles data-service interfaces $junos-interface-ifd-name
set dynamic-profiles data-service interfaces $junos-interface-ifd-name unit
  $junos-underlying-interface-unit
set dynamic-profiles data-service interfaces $junos-interface-ifd-name unit
  $junos-underlying-interface-unit family inet
set dynamic-profiles data-service firewall family inet filter filter EF_limit_G=768K
set dynamic-profiles data-service firewall family inet filter filter EF_limit_G=768K term
  EF
set dynamic-profiles data-service firewall family inet filter filter EF_limit_G=768K term
  default
set dynamic-profiles data-service firewall family inet filter filter EF_limit_G=768K term
  EF from forwarding-class EF
set dynamic-profiles data-service firewall family inet filter filter EF_limit_G=768K term
  EF then policer POL_EF_G=768K
set dynamic-profiles data-service firewall family inet filter filter EF_limit_G=768K term
  default then accept
set dynamic-profiles data-service class-of-service schedulers be-scheduler
set dynamic-profiles data-service class-of-service schedulers be-scheduler buffer-size
  remainder
set dynamic-profiles data-service class-of-service schedulers be-scheduler
  drop-profile-map loss-priority any protocol any
set dynamic-profiles data-service class-of-service schedulers be-scheduler
  drop-profile-map loss-priority any protocol any drop-profile drop3
set dynamic-profiles data-service class-of-service schedulers be-scheduler priority low
user@host# set dynamic-profiles data-service class-of-service schedulers be-scheduler
  transmit-rate percent 40
set dynamic-profiles data-service class-of-service schedulers be-scheduler excess-rate
  percent 90
set dynamic-profiles data-service class-of-service schedulers be-scheduler excess-priority
  high
set dynamic-profiles data-service class-of-service scheduler-maps data-service-map
set dynamic-profiles data-service class-of-service scheduler-maps data-service-map
  forwarding-class best-effort
set dynamic-profiles data-service class-of-service scheduler-maps data-service-map
  forwarding-class best-effort scheduler be-scheduler
set dynamic-profiles data-service class-of-service traffic-control-profiles tcp-data-service
```

```

set dynamic-profiles data-service class-of-service traffic-control-profiles tcp-data-service
  scheduler-map data-service-map
set dynamic-profiles data-service class-of-service traffic-control-profiles tcp-data-service
  shaping-rate 50k
set dynamic-profiles data-service class-of-service traffic-control-profiles tcp-data-service
  guaranteed-rate 10k
set dynamic-profiles data-service class-of-service traffic-control-profiles tcp-data-service
  delay-buffer-rate 10k
set dynamic-profiles data-service class-of-service interfaces $junos-interface-ifd-name
  unit $junos-underlying-interface-unit output-traffic-control-profile tcp-data-service

```

Configuring a Subscriber Interface with a Static VLAN

Step-by-Step Procedure

After you configure a static VLAN interface, you can reference it in a dynamic profile.

1. Configure the static VLAN interface.

```

[edit]
user@host# set interfaces ge-2/2/0

```
2. Enable hierarchical scheduling for the interface.

```

[edit interfaces ge-2/2/0]
user@host# set hierarchical-scheduler

```
3. Enable VLAN tagging.

```

[edit interfaces ge-2/2/0]
user@host# set vlan-tagging

```
4. Configure the unit and assign a VLAN ID.

```

[edit interfaces ge-2/2/0 vlan-tagging]
user@host# set unit 100 vlan-id 100

```
5. Define the family address type (inet for IPv4) for the VLAN interface.

```

[edit interfaces ge-2/2/0 vlan-tagging unit 100 vlan-id 100]
user@host# set family inet

```
6. Enable the physical interface to borrow an IP address from the loopback interface by setting an unnumbered interface address. Configure a secondary IP address on the loopback interface, lo0.0, and configure it as the preferred source address.

```

[edit interfaces ge-2/2/0 vlan-tagging unit 100 vlan-id 100 family inet]
user@host# set unnumbered-address lo0.0 preferred-source-address 100.0.0.1

```

Results Confirm the configuration of the static VLAN interface by entering the **show interfaces** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```

[edit]
user@host# show interfaces
interfaces {
  ge-2/2/0 {
    hierarchical-scheduler;
    vlan-tagging;
    unit 100 {
      vlan-id 100;

```

```

        family inet {
            unnumbered-address lo0.0 preferred-source-address 100.0.0.1;
        }
    }
}

```

Associating the Dynamic Profile with a Statically Created Interface

Step-by-Step Procedure

A dynamic profile is a set of characteristics, defined in a type of template, that you can use to provide dynamic subscriber access and services for broadband applications. When configuring the interface at the **[dynamic-profiles *profile-name* interfaces]** hierarchy level for a dynamic profile, you use variables to specify the interface name and the logical unit value. When a DHCP subscriber sends a DHCP request to the interface, the dynamic profile replaces the interface name variable and logical unit name variable with the actual interface name and logical unit number of the interface that received the DHCP request.



NOTE: Configuration of the interface name variable and logical interface name variable at the **[edit dynamic-profiles *profile-name* interfaces]** hierarchy level is required for a dynamic profile to function.

1. Create the new dynamic profile for data services for subscribers.

```

[edit]
user@host# set dynamic-profiles data-service

```

2. Define the ***interface-name*** variable statement with the internal **\$junos-interface-ifd-name** variable used by the router to match the interface name of the receiving interface.

```

[edit dynamic-profiles data-service]
user@host# set interfaces $junos-interface-ifd-name

```

3. Define the **unit** statement with the internal variable.

- When referencing an existing interface, specify the **\$junos-underlying-interface-unit** variable used by the router to match the unit value of the receiving interface.
- When creating dynamic interfaces, specify the **\$junos-interface-unit** variable used by the router to generate a unit value for the interface.

```

[edit dynamic-profiles data-service interfaces $junos-interface-ifd-name]
user@host# set unit $junos-underlying-interface-unit

```

or

```

[edit dynamic-profiles data-service interfaces $junos-interface-ifd-name]
user@host# set unit $junos-interface-unit

```

4. Define the family address type (inet for IPv4) for the **\$junos-interface-unit** variable.

```

[edit dynamic-profiles data-service interfaces $junos-interface-ifd-name unit
 $junos-underlying-interface-unit]

```

```
user@host# set family inet
```

Results Confirm the configuration of the dynamic profile by entering the **show dynamic-profiles** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```
[edit]
user@host# show dynamic-profiles
dynamic-profiles {
  data-service {
    interfaces {
      $junos-interface-ifd-name {
        unit $junos-underlying-interface-unit {
          family inet;
        }
      }
    }
  }
}
```

Configuring the Firewall Filter

Step-by-Step Procedure

To configure a static VLAN interface with a dynamic profile for subscriber access, you can configure a firewall filter to provide enhanced security by blocking packets based on various match criteria, such as subjecting traffic to a policer for rate limiting, assigning the traffic to a class-of-service (CoS) forwarding class for later queuing and packet rewrite operations, or directing traffic to a specific routing instance.

1. Configure the family address type (inet for IPv4) for the firewall filter and specify the filter name.

We recommend that you name the filter something that indicates the filter's purpose. In this example, we use the bandwidth limit settings.

```
[edit dynamic-profiles data-service]
user@host# set firewall family inet filter EF_limit_G=768K
```

2. Specify the term names for the filter. Make each term name unique and represent what its function is. The first term matches traffic that has been classified into the Expedited Forwarding (EF) class, and the second term matches all non-EF traffic.

```
[edit dynamic-profiles data-service firewall family inet filter EF_limit_G=768K]
user@host# set term EF
user@host# set term default
```

3. In each firewall filter term, specify the conditions used to match components of a packet. Configure the first term to match all traffic classified as EF class.

```
[edit dynamic-profiles data-service firewall family inet filter EF_limit_G=768K term EF]
user@host# set from forwarding-class EF
```

4. Specify the actions to take when the packet matches the condition in the first term. Send the EF traffic to the policer named **POL_EF_G=768K**.

```
[edit dynamic-profiles data-service firewall family inet filter EF_limit_G=768K term EF]
```

```
user@host# set then policer POL_EF_G=768K
```

5. Specify the action to take when the packet matches the condition in the second term. All non-EF packet traffic is accepted.

```
[edit dynamic-profiles data-service firewall family inet filter EF_limit_G=768K term
default]
user@host# set then accept
```

Results Confirm the configuration by entering the **show dynamic-profiles data-service firewall** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```
[edit]
user@host# show dynamic-profiles data-service firewall
family inet {
  filter EF_limit_G=768K {
    term EF {
      from {
        forwarding-class EF;
      }
      then policer POL_EF_G=768K;
    }
    term default {
      then accept;
    }
  }
}
```

Configuring Static Schedulers in a Dynamic Profile

Step-by-Step Procedure You can configure static scheduling and queuing parameters in a dynamic profile for subscriber access. Schedulers are part of the basic class-of-service (CoS) infrastructure. You must define at least one scheduler per forwarding class. Schedulers indicate a forwarding class's priority, transmit weight, and buffer size, as well as various shaping and rate control mechanisms.

1. Specify the best-effort scheduler for which you want to configure parameters.

```
[edit dynamic-profiles data-service class-of-service]
user@host# set schedulers be-scheduler
```



NOTE: Set schedulers to the name of the scheduler to be configured or to the Junos OS predefined variable (`$junos-cos-scheduler`) used for dynamic subscriber interfaces. The predefined variable is replaced with the scheduler name obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.

2. (Optional) Configure the buffer size to use the remaining buffer available.

This parameter allows you to specify an explicit buffer size, either as a percent of interface speed or as a function of time (specified in microseconds).


```
[edit dynamic-profiles data-service class-of-service schedulers be-scheduler]
user@host# set buffer-size remainder
```

3. (Optional) Configure the drop-profile map to associate one or more drop profiles with a queue.

The default random early detection (RED) drop profile is used when no explicit drop profile mapping is specified. Specify a packet-loss priority (PLP) level of any, and for the specified scheduler to accept any protocol type.

```
[edit dynamic-profiles data-service class-of-service schedulers be-scheduler]
user@host# set drop-profile-map loss-priority any protocol any
```

4. (Optional) Configure the drop profile to map a fill level (fullness of a queue) to a drop probability (probability that a packet is dropped).

```
[edit dynamic-profiles data-service class-of-service schedulers be-scheduler]
drop-profile-map loss-priority any protocol any]
user@host# set drop-profile drop3
```

You enable RED by applying a drop profile to a scheduler.

5. (Optional) Configure the queue's scheduler priority to a specific level (low) for guaranteed rate traffic.

```
[edit dynamic-profiles data-service class-of-service schedulers be-scheduler]
user@host# set priority low
```

6. (Optional) Configure the queue's transmit weight [in bits per second (bps)] or as a percentage of transmission capacity.

```
[edit dynamic-profiles data-service class-of-service schedulers be-scheduler]
user@host# set transmit-rate percent 40
```

The transmit rate guarantees the rate for the queue, assuming no priority-based starvation occurs. When you do not specify a transmit weight, or when the transmit rate is reached, the queue can only send excess-rate traffic because that queue's priority is demoted to the excess region. A percentage of zero (0) drops all packets in the queue.

7. (Optional) Configure the queue's weight as either a percentage, or a proportion, for any unused bandwidth traffic to share.

```
[edit dynamic-profiles data-service class-of-service schedulers be-scheduler]
user@host# set excess-rate percent 90
```

Behavior varies based on interface mode, explicit configuration, and whether any other queues have explicit weight configured. By default, excess bandwidth between the guaranteed and shaped rate is shared equally among queues.

8. (Optional) Configure the priority of how excess bandwidth traffic is sent on a scheduler in a dynamic profile.

```
[edit dynamic-profiles data-service class-of-service schedulers be-scheduler]
user@host# set excess-priority high
```

To prevent the queue from sending any excess rate traffic, set to none.

Results Confirm the configuration of the scheduler with static values in the dynamic profile by entering the **show dynamic-profiles data-service class-of-service** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```
[edit]
user@host# show dynamic-profiles data-service class-of-service
class-of-service {
  schedulers {
    be-scheduler {
      buffer-size remainder;
      drop-profile-map loss-priority any protocol any drop-profile drop3;
      priority low;
      transmit-rate percent 40;
      excess-rate percent 90;
      excess-priority high;
    }
  }
}
```

Associating the Scheduler with a Scheduler Map

Step-by-Step Procedure After you define your schedulers, you must link them to a set of queues on a logical interface using a scheduler map. Applying a scheduler map to an interface places the related set of schedulers and drop profiles into effect.

1. Configure the scheduler map name.

```
[edit dynamic-profiles data-service class-of-service]
user@host# set scheduler-maps data-service-map
```

2. Configure a forwarding class to associate a scheduler with a scheduler map.

```
[edit dynamic-profiles data-service class-of-service scheduler-maps
data-service-map]
user@host# set forwarding-class best-effort
```

3. Associate the scheduler you previously defined (**be-scheduler**) with the scheduler map.

```
[edit dynamic-profiles data-service class-of-service scheduler-maps
data-service-map forwarding-class best-effort]
user@host# set scheduler be-scheduler
```

Results Confirm the configuration of the scheduler map by entering the **show dynamic-profiles data-service class-of-service scheduler-maps** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```
[edit]
user@host# show dynamic-profiles data-service class-of-service scheduler-maps
scheduler-maps {
  data-service-map {
    forwarding-class best-effort scheduler be-scheduler;
  }
}
```

Configuring and Applying Static Traffic Shaping and Scheduling Parameters in a Dynamic Profile

Step-by-Step Procedure

Configure static traffic shaping and scheduling parameters in a traffic-control profile. A traffic-control profile is a generic class-of-service (CoS) container that you can apply at all points of a CoS hierarchy to affect the committed information rate (CIR), peak information rate (PIR), and excess bandwidth handling. You can specify the traffic-control profile at the port, logical interface, or logical interface-set level. The traffic-control profile also references the scheduler map.

1. Create the traffic-control profile and assign it a name.

```
[edit dynamic-profiles data-service class-of-service]
user@host# edit traffic-control-profiles tcp-data-service
```

2. Apply the static scheduler map, **data-service-map**, that you previously configured.

```
[edit dynamic-profiles data-service class-of-service traffic-control-profiles
tcp-data-service]
user@host# set scheduler-map data-service-map
```

3. Configure the shaping rate [in bits per second (bps)] to use for the scheduler in the dynamic profile.

```
[edit dynamic-profiles data-service class-of-service traffic-control-profiles
tcp-data-service]
user@host# set shaping-rate 50k
```

The shaping rate places a maximum limit on a queue's transmit capacity. By default, the shaping rate is equal to the interface speed/shaping rate enabling the queue to send at the full rate of the interface.

4. Configure the guaranteed rate [in bits per second (bps)] to use for the scheduler in the dynamic profile.

```
[edit dynamic-profiles data-service class-of-service traffic-control-profiles
tcp-data-service]
user@host# set guaranteed-rate 10k
```

The guaranteed rate is the minimum bandwidth the queue can receive; if excess physical interface bandwidth is available for use, the logical interface can receive more than the guaranteed rate provisioned for the interface, depending on how you choose to manage excess bandwidth and the interface's mode of PIR compared to CIR/PIR.

5. Configure the delay-buffer rate [in bits per second (bps)] based on the delay-buffer calculation.

```
[edit dynamic-profiles data-service class-of-service traffic-control-profiles
tcp-data-service]
user@host# set delay-buffer-rate 10k
```

The delay buffer rate setting at one level of the hierarchy becomes the reference bandwidth used at the next higher level, and the sum of the reference bandwidth cannot exceed the value used at a lower level. If you do not include this statement, the delay-buffer rate is based on the guaranteed rate if one is configured, or on the shaping rate if no guaranteed rate is configured.

6. After you configure the traffic shaping and scheduling CoS parameters in a dynamic profile, you apply them to an interface. The output traffic-control profile enables you to provide traffic scheduling to the interface.

Configure the interface name and logical interface using a variable, and apply the output traffic-control profile to the interface. Specify the previously defined traffic-control profile, **tcp-data-service**.

```
[edit dynamic-profiles data-service class-of-service]
user@host# set interfaces $junos-interface-ifd-name unit
$junos-underlying-interface-unit output-traffic-control-profile tcp-data-service
```

Results Confirm the configuration and application of the static traffic shaping and scheduling parameters by entering the **show dynamic-profiles** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```
[edit]
user@host# show dynamic-profiles
dynamic-profiles {
  data-service {
    class-of-service {
      interfaces {
        $junos-interface-ifd-name {
          unit $junos-underlying-interface-unit {
            output-traffic-control-profile tcp-data-service;
          }
        }
      }
    }
  }
  traffic-control-profiles {
    tcp-data-service {
      scheduler-map data-service-map;
      shaping-rate 50k;
      guaranteed-rate 10k;
      delay-buffer-rate 10k;
    }
  }
}
```

Verification

Confirm that the configuration is working properly.

- [Verifying Traffic Shaping and Scheduling Profiles for Subscriber Access on page 48](#)
- [Verifying the Mapping of Schedulers for Subscriber Access on page 49](#)

Verifying Traffic Shaping and Scheduling Profiles for Subscriber Access

Purpose View the class-of-service (CoS) configurations that are referenced in a dynamic profile for subscriber access.

Action user@host> **show class-of-service traffic-control-profile**
Traffic control profile: tcp-data-service, Index: 57625
Shaping rate: 50000
Scheduler map: data-service-map
Delay Buffer rate: 10000
Guaranteed rate: 10000

Meaning The Shaping rate, Delay Buffer rate, and Guaranteed rate fields indicate rates of 50,000 bps, 10,000 bps, and 10,000 bps, respectively, for the traffic-control profile.

Verifying the Mapping of Schedulers for Subscriber Access

Purpose Display the mapping of schedulers to forwarding classes and a summary of scheduler parameters for each entry.

Action user@host> **show class-of-service scheduler-map**
Scheduler map: data-service-map, Index: 84

Scheduler: be-scheduler, Index: 8721, Forwarding class: best-effort
Transmit rate: 40 percent, Rate Limit: none, Maximum buffer delay: 39 ms,
Priority: low
Drop profiles:
Loss priority Protocol Index Name
Any Any 8724 drop3

Meaning The Scheduler map field indicates the parameters are for the best-effort scheduler. The Transmit rate field shows 40 percent; the Rate Limit field indicates no limit; and the Drop profiles fields are for drop3.

Related Documentation

- [CoS for Subscriber Access Overview on page 3](#)
- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)

Example: Configuring Dynamic Hierarchical Scheduling and Queueing for Subscriber Access

In this example, subscribers are provided with a data and voice service defined in an access profile when they initially log in. The RADIUS administrator supplies the initial values on the RADIUS server, and the service activation is performed at subscriber login.

After the initial login, the subscriber adds an assured forwarding service that is not defined in the original access profile. A service profile is used to configure the schedulers and a RADIUS CoA activates the service. The queues defined for the schedulers in the initial scheduler map and the new scheduler map are merged.

In addition, the values for the initial data and voice service are upgraded by the RADIUS administrator through a separate RADIUS CoA message.

To configure the initial service and enable the activation through a RADIUS CoA:

1. Configure the access profile for the service activation.
 - a. Configure the VLAN interface for the access profile.

```
[edit]
dynamic-profiles access-profile {
  interfaces {
    $junos-interface-ifd-name {
      unit $junos-underlying-interface-unit {
        family inet;
      }
    }
  }
}
```

- b. Configure the class of service parameters in the access profile. In this example, you configure Junos OS predefined variables that provide the initial scheduler name and scheduler parameters obtained from the RADIUS authentication server when the subscriber logs in.

Include the configurations for the interfaces, schedulers, and the scheduler maps.

```
[edit]
dynamic-profiles access-profile {
  class-of-service {
    traffic-control-profiles {
      tcp1 {
        scheduler-map $junos-cos-scheduler-map;
        shaping-rate $junos-cos-shaping-rate;
        guaranteed-rate $junos-cos-guaranteed-rate;
        delay-buffer-rate $junos-cos-delay-buffer-rate;
      }
    }
    interfaces {
      $junos-interface-ifd-name {
        unit "$junos-underlying-interface-unit" {
          classifiers {
            ieee-802.1 l2_classifier;
          }
          rewrite-rules {
            ieee-802.1 l2_rewrite;
          }
          output-traffic-control-profile tcp1;
        }
      }
    }
    schedulers {
      $junos-cos-scheduler {
        buffer-size percent $junos-cos-scheduler-bs;
        priority $junos-cos-scheduler-pri;
        transmit-rate percent $junos-cos-scheduler-tx;
        drop-profile-map loss-priority low protocol any $junos-cos-scheduler-low;
        drop-profile-map loss-priority medium-low protocol any
          $junos-cos-scheduler-medium-low;
      }
    }
  }
}
```

```

        drop-profile-map loss-priority medium-high protocol any
        $junos-cos-scheduler-medium-high;
        drop-profile-map loss-priority high protocol any $junos-cos-scheduler-high;
    }
}
scheduler-maps {
    data_voice_smap {
        forwarding-class be scheduler be_sch;
        forwarding-class ef scheduler ef_sch;
    }
}
}
}

```

Table 10 on page 51 lists the initial values defined by the RADIUS administrator for the scheduler map and shaping rates.

Table 10: Initial Scheduler Map and Shaping Values at Subscriber Login

Predefined Variable	RADIUS Tag	Value
\$junos-cos-scheduler-map	T01	data_voice_smap
\$junos-cos-shaping-rate	T02	6m
\$junos-cos-guaranteed-rate	T03	4m
\$junos-cos-delay-buffer-rate	T04	4m

Table 11 on page 51 lists the initial values defined by the RADIUS administrator for the voice (expedited forwarding) scheduler.

Table 11: Initial CoS Values for the Voice Scheduler at Subscriber Login

Predefined Variable	Tag	Value
\$junos-cos-scheduler	—	ef_sch
\$junos-cos-scheduler-tx	T01	10
\$junos-cos-scheduler-bs	T02	10
\$junos-cos-scheduler-pri	T03	medium-high
\$junos-cos-scheduler-dropfile-low	T04	d3
\$junos-cos-scheduler-dropfile-medium-low	T05	d2
\$junos-cos-scheduler-dropfile-medium-high	T06	d1
\$junos-cos-scheduler-dropfile-high	T07	d0

Table 12 on page 52 lists the initial values defined by the RADIUS administrator for the data (best effort) scheduler.

Table 12: Initial CoS Values for the Data Scheduler at Subscriber Login

Predefined Variable	Tag	Value
\$junos-cos-scheduler	—	be_sch
\$junos-cos-scheduler-tx	T01	10
\$junos-cos-scheduler-bs	T02	10
\$junos-cos-scheduler-pri	T03	low
\$junos-cos-scheduler-dropfile-low	T04	d0
\$junos-cos-scheduler-dropfile-medium-low	T05	d1
\$junos-cos-scheduler-dropfile-medium-high	T06	d2
\$junos-cos-scheduler-dropfile-high	T07	d3

2. Configure the classifiers, drop profiles, forwarding classes, and rewrite rules in the static **[edit class-of-service]** hierarchy.

```
[edit]
class-of-service {
  classifiers {
    dscp dscp_classifier {
      forwarding-class be {
        loss-priority low code-points 000000;
      }
      forwarding-class af {
        loss-priority medium-low code-points 000001;
      }
    }
    ieee-802.1 l2_classifier {
      forwarding-class be {
        loss-priority medium-low code-points 000;
      }
      forwarding-class ef {
        loss-priority medium-low code-points 100;
      }
      forwarding-class af {
        loss-priority medium-low code-points 010;
      }
    }
  }
  drop-profiles {
    d0 {
      fill-level 25 drop-probability 100;
      fill-level 0 drop-probability 0;
    }
  }
}
```



```

    }
    d1 {
        fill-level 50 drop-probability 100;
        fill-level 0 drop-probability 0;
    }
    d2 {
        fill-level 75 drop-probability 100;
        fill-level 0 drop-probability 0;
    }
    d3 {
        fill-level 0 drop-probability 0;
        fill-level 100 drop-probability 100;
    }
}
forwarding-classes {
    queue 0 be;
    queue 1 ef;
    queue 2 af;
    queue 3 nc;
}
interfaces {
    ge-1/2/9 {
        shaping-rate 100m;
    }
}
rewrite-rules {
    ieee-802.1 l2_rewrite {
        forwarding-class be {
            loss-priority medium-low code-point 000;
        }
        forwarding-class ef {
            loss-priority medium-low code-point 001;
        }
        forwarding-class af {
            loss-priority medium-low code-point 100;
        }
    }
    dscp l2_rewrite {
        forwarding-class be {
            loss-priority medium-low code-points 000;
        }
        forwarding-class ef {
            loss-priority medium-low code-points 001;
        }
        forwarding-class af {
            loss-priority medium-low code-points 001;
        }
    }
}
}

```

3. Configure the service profile enable RADIUS to activate the video service after login. The video service corresponds to assured forwarding PHB.

In this example, you configure Junos OS predefined variables that provide the initial scheduler name and scheduler parameters obtained from the RADIUS authentication server when the subscriber logs in.

```
[edit]
dynamic-profiles service-af {
  variables {
    af_fc default-value video;
    af_sch default-value af_sch;
    sch-drop-any default-value all;
    sch-pri-2 default-value strict-high;
    sch-bs-2 default-value 40;
    sch-tx-2 default-value 3m;
    smap default-value any
  }
  class-of-service {
    scheduler-maps {
      "$smap" {
        forwarding-class "$af_fc" scheduler "$af_sch";
      }
    }
    schedulers {
      "$af_sch" {
        transmit-rate percent "$sch-tx-2";
        buffer-size percent "$sch-bs-2";
        priority "$sch-pri-2";
        drop-profile-map loss-priority any protocol any drop-profile "$sch-drop-any";
      }
    }
  }
}
```

After the three services are activated, subscribers receive upgraded values for the data and voice service when RADIUS sends a change of authorization (CoA). In this case, the CoS parameters are replaced, because multiple subscribers were not enabled on the logical interface.

[Table 13 on page 54](#) lists the upgraded values defined by the RADIUS administrator.

Table 13: Upgraded CoS Values for the Video Service

Variable	RADIUS Tag	Value
junos-cos-scheduler-map	T01	data_voice_smap
junos-cos-shaping-rate	T02	14m
junos-cos-guaranteed-rate	T03	13m
junos-cos-delay-buffer-rate	T04	12m

[Table 14 on page 55](#) lists the values defined by the RADIUS administrator for the video (assured forwarding) scheduler.

Table 14: Upgraded CoS Values for the Video Scheduler

Predefined Variable	Tag	Value
\$junos-cos-scheduler	—	af_sch
\$junos-cos-scheduler-tx	T01	10
\$junos-cos-scheduler-bs	T02	10
\$junos-cos-scheduler-pri	T03	medium
\$junos-cos-scheduler-dropfile-low	T04	d3
\$junos-cos-scheduler-dropfile-medium-low	T05	d2
\$junos-cos-scheduler-dropfile-medium-high	T06	d1
\$junos-cos-scheduler-dropfile-high	T07	d0

Table 15 on page 55 lists the values defined by the RADIUS administrator for the expedited forwarding scheduler in the CoA message. The values are the same as the initial service.

Table 15: Initial CoS Values for the Expedited Forwarding Scheduler at Subscriber Login

Predefined Variable	Tag	Value
\$junos-cos-scheduler	—	ef_sch
\$junos-cos-scheduler-tx	T01	10
\$junos-cos-scheduler-bs	T02	10
\$junos-cos-scheduler-pri	T03	medium-high
\$junos-cos-scheduler-dropfile-low	T04	d3
\$junos-cos-scheduler-dropfile-medium-low	T05	d2
\$junos-cos-scheduler-dropfile-medium-high	T06	d1
\$junos-cos-scheduler-dropfile-high	T07	d0

Table 16 on page 56 lists the values defined by the RADIUS administrator for the best effort scheduler in the CoA message. The values are the same as the initial service.

Table 16: Initial CoS Values for the Best Effort Scheduler at Subscriber Login

Predefined Variable	Tag	Value
\$junos-cos-scheduler	—	be_sch
\$junos-cos-scheduler-tx	T01	10
\$junos-cos-scheduler-bs	T02	10
\$junos-cos-scheduler-pri	T03	low
\$junos-cos-scheduler-dropfile-low	T04	d0
\$junos-cos-scheduler-dropfile-medium-low	T05	d1
\$junos-cos-scheduler-dropfile-medium-high	T06	d2
\$junos-cos-scheduler-dropfile-high	T07	d3

Related Documentation

- [Changing CoS Services Overview on page 167](#)
- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)

Example: Configuring Hierarchical Scheduling and Queuing for a Static PPPoE Subscriber Interface

In this example, the network administrator defines hierarchical queuing and scheduler parameters by configuring traffic-control profile and binding it directly to a PPPoE subscriber interface.

This configuration is supported on the IQ2E PIC.

To use this configuration in a broadband access network, each forwarding class can represent one type of services provided to a household customer and is mapped to a queue. Each PPPoE interface represents a household and provides shaping of all household traffic to an aggregate rate. All of the PPPoE interfaces on the physical interfaces are shaped to the underlying physical interface rate.

[Table 17 on page 56](#) lists the scheduler and queue mapping for this configuration.

Table 17: Scheduler per Logical Interface Mapping

Level	Type	Mapping
4	Queue	PPPoE interface

Table 17: Scheduler per Logical Interface Mapping (*continued*)

Level	Type	Mapping
3	Scheduler	PPPoE interface
2	Scheduler	—
1	Scheduler	Underlying physical interface

```

interfaces {
  ge-3/0/3 {
    hierarchical-scheduler;
    vlan-tagging;
    unit 0 {
      encapsulation ppp-over-ether;
      vlan-id 100;
    }
  }
  pp0 {
    unit 0 {
      pppoe-options {
        underlying-interface ge-3/0/3.0;
        server;
      }
      family inet {
        address 120.20.20.20/32 {
          destination 120.20.20.21;
        }
      }
    }
    unit 1 {
      pppoe-options {
        underlying-interface ge-3/0/3.0;
        server;
      }
      family inet {
        address 130.30.30.30/32 {
          destination 130.30.30.31;
        }
      }
    }
    unit 2 {
      pppoe-options {
        underlying-interface ge-3/0/3.0;
        server;
      }
      family inet {
        address 140.40.40.40/32 {
          destination 140.40.40.41;
        }
      }
    }
  }
}

```

```
class-of-service {
  traffic-control-profiles {
    tcp {
      scheduler-map data_smap;
      shaping-rate 50k;
      guaranteed-rate 10k;
    }
  }
  interfaces {
    pp0 {
      unit 0 {
        output-traffic-control-profile tcp;
      }
      unit 1 {
        output-traffic-control-profile tcp;
      }
      unit 2 {
        output-traffic-control-profile tcp;
      }
    }
    forwarding-classes {
      queue 0 be;
      queue 1 ef;
      queue 3 nc;
      queue 2 af;
    }
    scheduler-maps {
      data_smap {
        forwarding-class be scheduler be_sch;
      }
      voice_data_smap {
        forwarding-class be scheduler be_sch;
      }
      vid_data_smap {
        forwarding-class ef scheduler ef_sch;
      }
    }
    schedulers {
      be_sch {
        transmit-rate percent 10;
        buffer-size remainder;
        priority low;
      }
      ef_sch {
        transmit-rate percent 10;
        buffer-size remainder;
        priority low;
      }
      af_sch {
        transmit-rate percent 10;
        buffer-size remainder;
        priority low;
      }
      nc_sch {
        transmit-rate percent 10;
        buffer-size remainder;
      }
    }
  }
}
```

```
        priority low;
    }
}
```

- Related Documentation
- [CoS for PPPoE Subscriber Interfaces Overview on page 9](#)
 - [Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 37](#)

Example: Configuring Hierarchical Scheduling and Queueing for an Underlying Static PPPoE Subscriber Interface

In this example, the network administrator defines hierarchical queues and scheduler parameters by configuring a traffic-control profile and binding it directly to a PPPoE subscriber interface. The network administrator then configures the traffic-control profile on the underlying interface where a group of PPPoE interfaces reside.

This configuration is supported on the IQ2E PIC.

To use this configuration in a broadband access network, each forwarding class represents one type of services provided to a household customer and is mapped to a queue. Each PPPoE interface represents a household and provides shaping of all household traffic to an aggregate rate. The underlying logical interface where a group of PPPoE interfaces resides represents a DSLAM and provides shaping to the DSLAM rate.

Table 18 on page 59 lists the scheduler and queue mapping for this configuration.

Table 18: Scheduler per Underlying Interface Mapping

Level	Type	Mapping
4	Queue	PPPoE interface
3	Scheduler	PPPoE interface
2	Scheduler	Underlying logical interface
1	Scheduler	Underlying interface

```
interfaces {
  ge-3/0/3 {
    hierarchical-scheduler;
    vlan-tagging;
    unit 0 {
      encapsulation ppp-over-ether;
      vlan-id 100;
    }
    unit 1 {
      vlan-id 101;
    }
  }
  pp0 {
    hierarchical-scheduler;
```

```
unit 0 {
  pppoe-options {
    underlying-interface ge-3/0/3.0;
    server;
  }
  family inet {
    address 120.20.20.20/32 {
      destination 120.20.20.21;
    }
  }
}
unit 1 {
  pppoe-options {
    underlying-interface ge-3/0/3.0;
    server;
  }
  family inet {
    address 130.30.30.30/32 {
      destination 130.30.30.31;
    }
  }
}
unit 2 {
  pppoe-options {
    underlying-interface ge-3/0/3.0;
    server;
  }
  family inet {
    address 140.40.40.40/32 {
      destination 140.40.40.41;
    }
  }
}
}
}
class-of-service {
  traffic-control-profiles {
    tcp1 {
      scheduler-map data_smap;
      shaping-rate 50k;
      guaranteed-rate 10k;
    }
    tcp2 {
      scheduler-map data_smap;
      shaping-rate 50m;
      guaranteed-rate 10m;
    }
  }
}
interfaces {
  pp0 {
    unit 0 {
      output-traffic-control-profile tcp1;
    }
    unit 1 {
      output-traffic-control-profile tcp1;
    }
  }
}
```



```
unit 2 {
  output-traffic-control-profile tcp1;
}
}
ge-3/0/3 {
  unit 0 {
    output-traffic-control-profile tcp2;
  }
}
...
}
```

- Related Documentation
- [CoS for PPPoE Subscriber Interfaces Overview on page 9](#)
 - [Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 37](#)
 - [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)

Example: Configuring Hierarchical Scheduling and Queueing for an Interface Set of Static PPPoE Subscriber Interfaces

In this example, the network administrator defines hierarchical queues and scheduler parameters by configuring traffic-control profile and binding it directly to a PPPoE subscriber interface. The network administrator then configures the traffic-control profile on a set of PPPoE interfaces.

This configuration is supported on the IQ2E PIC.

To use this configuration in a broadband access network, each forwarding class represents one type of services provided to a household customer and is mapped to a queue. Each PPPoE interface represents a household and provides shaping of all household traffic to an aggregate rate. In addition, the PPPoE interface-set configuration provides shaping of traffic for a group of PPPoE interface on a DSLAM to a DSLAM aggregate rate.

[Table 19 on page 61](#) lists the scheduler and queue mapping for this configuration.

Table 19: Scheduler per Logical Interface with Interface Set Mapping

Level	Type	Mapping
4	Queue	PPPoE interface
3	Scheduler	PPPoE interface
2	Scheduler	Set of PPPoE interfaces
1	Scheduler	Underlying physical interface

```
interfaces {
  interface-set iflset1 {
    interface pp0 {
```

```
    unit 0;
    unit 1;
    unit 2;
  }
}
pp0 {
  unit 0 {
    pppoe-options {
      underlying-interface ge-3/0/3.0;
      server;
    }
    family inet {
      address 120.20.20.20/32 {
        destination 120.20.20.21;
      }
    }
  }
}
unit 1 {
  pppoe-options {
    underlying-interface ge-3/0/3.0;
    server;
  }
  family inet {
    address 130.30.30.30/32 {
      destination 130.30.30.31;
    }
  }
}
unit 2 {
  pppoe-options {
    underlying-interface ge-3/0/3.0;
    server;
  }
  family inet {
    address 140.40.40.40/32 {
      destination 140.40.40.41;
    }
  }
}
}
ge-3/0/3 {
  hierarchical-scheduler;
  vlan-tagging;
  unit 0 {
    encapsulation ppp-over-ether;
    vlan-id 100;
  }
  unit 1 {
    vlan-id 101;
  }
  unit 2 {
    vlan-id 102;
  }
}
}
class-of-service {
```

```
traffic-control-profiles {
  tcp1 {
    scheduler-map data_smap;
    shaping-rate 50k;
    guaranteed-rate 10k;
  }
  tcp2 {
    scheduler-map data_smap;
    shaping-rate 50m;
    guaranteed-rate 10m;
  }
}
interfaces {
  pp0 {
    unit 0 {
      output-traffic-control-profile tcp1;
    }
    unit 1 {
      output-traffic-control-profile tcp1;
    }
    unit 2 {
      output-traffic-control-profile tcp1;
    }
    interface-set iflset1 {
      output-traffic-control-profile tcp2;
    }
    ...
  }
}
```

- Related Documentation**
- [CoS for PPPoE Subscriber Interfaces Overview on page 9](#)
 - [Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 37](#)
 - [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)

CHAPTER 4

Configuring Hierarchical CoS Scheduling on MPLS Ethernet Pseudowire Subscriber Interfaces

- [Hierarchical CoS on MPLS Pseudowire Subscriber Interfaces Overview on page 65](#)
- [CoS Two-Level Hierarchical Scheduling on MPLS Pseudowire Subscriber Interfaces on page 66](#)
- [CoS Three-Level Hierarchical Scheduling on MPLS Pseudowire Subscriber Interfaces on page 68](#)
- [CoS Configuration Overview for MPLS Pseudowire Subscriber Interfaces on page 71](#)
- [Configuring CoS Two-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces on page 72](#)
- [Configuring CoS Three-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces \(Logical Interfaces over a Transport Logical Interface\) on page 74](#)
- [Configuring CoS Three-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces \(Logical Interfaces over a Pseudowire Interface Set\) on page 76](#)

Hierarchical CoS on MPLS Pseudowire Subscriber Interfaces Overview

Junos OS supports two aspects of CoS for MPLS pseudowire subscriber interfaces. You can apply CoS rewrite rules and behavior aggregate (BA) classifiers to MPLS pseudowire subscriber interfaces. In addition, CoS performs egress hierarchical shaping towards the subscriber on MPLS pseudowire subscriber interfaces.

Hierarchical CoS enables you to apply traffic scheduling and queuing parameters and packet transmission scheduling parameters to an individual subscriber interface rather than to all interfaces configured on the port. Hierarchical CoS is supported on MX Series routers with either EQ DPCs or MPC/MICs installed.

On Juniper Networks MX Series routers, MPC/MIC and EQ DPC interfaces support a four-level CoS scheduling hierarchy that, when fully configured, consists of the physical interface (level 1), the interface set or the underlying interface (level 2), one or more logical interfaces (level 3), and one or more queues (level 4). Although all CoS scheduling hierarchies are four-level, level 1 is always the physical interface and level 4 is always the queue. Hierarchical scheduling configurations consist of the type of interfaces you

configure; for example, a logical interface or an interface set and where those interfaces reside in the scheduling hierarchy, either level 2 or level 3. Because many hierarchical scheduling configurations are possible, we use the terms *two-level hierarchical scheduling* and *three-level hierarchical scheduling* in this discussion.

Related Documentation

- [Pseudowire Subscriber Logical Interfaces Overview](#)
- [Configuring a Pseudowire Subscriber Logical Interface](#)
- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)
- [CoS Two-Level Hierarchical Scheduling on MPLS Pseudowire Subscriber Interfaces on page 66](#)
- [CoS Three-Level Hierarchical Scheduling on MPLS Pseudowire Subscriber Interfaces on page 68](#)
- [CoS Configuration Overview for MPLS Pseudowire Subscriber Interfaces on page 71](#)
- [hierarchical-scheduler \(Subscriber Interfaces on MX Series Routers\) on page 576](#)

CoS Two-Level Hierarchical Scheduling on MPLS Pseudowire Subscriber Interfaces

Two-level hierarchical scheduling limits the number of hierarchical levels in the scheduling hierarchy to two. In a two-level scheduling hierarchy, all logical interfaces and interface sets share a single level 2 node. [Table 20 on page 66](#) summarizes the interface hierarchy and the CoS scheduler node levels for two-level hierarchical scheduling.

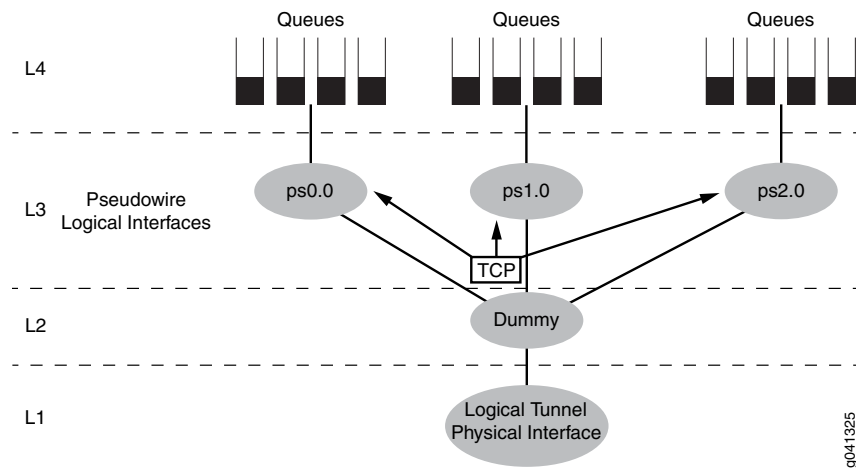
Table 20: Two-Level Hierarchical Scheduling—Interface Hierarchy Versus Scheduling Nodes

Level 1	Level 2	Level 3	Level 4
Physical interface	—	Pseudowire transport logical interface	One or more queues
Physical interface	—	Interface set	One or more queues
Physical interface	—	Pseudowire service logical interface	One or more queues

You use the two-level hierarchical scheduling when you have many pseudowires but you do not require shaping specific to the subscriber logical interface. For example, when your configuration is one subscriber per pseudowire interface.

[Figure 7 on page 67](#) shows a two-level hierarchical scheduling configuration for the MPLS pseudowires. In this configuration, level 1 is the physical interface used for the logical tunnel anchor node. All of the pseudowire transport interfaces share a single level 2 node. The level 3 nodes are the pseudowire transport logical interfaces (ps0.0, ps1.0, and ps2.0). In this configuration, interface sets are not configured and only the logical interfaces have traffic control profiles.

Figure 7: MPLS Pseudowire Subscriber Interface Two-Level Scheduler Configuration



Two-level hierarchical scheduling has up to eight class of service queues. For this configuration, include the `maximum-hierarchy-levels 2` option under the `[edit interfaces interface-name hierarchical-scheduler]` statement at the physical interface for the anchor logical tunnel.



NOTE: You cannot configure shaping policies on both the pseudowire logical interfaces and the subscriber logical interfaces over the same pseudowire. If a traffic-control profile is configured on a pseudowire logical interface, and CoS policies are configured on the subscriber logical interface over another pseudowire, all of the logical interfaces are at level 3 and act as peers.

Related Documentation

- [Pseudowire Subscriber Logical Interfaces Overview](#)
- [Configuring a Pseudowire Subscriber Logical Interface](#)
- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)
- [Hierarchical CoS on MPLS Pseudowire Subscriber Interfaces Overview on page 65](#)
- [CoS Three-Level Hierarchical Scheduling on MPLS Pseudowire Subscriber Interfaces on page 68](#)
- [CoS Configuration Overview for MPLS Pseudowire Subscriber Interfaces on page 71](#)
- [Configuring CoS Two-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces on page 72](#)
- [hierarchical-scheduler \(Subscriber Interfaces on MX Series Routers\) on page 576](#)

CoS Three-Level Hierarchical Scheduling on MPLS Pseudowire Subscriber Interfaces

In three-level hierarchical scheduling, the CoS scheduler nodes at level 1, level 2, and level 3 form a scheduling hierarchy. You can configure many different three-level scheduling hierarchies, depending on the location of the interface set and the use of underlying interfaces. In all variations, the physical interface on which the logical tunnel resides is a level 1 CoS scheduler node and the queues reside at level 4. Three-level scheduling hierarchies can have up to eight class of service queues.

[Table 21 on page 68](#) summarizes the most common three-level hierarchical scheduling configurations and shows the interface hierarchy and CoS scheduler nodes.

Table 21: Three-Level Hierarchical Scheduling—Interface Hierarchy Versus CoS Scheduling Node Levels

Level 1	Level 2	Level 3	Level 4
Physical interface	Pseudowire interface set	Pseudowire service logical interfaces	One or more queues
Physical interface	Pseudowire transport logical interface	Pseudowire interface set	One or more queues
Physical interface	Pseudowire transport logical interface	Pseudowire service logical interfaces	One or more queues

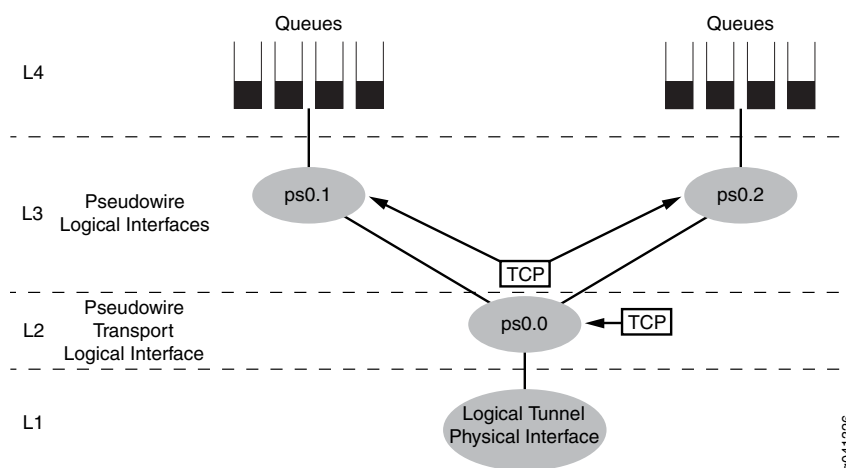
Three-Level Scheduling Hierarchy: Pseudowire Logical Interfaces over a Transport Logical Interface

[Figure 8 on page 69](#) shows an MPLS pseudowire three-level scheduling hierarchy that includes two pseudowire service logical interfaces over a pseudowire transport logical interface. This variation uses the following scheduler nodes:

- Level 4—Forwarding class-based queues
- Level 3—Pseudowire service logical interfaces (ps0.1 and ps0.2) for subscriber sessions
- Level 2—Pseudowire transport logical interface (ps0.0)
- Level 1—Common/shared physical interface of the logical tunnel anchor point

You apply the traffic-control profiles at the pseudowire transport logical interfaces (level 2) and the pseudowire service logical interfaces (level 3).

Figure 8: Three-Level Scheduling Hierarchy Case 1: Pseudowire Service Logical Interfaces over a Transport Logical Interface



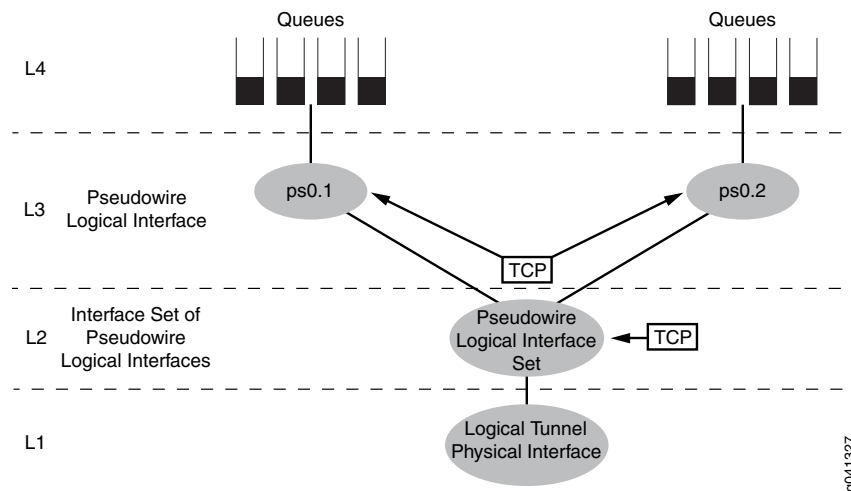
Three-Level Scheduling Hierarchy : Pseudowire Service Logical Interfaces over a Pseudowire Service Interface Set

Figure 9 on page 70 shows another variation of MPLS pseudowire three-level hierarchical scheduling that includes two pseudowire service logical interfaces over a pseudowire service interface set. This variation uses the following CoS scheduler nodes:

- Level 4—Forwarding class-based queues
- Level 3—Pseudowire service logical interfaces (`ps0.1` and `ps0.2`)
- Level 2—Pseudowire service interface set
- Level 1—Common/shared physical interface of the logical tunnel anchor point

You apply the traffic-control profile at the pseudowire service interfaces (level 3) and at the interface set (level 2). This variation is most useful for subscriber edge deployments.

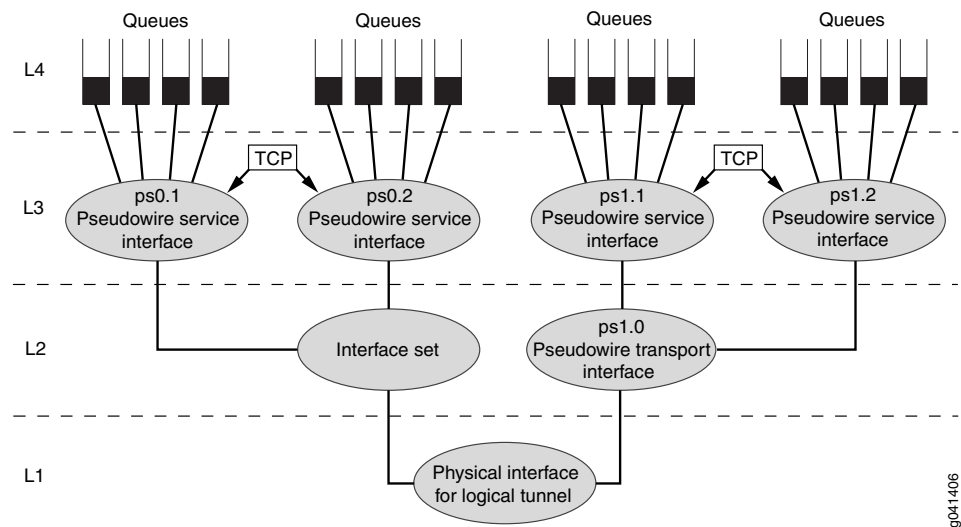
Figure 9: Three-Level Scheduling Hierarchy Case 2: Pseudowire Service Logical Interfaces over a Pseudowire Service Interface Set



Three-Level Scheduling Hierarchy Combined Deployment Scenario

Figure 10 on page 70 shows a deployment scenario that combines the three-level hierarchical scheduling scenarios in Figure 8 on page 69 and Figure 9 on page 70.

Figure 10: Three-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces—Deployment Scenario



This variation uses the following CoS scheduler nodes:

- Level 4—Forwarding class-based queues
- Level 3—Pseudowire service logical interfaces (ps0.1, ps0.2, ps1.1, and ps1.2)

- Level 2—Service interface set for pseudowire service interfaces (ps0.1 and ps0.2) and transport logical interface (ps1.0) for the pseudowire service logical interfaces (ps1.1 and ps1.2)
- Level 1—Common/shared physical interface of the logical tunnel anchor point

You apply the traffic-control profiles to the interfaces at both level 2 and level 3, as well as the interface set at level 2.

Related Documentation

- *Pseudowire Subscriber Logical Interfaces Overview*
- *Configuring a Pseudowire Subscriber Logical Interface*
- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)
- [Hierarchical CoS on MPLS Pseudowire Subscriber Interfaces Overview on page 65](#)
- [CoS Configuration Overview for MPLS Pseudowire Subscriber Interfaces on page 71](#)
- [Configuring CoS Three-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces \(Logical Interfaces over a Transport Logical Interface\) on page 74](#)
- [Configuring CoS Three-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces \(Logical Interfaces over a Pseudowire Interface Set\) on page 76](#)
- [hierarchical-scheduler \(Subscriber Interfaces on MX Series Routers\) on page 576](#)

CoS Configuration Overview for MPLS Pseudowire Subscriber Interfaces

CoS supports two-level and three-level hierarchies for MPLS pseudowire subscriber interfaces.

To configure two-level scheduling, include the **maximum-hierarchy-levels 2** option under the **[edit interfaces *interface-name* hierarchical-scheduler]** statement on the physical interface of the logical tunnel anchor point.

To configure three-level hierarchical scheduling, include the **implicit-hierarchy** option under the **[edit interfaces *interface-name* hierarchical-scheduler]** statement on the physical interface of the logical tunnel anchor point. Use the following guidelines for configuring the **implicit-hierarchy** option:

- If an output traffic-control profile is configured on the pseudowire transport interface and on a pseudowire service interface, the two interfaces form a scheduling hierarchy. The pseudowire transport interface resides in a level 2 scheduler node and the pseudowire service interface resides in a level 3 scheduler node.
- If an output traffic-control profile is configured on the pseudowire services interface but not on a pseudowire transport interface, the pseudowire services interface resides in a level 3 scheduler node.
- If an output traffic-control profile is only configured on the pseudowire transport interface and not on the pseudowire services interface, the pseudowire transport interface resides in a level 3 scheduler node and all pseudowire traffic uses this node.

If the **implicit-hierarchy** option is not set on the logical tunnel anchor point, logical interfaces behave normally with the hierarchical-scheduler mode configured with or without the **hierarchical-scheduler maximum-hierarchy-levels** option under the **[edit interfaces interface-name hierarchical-scheduler]** statement. In this case, when you apply a traffic-control profile to the pseudowire and service logical interfaces, they both reside in level 3 scheduler nodes and do not form a scheduling hierarchy, which might not be the desirable behavior. In business edge, where only the pseudowire logical interfaces need to be shaped, applying the traffic-control profile at just the transport logical interface may be sufficient.

When configuring the logical tunnel physical interface for the maximum hierarchy level, all pseudowire logical interfaces operating on the physical interface use the same hierarchy model. If you want to mix two-level and three-level scheduling hierarchies, you can group the pseudowires together by hierarchy levels and share the same logical tunnel anchor point or you can use three-level scheduling for all pseudowires over the anchor point.

To specify rewrite rules and classifiers on pseudowire interfaces, reference the pseudowire device under the **[edit class-of-service interfaces]** hierarchy level and specify the rewrite rules and classifiers for the pseudowire interfaces.

To control all pseudowire traffic using the same logical tunnel interface, apply CoS policies at the physical interface for the anchor logical tunnel.

**Related
Documentation**

- *Pseudowire Subscriber Logical Interfaces Overview*
- *Configuring a Pseudowire Subscriber Logical Interface*
- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)
- [Hierarchical CoS on MPLS Pseudowire Subscriber Interfaces Overview on page 65](#)
- [Configuring CoS Two-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces on page 72](#)
- [Configuring CoS Three-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces \(Logical Interfaces over a Transport Logical Interface\) on page 74](#)
- [Configuring CoS Three-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces \(Logical Interfaces over a Pseudowire Interface Set\) on page 76](#)
- [hierarchical-scheduler \(Subscriber Interfaces on MX Series Routers\) on page 576](#)

Configuring CoS Two-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces

Before configuring CoS parameters for MPLS pseudowire subscriber interfaces, you must first complete these tasks:

1. Configure the pseudowire logical interfaces. See *Configuring a Pseudowire Subscriber Logical Interface*.
2. Configure the pseudowire device count. See *Configuring the Maximum Number of Pseudowire Logical Interface Devices Supported on the Router*.

3. Configure the pseudowire device including the logical tunnel anchor point. See *Configuring a Pseudowire Subscriber Logical Interface Device*.
4. Configure the pseudowire transport logical interface. See *Configuring the Transport Logical Interface for a Pseudowire Subscriber Logical Interface*.
5. Configure the pseudowire signaling (either Layer 2 circuit signaling or Layer 2 VPN signaling). See *Configuring Layer 2 Circuit Signaling for Pseudowire Subscriber Logical Interfaces* or *Configuring Layer 2 VPN Signaling for Pseudowire Subscriber Logical Interfaces*.
6. Configure the pseudowire logical interfaces. See *Configuring the Service Logical Interface for a Pseudowire Subscriber Logical Interface*.

To configure CoS policies on MPLS pseudowire subscriber interfaces using two-level scheduling:

1. Configure the hierarchical scheduler for the physical interface used for the logical tunnel (anchor point). For two-level scheduling the hierarchical scheduler must be set to **maximum-scheduler levels 2**.

```
[edit]
user@host#edit interfaces ps ps-anchor-device-name
user@host#set hierarchical-scheduler maximum-hierarchy-levels 2
```

2. Specify the traffic-control profile to use on the pseudowire logical interface.

```
[edit class-of-service]
user@host#edit interfaces ps ps-device-name
user@host#edit unit logical-unit-number
user@host#set output-traffic-control-profile profile-name
```

3. Configure the rewrite rule.

The available rewrite rule types for pseudowire interfaces are **dscp** and **inet-precedence**.

```
[edit class-of-service]
user@host#edit interfaces ps ps-device-name
user@host#edit unit logical-unit-number
user@host#edit rewrite-rules (dscp | inet-precedence) rewrite-name
user@host#edit forwarding-class class-name
user@host#set loss-priority class-name code-point (alias | bits)
```

4. Configure the classifier.

The available classifier types for pseudowire interfaces are **dscp** and **inet-precedence**.

```
[edit class-of-service]
user@host#edit interfaces ps ps-device-name
user@host#edit unit logical-unit-number
user@host#edit classifiers (dscp | inet-precedence) classifier-name
user@host#edit forwarding-class class-name
user@host#set loss-priority class-name code-points [aliases] [bit-patterns]
```

5. Apply the rewrite rule and classifier to the pseudowire interface.

For the *interface_name* parameter, specify the pseudowire device name.

```
[edit class-of-service interfaces interface_name unit logical-unit-number]
```

```
user@host#set rewrite-rule (dscp | inet-precedence) (rewrite-name | default) protocol
protocol-types
```

```
user@host#set classifiers (dscp | inet-precedence) (classifier-name | default)
```

**Related
Documentation**

- *CoS on Ethernet Pseudowires in Universal Edge Networks Overview*
- *CoS Inputs and Outputs Examples*
- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)
- [Hierarchical CoS on MPLS Pseudowire Subscriber Interfaces Overview on page 65](#)
- [CoS Two-Level Hierarchical Scheduling on MPLS Pseudowire Subscriber Interfaces on page 66](#)
- [CoS Three-Level Hierarchical Scheduling on MPLS Pseudowire Subscriber Interfaces on page 68](#)
- [CoS Configuration Overview for MPLS Pseudowire Subscriber Interfaces on page 71](#)
- [hierarchical-scheduler \(Subscriber Interfaces on MX Series Routers\) on page 576](#)

Configuring CoS Three-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces (Logical Interfaces over a Transport Logical Interface)

Before configuring CoS three-level scheduling on pseudowire logical interfaces over a transport logical interface, you must first complete these tasks:

1. Configure the pseudowire logical interfaces. See *Configuring a Pseudowire Subscriber Logical Interface*.
2. Configure the pseudowire device count. See *Configuring the Maximum Number of Pseudowire Logical Interface Devices Supported on the Router*.
3. Configure the pseudowire device including the logical tunnel anchor point. See *Configuring a Pseudowire Subscriber Logical Interface Device*.
4. Configure the pseudowire transport logical interface. See *Configuring the Transport Logical Interface for a Pseudowire Subscriber Logical Interface*.
5. Configure the pseudowire signaling (either Layer 2 circuit signaling or Layer 2 VPN signaling). See *Configuring Layer 2 Circuit Signaling for Pseudowire Subscriber Logical Interfaces* or *Configuring Layer 2 VPN Signaling for Pseudowire Subscriber Logical Interfaces*.
6. Configure the pseudowire logical interfaces. See *Configuring the Service Logical Interface for a Pseudowire Subscriber Logical Interface*.

Three-level scheduling on pseudowire logical interfaces over a transport logical interface requires you to apply the traffic-control profiles at both the pseudowire logical interface and the pseudowire transport logical interface. To configure CoS policies on three-level scheduling on pseudowire logical interfaces over a transport logical interface:

1. Configure the hierarchical scheduler for the physical interface used for the logical tunnel (anchor point). For three-level scheduling the hierarchical scheduler must be set to **implicit-hierarchy**.

```
[edit]
user@host#edit interfaces ps-anchor-device-name
user@host#set hierarchical-scheduler implicit-hierarchy
```

2. Specify the traffic-control profile to use on the pseudowire logical interface.

```
[edit class-of-service]
user@host#edit interfaces ps ps-device-name
user@host#edit unit logical-unit-number
user@host#set output-traffic-control-profile profile-name
```

3. Specify the traffic-control profile to use on the pseudowire transport logical interface.

```
[edit class-of-service]
user@host#edit interfaces ps ps-device-name
user@host#edit unit logical-unit-number
user@host#set output-traffic-control-profile profile-name
```

4. Configure the rewrite rule.

The available rewrite rule types for pseudowire interfaces are **dscp** and **inet-precedence**.

```
[edit class-of-service]
user@host#edit interfaces ps ps-device-name
user@host#edit unit logical-unit-number
user@host#edit rewrite-rules (dscp | inet-precedence) rewrite-name
user@host#edit forwarding-class class-name
user@host#set loss-priority class-name code-point (alias | bits)
```

5. Configure the classifier.

The available classifier types for pseudowire interfaces are **dscp** and **inet-precedence**.

```
[edit class-of-service]
user@host#edit interfaces ps ps-device-name
user@host#edit unit logical-unit-number
user@host#edit classifiers (dscp | inet-precedence) classifier-name
user@host#edit forwarding-class class-name
user@host#set loss-priority class-name code-points [aliases] [bit-patterns]
```

6. Apply the rewrite rule and classifier to the pseudowire interfaces.

For the *interface_name* parameter, specify the pseudowire device name.

```
[edit class-of-service interfaces interface_name unit logical-unit-number]
user@host#set rewrite-rule (dscp | inet-precedence) (rewrite-name | default) protocol
protocol-types
user@host#set classifiers (dscp | inet-precedence) (classifier-name | default)
```

Related Documentation

- [CoS on Ethernet Pseudowires in Universal Edge Networks Overview](#)
- [CoS Inputs and Outputs Examples](#)
- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)
- [Hierarchical CoS on MPLS Pseudowire Subscriber Interfaces Overview on page 65](#)
- [CoS Three-Level Hierarchical Scheduling on MPLS Pseudowire Subscriber Interfaces on page 68](#)
- [CoS Configuration Overview for MPLS Pseudowire Subscriber Interfaces on page 71](#)
- [Configuring CoS Three-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces \(Logical Interfaces over a Pseudowire Interface Set\) on page 76](#)
- [hierarchical-scheduler \(Subscriber Interfaces on MX Series Routers\) on page 576](#)

Configuring CoS Three-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces (Logical Interfaces over a Pseudowire Interface Set)

Before configuring three-level scheduling on pseudowire logical interfaces over a pseudowire logical interface set, you must first complete the following tasks:

1. Configure the pseudowire logical interfaces. See *Configuring a Pseudowire Subscriber Logical Interface*.
2. Configure the pseudowire device count. See *Configuring the Maximum Number of Pseudowire Logical Interface Devices Supported on the Router*.
3. Configure the pseudowire device including the logical tunnel anchor point. See *Configuring a Pseudowire Subscriber Logical Interface Device*.
4. Configure the pseudowire transport logical interface. See *Configuring the Transport Logical Interface for a Pseudowire Subscriber Logical Interface*.
5. Configure the pseudowire signaling (either Layer 2 circuit signaling or Layer 2 VPN signaling). See *Configuring Layer 2 Circuit Signaling for Pseudowire Subscriber Logical Interfaces* or *Configuring Layer 2 VPN Signaling for Pseudowire Subscriber Logical Interfaces*.
6. Configure the pseudowire logical interfaces. See *Configuring the Service Logical Interface for a Pseudowire Subscriber Logical Interface*.

Three-level scheduling on pseudowire logical interfaces over a pseudowire logical interface set requires you to apply the traffic-control profiles at both the pseudowire logical interface and the pseudowire logical interface-set. To configure CoS policies on MPLS pseudowire subscriber interfaces using three-level implicit hierarchical scheduling:

1. Configure the hierarchical scheduler for the physical interface used for the logical tunnel (anchor point). For three-level scheduling the hierarchical scheduler must be set to **implicit-hierarchy**.

[edit]

user@host#edit interfaces ps-anchor-device-name


```
user@host#set hierarchical-scheduler implicit-hierarchy
```

- Specify the traffic-control profile to use on the pseudowire logical interfaces.

```
[edit class-of-service]
user@host#edit interfaces ps ps-device-name
user@host#edit unit logical-unit-number
user@host#set output-traffic-control-profile profile-name
```

- Define a pseudowire logical interface set and configure the traffic-control profile used for the interface set.

```
[edit class-of-service]
user@host#edit interfaces
user@host#edit interface-set interface-set-name
user@host#edit output-traffic-control-profile profile-name
```

- Group the pseudowire logical interfaces in the pseudowire logical interface set.

```
[edit ]
user@host#edit interfaces
user@host#edit interface-set interface-set-name
user@host#edit interface ps ps-device-name
user@host#edit unit logical-unit-number
```

- Configure the rewrite rule.

The available rewrite rule types for pseudowire interfaces are **dscp** and **inet-precedence**.

```
[edit class-of-service]
user@host#edit interfaces ps ps-device-name
user@host#edit unit logical-unit-number
user@host#edit rewrite-rules (dscp | inet-precedence) rewrite-name
user@host#edit forwarding-class class-name
user@host#set loss-priority class-name code-point (alias | bits)
```

- Configure the classifier.

The available classifier types for pseudowire interfaces are **dscp** and **inet-precedence**.

```
[edit class-of-service]
user@host#edit interfaces ps ps-device-name
user@host#edit unit logical-unit-number
user@host#edit classifiers (dscp | inet-precedence) classifier-name
user@host#edit forwarding-class class-name
user@host#set loss-priority class-name code-points [aliases] [bit-patterns]
```

- Apply the rewrite rule and classifier to the pseudowire interfaces.

For the *interface_name* parameter, specify the ps device name.

```
[edit class-of-service interfaces interface_name unit logical-unit-number]
user@host#set rewrite-rule (dscp | inet-precedence) (rewrite-name | default) protocol
protocol-types
user@host#set classifiers (dscp | inet-precedence) (classifier-name | default)
```

Related Documentation

- *CoS on Ethernet Pseudowires in Universal Edge Networks Overview*
- *CoS Inputs and Outputs Examples*

- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)
- [Hierarchical CoS on MPLS Pseudowire Subscriber Interfaces Overview on page 65](#)
- [CoS Three-Level Hierarchical Scheduling on MPLS Pseudowire Subscriber Interfaces on page 68](#)
- [CoS Configuration Overview for MPLS Pseudowire Subscriber Interfaces on page 71](#)
- [Configuring CoS Three-Level Hierarchical Scheduling for MPLS Pseudowire Subscriber Interfaces \(Logical Interfaces over a Transport Logical Interface\) on page 74](#)
- [**hierarchical-scheduler \(Subscriber Interfaces on MX Series Routers\) on page 576**](#)

CHAPTER 5

Allocating Dedicated Queues for Each Logical Interface Using Per-Unit Scheduling

- [Hardware Requirements for Dynamic Per-Unit Scheduling on page 79](#)
- [Configuring Per-Unit Scheduling in a Dynamic Profile on page 80](#)
- [Example: Configuring Per-Unit Scheduling for Subscriber Access on page 82](#)

Hardware Requirements for Dynamic Per-Unit Scheduling

Table 22 on page 79 lists the hardware requirements based on subscriber interface type for per-unit scheduling in dynamic CoS configurations.

Table 22: Hardware Required for Per-Unit Scheduling Dynamic CoS Configurations

Subscriber Interface Type	EQ DPCs on MX Series Routers	MPC/MIC Modules on MX Series Routers	IQ2 PICs on M120 and M320 Routers	IQ2E PICs on M120 and M320 Routers
Static and dynamic VLANs	Yes	Yes	No	No
Static and dynamic VLANs over aggregated Ethernet	No	No	No	No
Static or dynamic IP demux interfaces	Yes	No	No	No
Static or dynamic IP demux interfaces over aggregated Ethernet	No	No	No	No
Static or dynamic VLAN demux interfaces	No	No	No	No

Table 22: Hardware Required for Per-Unit Scheduling Dynamic CoS Configurations (*continued*)

Subscriber Interface Type	EQ DPCs on MX Series Routers	MPC/MIC Modules on MX Series Routers	IQ2 PICs on M120 and M320 Routers	IQ2E PICs on M120 and M320 Routers
Static or dynamic VLAN demux interfaces over aggregated Ethernet	No	No	No	No
Static PPPoE interfaces	No	Yes	Yes	Yes
Dynamic PPPoE interfaces	No	No	Yes	Yes
Static or dynamic PPPoE interfaces over aggregated Ethernet	No	No	No	No
L2TP LAC tunnel over PPP	No	No	No	No
L2TP LNS inline service over PPP	No	No	No	No

Related Documentation

- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [Configuring Per-Unit Scheduling in a Dynamic Profile on page 80](#)

Configuring Per-Unit Scheduling in a Dynamic Profile

Per-unit scheduling enables one set of output queues for each logical interface configured under the physical interface. In per-unit scheduling configurations, each Layer 3 scheduler node is allocated a dedicated set of queues.

If you do not explicitly configure CoS parameters, a default traffic profile with queues is attached to the logical interface.

To configure per-unit scheduling and queuing for subscriber access:

1. Configure the static CoS parameters in the **[edit class-of-service]** hierarchy.
 - a. Enable the per-unit scheduler for the physical interface.


```
[edit interfaces interface-name]
user@host# set per-unit-scheduler
```
 - b. Configure the drop profiles.

See *Configuring RED Drop Profiles*.
 - c. Configure the forwarding classes.

See *Configuring Forwarding Classes*.

- d. Configure the rewrite-rules and classifier definitions.

See *Configuring Rewrite Rules and Defining Classifiers*.

See *Junos CoS Components* for information about configuring the remaining CoS parameters.

2. Configure a static or dynamic subscriber interface that can be referenced in the dynamic profile.
 - For static VLAN interfaces, see *Configuring Static Subscriber Interfaces in Dynamic Profiles*.
 - For dynamic IP demux interfaces, see *Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles*.
 - For dynamic PPPoE interfaces, see *Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles*.
3. Configure CoS parameters in a dynamic profile.
 - a. Configure the dynamic profile.

See *Configuring a Basic Dynamic Profile*.
 - b. Configure traffic shaping and scheduling parameters in the dynamic profile using a traffic-control profile.

See [“Configuring Traffic Scheduling and Shaping for Subscriber Access” on page 11](#).
 - c. Configure the schedulers and scheduler map in the dynamic profile.

You can configure the schedulers using dynamic variables or a combination of both static values and dynamic variables.

See [“Configuring Schedulers in a Dynamic Profile for Subscriber Access” on page 13](#).
 - d. Apply CoS parameters to a subscriber interface by referencing an interface in the dynamic profile.
 - For traffic shaping and scheduling, see [“Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile” on page 223](#).
 - For rewrite rules, see [“Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile” on page 225](#).
 - For classifiers, see [“Applying a Classifier to a Subscriber Interface in a Dynamic Profile” on page 226](#).
4. (Optional) Configure variables in access and service profiles to enable RADIUS to activate subscriber and upgrade services through CoA.



NOTE: Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.

Because you have configured the scheduler map in the dynamic profile, queues are merged when subscribers change services. Other CoS parameters are replaced.

When multiple subscribers are enabled on a DHCP subscriber interface, and the dynamic profile referenced by DHCP does not have the **replace** keyword configured, the system does not replace the parameters. Instead, it combines the values of the parameters to their maximum scalar value.

- a. Configure CoS variables in a dynamic profile.

See [“Configuring User-Defined CoS Variables in a Dynamic Service Profile” on page 174](#)

- b. (Optional) Enable multiple clients for the same subscriber (logical interface) to aggregate attributes by configuring the **aggregate-clients** option for the dynamic profile attached to a DHCP subscriber interface.

See *Attaching Dynamic Profiles to DHCP Subscriber Interfaces or DHCP Client Interfaces*.

**Related
Documentation**

- [CoS for Subscriber Access Overview on page 3](#)
- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [Example: Configuring Per-Unit Scheduling for Subscriber Access on page 82](#)

Example: Configuring Per-Unit Scheduling for Subscriber Access

In this example, a network administrator sets up a subscriber access configuration with per-unit scheduling.

1. The administrator configures the static VLAN interfaces and enables per-unit scheduling for the interfaces.

```
[edit]
interfaces {
  ge-1/1/0 {
    per-unit-scheduler;
    vlan-tagging;
    unit 100 {
      vlan-id 100;
      family inet {
        unnumbered-address lo0.0 preferred-source-address 192.100.1.1;
      }
    }
  }
  unit 200 {
    vlan-id 200;
    family inet {
      unnumbered-address lo0.0 preferred-source-address 192.100.1.1;
    }
  }
}
ge-1/1/1 {
  per-unit-scheduler;
```

```

vlan-tagging;
unit 100 {
  vlan-id 100;
  family inet {
    unnumbered-address lo0.0 preferred-source-address 192.100.1.1;
  }
}
unit 200 {
  vlan-id 200;
  family inet {
    unnumbered-address lo0.0 preferred-source-address 192.100.1.1;
  }
}
}
ge-1/0/1 {
  unit 0 {
    family inet {
      address 3.1.1.1/24;
    }
  }
}
ge-1/1/2 {
  description "wfce14 eth1 soso ge-1/1/2";
  vlan-tagging;
  gigether-options {
    no-auto-negotiation;
  }
  unit 100 {
    vlan-id 100;
    family inet {
      address 121.0.0.1/24;
    }
  }
}
}

```

2. The administrator configures static CoS parameters, including forwarding classes and classifiers, to be referenced in the dynamic profiles.

```

[edit]
class-of-service {
  classifiers {
    inet-precedence 8q-inet {
      forwarding-class be {
        loss-priority low code-points 000;
      }
      forwarding-class ef {
        loss-priority low code-points 001;
      }
      forwarding-class af {
        loss-priority low code-points 010;
      }
      forwarding-class nc {
        loss-priority low code-points 011;
      }
      forwarding-class voice {

```

```
        loss-priority low code-points 100;
    }
    forwarding-class video {
        loss-priority low code-points 101;
    }
    forwarding-class game {
        loss-priority low code-points 110;
    }
    forwarding-class data {
        loss-priority low code-points 111;
    }
}
inet-precedence 4q-inet {
    forwarding-class be {
        loss-priority low code-points [ 000 001 ];
    }
    forwarding-class ef {
        loss-priority low code-points [ 010 011 ];
    }
    forwarding-class af {
        loss-priority low code-points [ 100 101 ];
    }
    forwarding-class nc {
        loss-priority low code-points [ 110 111 ];
    }
}
inet-precedence 8q-drop-inet {
    forwarding-class be {
        loss-priority low code-points 000;
    }
    forwarding-class ef {
        loss-priority medium-low code-points 001;
    }
    forwarding-class af {
        loss-priority medium-high code-points 010;
    }
    forwarding-class nc {
        loss-priority high code-points 011;
    }
    forwarding-class voice {
        loss-priority low code-points 100;
    }
    forwarding-class video {
        loss-priority medium-low code-points 101;
    }
    forwarding-class game {
        loss-priority medium-high code-points 110;
    }
    forwarding-class data {
        loss-priority high code-points 111;
    }
}
inet-precedence 4q-drop-inet {
    forwarding-class be {
        loss-priority low code-points [ 000 001 ];
    }
}
```



```
        forwarding-class ef {
            loss-priority medium-low code-points [ 010 011 ];
        }
        forwarding-class af {
            loss-priority medium-high code-points [ 100 101 ];
        }
        forwarding-class nc {
            loss-priority high code-points [ 110 111 ];
        }
    }
}
drop-profiles {
    d0 {
        fill-level 25 drop-probability 100;
        fill-level 0 drop-probability 0;
    }
    d1 {
        fill-level 50 drop-probability 100;
        fill-level 0 drop-probability 0;
    }
    d2 {
        fill-level 75 drop-probability 100;
        fill-level 0 drop-probability 0;
    }
    d3 {
        fill-level 100 drop-probability 100;
        fill-level 0 drop-probability 0;
    }
    all {
        fill-level 0 drop-probability 0;
        fill-level 100 drop-probability 100;
    }
}
forwarding-classes {
    queue 0 be;
    queue 1 ef;
    queue 2 af;
    queue 3 nc;
    queue 4 voice;
    queue 5 video;
    queue 6 game;
    queue 7 data;
}
interfaces {
    ge-1/0/1 {
        unit 0 {
            classifiers {
                inet-precedence 8q-drop-low-high-inet;
            }
        }
    }
}
traceoptions {
    flag all;
    flag asynch;
    flag route-socket;
```

```
    }  
  }
```

3. The administrator configures the access and service dynamic profiles to receive CoS parameters for the subscriber interfaces through RADIUS.

```
[edit]  
dynamic-profiles {  
  subscriber {  
    interfaces {  
      "$junos-interface-ifd-name" {  
        unit "$junos-underlying-interface-unit" {  
          family inet;  
        }  
      }  
    }  
  }  
  class-of-service {  
    traffic-control-profiles {  
      zero {  
        scheduler-map "$junos-cos-scheduler-map";  
        shaping-rate "$junos-cos-shaping-rate";  
        guaranteed-rate "$junos-cos-guaranteed-rate";  
        delay-buffer-rate "$junos-cos-delay-buffer-rate";  
      }  
    }  
    interfaces {  
      "$junos-interface-ifd-name" {  
        unit "$junos-underlying-interface-unit" {  
          output-traffic-control-profile zero;  
        }  
      }  
    }  
  }  
  scheduler-maps {  
    be_smap {  
      forwarding-class be scheduler be_sch;  
    }  
    all_smap {  
      forwarding-class be scheduler be_sch;  
      forwarding-class ef scheduler ef_sch;  
      forwarding-class af scheduler af_sch;  
      forwarding-class nc scheduler nc_sch;  
      forwarding-class video scheduler video_sch;  
      forwarding-class data scheduler data_sch;  
    }  
    be_ef_smap {  
      forwarding-class be scheduler be_sch;  
      forwarding-class ef scheduler ef_sch;  
    }  
    af_smap {  
      forwarding-class af scheduler af_sch;  
    }  
    be_ef_af_nc_smap {  
      forwarding-class be scheduler be_sch;  
      forwarding-class ef scheduler ef_sch;  
      forwarding-class af scheduler af_sch;  
      forwarding-class nc scheduler nc_sch;  
    }  
  }  
}
```

```

    }
    voice_video_game_data_smap {
        forwarding-class voice scheduler voice_sch;
        forwarding-class video scheduler video_sch;
        forwarding-class game scheduler game_sch;
        forwarding-class data scheduler data_sch;
    }
}
schedulers {
    "$junos-cos-scheduler" {
        transmit-rate percent "$junos-cos-scheduler-tx";
        buffer-size percent "$junos-cos-scheduler-bs";
        priority "$junos-cos-scheduler-pri";
        drop-profile-map loss-priority low protocol any drop-profile
            "$junos-cos-scheduler-dropfile-low";
        drop-profile-map loss-priority medium-low protocol any drop-profile
            "$junos-cos-scheduler-dropfile-medium-low";
        drop-profile-map loss-priority medium-high protocol any drop-profile
            "$junos-cos-scheduler-dropfile-medium-high";
        drop-profile-map loss-priority high protocol any drop-profile
            "$junos-cos-scheduler-dropfile-high";
    }
}
}
}
service {
    variables {
        fc_1 default-value be;
        sch_1 default-value be_sch;
        sch-tx_1 default-value 20000000;
        sch-bs_1 default-value 10;
        sch-pri_1 default-value high;
        sch-drop-low_1 default-value d3;
        sch-drop-med-low_1 default-value d2;
        sch-drop-med-high_1 default-value d1;
        sch-drop-high_1 default-value d0;
        sch-drop-any_1 default-value d3;
        fc_2 default-value af;
        sch_2 default-value af_sch;
        sch-tx_2 default-value 10;
        sch-bs_2 default-value 10;
        sch-pri_2 default-value high;
        sch-drop-low_2 default-value d3;
        sch-drop-med-low_2 default-value d2;
        sch-drop-med-high_2 default-value d1;
        sch-drop-high_2 default-value d0;
        sch-drop-any_2 default-value d3;
        fc_3 default-value voice;
        sch_3 default-value voice_sch;
        sch-tx_3 default-value 20000000;
        sch-bs_3 default-value 10;
        sch-pri_3 default-value high;
        sch-drop-low_3 default-value d3;
        sch-drop-med-low_3 default-value d2;
        sch-drop-med-high_3 default-value d1;
        sch-drop-high_3 default-value d0;
    }
}

```

```
sch-drop-any_3 default-value d3;
fc_4 default-value game;
sch_4 default-value game_sch;
sch-tx_4 default-value 10;
sch-bs_4 default-value 10;
sch-pri_4 default-value high;
sch-drop-low_4 default-value d3;
sch-drop-med-low_4 default-value d2;
sch-drop-med-high_4 default-value d1;
sch-drop-high_4 default-value d0;
sch-drop-any_4 default-value d3;
scheduler-map default-value all_smap;
}
class-of-service {
  scheduler-maps {
    "$scheduler-map" {
      forwarding-class "$fc_1" scheduler "$sch_1";
      forwarding-class "$fc_2" scheduler "$sch_2";
      forwarding-class "$fc_3" scheduler "$sch_3";
      forwarding-class "$fc_4" scheduler "$sch_4";
    }
  }
}
schedulers {
  "$sch_1" {
    transmit-rate "$sch-tx_1";
    buffer-size percent "$sch-bs_1";
    priority "$sch-pri_1";
    drop-profile-map loss-priority low protocol any drop-profile
      "$sch-drop-low_1";
    drop-profile-map loss-priority medium-low protocol any drop-profile
      "$sch-drop-med-low_1";
    drop-profile-map loss-priority medium-high protocol any drop-profile
      "$sch-drop-med-high_1";
    drop-profile-map loss-priority high protocol any drop-profile
      "$sch-drop-high_1";
  }
  "$sch_2" {
    transmit-rate percent "$sch-tx_2";
    buffer-size percent "$sch-bs_2";
    priority "$sch-pri_2";
    drop-profile-map loss-priority low protocol any drop-profile
      "$sch-drop-low_2";
    drop-profile-map loss-priority medium-low protocol any drop-profile
      "$sch-drop-med-low_2";
    drop-profile-map loss-priority medium-high protocol any drop-profile
      "$sch-drop-med-high_2";
    drop-profile-map loss-priority high protocol any drop-profile
      "$sch-drop-high_2";
  }
  "$sch_3" {
    transmit-rate "$sch-tx_3";
    buffer-size percent "$sch-bs_3";
    priority "$sch-pri_3";
    drop-profile-map loss-priority low protocol any drop-profile
      "$sch-drop-low_3";
```

```

        drop-profile-map loss-priority medium-low protocol any drop-profile
            "$sch-drop-med-low_3";
        drop-profile-map loss-priority medium-high protocol any drop-profile
            "$sch-drop-med-high_3";
        drop-profile-map loss-priority high protocol any drop-profile
            "$sch-drop-high_3";
    }
    "$sch_4" {
        transmit-rate percent "$sch-tx_4";
        buffer-size percent "$sch-bs_4";
        priority "$sch-pri_4";
        drop-profile-map loss-priority low protocol any drop-profile
            "$sch-drop-low_4";
        drop-profile-map loss-priority medium-low protocol any drop-profile
            "$sch-drop-med-low_4";
        drop-profile-map loss-priority medium-high protocol any drop-profile
            "$sch-drop-med-high_4";
        drop-profile-map loss-priority high protocol any drop-profile
            "$sch-drop-high_4";
    }
}
}
}
}
service_2 {
    variables {
        fc_1 default-value be;
        sch_1 default-value be_sch;
        sch-tx_1 default-value 10;
        sch-bs_1 default-value 10;
        sch-pri_1 default-value high;
        sch-drop-low_1 default-value d3;
        sch-drop-med-low_1 default-value d2;
        sch-drop-med-high_1 default-value d1;
        sch-drop-high_1 default-value d0;
        sch-drop-any_1 default-value d3;
        scheduler-map default-value all_smap;
    }
    class-of-service {
        scheduler-maps {
            "$scheduler-map" {
                forwarding-class "$fc_1" scheduler "$sch_1";
            }
        }
    }
    schedulers {
        "$sch_1" {
            transmit-rate percent "$sch-tx_1";
            buffer-size percent "$sch-bs_1";
            priority "$sch-pri_1";
            drop-profile-map loss-priority low protocol any drop-profile
                "$sch-drop-low_1";
            drop-profile-map loss-priority medium-low protocol any drop-profile
                "$sch-drop-med-low_1";
            drop-profile-map loss-priority medium-high protocol any drop-profile
                "$sch-drop-med-high_1";
            drop-profile-map loss-priority high protocol any drop-profile
                "$sch-drop-high_1";
        }
    }
}

```

```
    }  
  }  
}  
}
```

4. The network administrator configures DHCP and RADIUS to grant access and services to the interfaces referenced by the **subscriber** dynamic profile.

```
[edit]  
forwarding-options {  
  dhcp-relay {  
    traceoptions {  
      file size 1g;  
      flag all;  
    }  
    dynamic-profile subscriber aggregate-clients replace;  
    server-group {  
      subscriber-server {  
        3.1.1.2;  
      }  
    }  
    active-server-group subscriber-server;  
    group relay-0 {  
      authentication {  
        password pwd0;  
        username-include {  
          user-prefix user0;  
          mac-address;  
        }  
      }  
      interface ge-1/1/0.100;  
      interface ge-1/1/0.200;  
    }  
  }  
}  
radius-server {  
  121.0.0.11 secret "$9$mPF/u0lcrv1RvL7V4oik.Pz3/CtOIE"; ## SECRET-DATA  
}  
profile subscriber-profile {  
  authentication-order radius;  
  radius {  
    authentication-server 121.0.0.11;  
    accounting-server 121.0.0.11;  
  }  
  radius-server {  
    121.0.0.11 secret "$9$.mz6pu1hyKBIK8xdg4jHqmQF69A01R"; ## SECRET-DATA  
  }  
  accounting {  
    order radius;  
    statistics time;  
  }  
}
```

- Related Documentation**
- [Configuring Per-Unit Scheduling in a Dynamic Profile on page 80](#)

CHAPTER 6

Configuring Dedicated Queue Scaling with Hierarchical CoS or Per-Unit Scheduling

- [Dedicated Queue Scaling for CoS Configurations on MIC and MPC Interfaces Overview on page 93](#)
- [Managing Dedicated and Remaining Queues for Dynamic CoS Configurations on MIC and MPC Interfaces on page 97](#)
- [Verifying the Number of Dedicated Queues Configured on MIC and MPC Interfaces on page 99](#)

Dedicated Queue Scaling for CoS Configurations on MIC and MPC Interfaces Overview

The 30-Gigabit Ethernet Queuing and 60-Gigabit Ethernet Queuing and Enhanced Queuing Ethernet Modular Port Concentrators (MPCs) provide a set of dedicated queues for subscriber interfaces configured with hierarchical scheduling or per-unit scheduling.

The dedicated queues offered on these MPCs enable service providers to reduce costs through different scaling configurations. For example, the 60-Gigabit Ethernet Enhanced Queuing MPC enables service providers to reduce the cost per subscriber by allowing many subscriber interfaces to be created with four or eight queues. Alternatively, the 30-Gigabit Ethernet and 60-Gigabit Ethernet Queuing MPCs enable service providers to reduce hardware costs, but allow fewer subscriber interfaces to be created with four or eight queues.

This topic describes the overall queue, scheduler node, and logical interface scaling for subscriber interfaces created on these MIC and MPC combinations.

Queue Scaling for MIC and MPC Combinations

[Table 23 on page 93](#) lists the number of dedicated queues and number of subscribers supported per MPC.

Table 23: Dedicated Queues for MIC and MPC Interfaces

MPC	Dedicated Egress Queues	Supported Subscriber Interfaces	Logical Interfaces with 4 Queues	Logical Interfaces with 8 Queues
30-Gigabit Ethernet Queuing MPC	64,000	16,000	16,000 (8000 per PIC)	8000 (4000 per PIC)

Table 23: Dedicated Queues for MIC and MPC Interfaces (*continued*)

MPC	Dedicated Egress Queues	Supported Subscriber Interfaces	Logical Interfaces with 4 Queues	Logical Interfaces with 8 Queues
60-Gigabit Ethernet Queuing MPC	128,000	32,000	32,000 (8000 per PIC)	16,000 (4000 per PIC)
60-Gigabit Ethernet Enhanced Queuing MPC	512,000	64,000	64,000 (16,000 per PIC)	64,000 (16,000 per PIC)

MPCs vary in the number of Packet Forwarding Engines on board. MPC1s, such as the 30-Gigabit Ethernet MPC, have one Packet Forwarding Engine. MPC2s, such as the 60-Gigabit Ethernet MPC, have two Packet Forwarding Engines. Each Packet Forwarding Engine has two schedulers that share the management of the queues.

A scheduler maps to one-half of a MIC; in CLI configuration statements, that one-half of a MIC corresponds to PIC 0, 1, 2, or 3. MIC ports are partitioned equally across the PICs. A two-port MIC has one port per PIC. A four-port MIC has two ports per PIC.

Each interface-set uses eight queues from total available egress queues.

Distribution of Queues on 30-Gigabit Ethernet Queuing MPCs

On 30-Gigabit Ethernet Queuing MPCs, each scheduler maps to different PICs. When only one MIC is installed, scheduler 0 maps to PIC 0 and scheduler 1 maps to PIC 1 on the MIC. When two MICs are installed, scheduler 0 can additionally distribute queues to PIC 2 on MIC 1, and scheduler 1 can additionally distribute queues to PIC 3 on MIC 1. However, the distribution of queues to the MICs is not hard-partitioned for 30-Gigabit Ethernet Queuing MPCs or other MPC1s. Distribution depends instead on how you allocate the queues to the PICs.

[Figure 11 on page 95](#) shows the queue distribution on a 30-Gigabit Ethernet Queuing MPC with only one MIC installed. All 64,000 egress queues on the MPC are available to the single Packet Forwarding Engine. On the Packet Forwarding Engine, half of these queues (32,000) are managed by each scheduler. Scheduler 0 contributes all of its 32,000 queues to PIC 0. Scheduler 1 contributes all of its 32,000 queues to PIC 1.

Figure 11: Distribution of Queues on the 30-Gigabit Ethernet Queuing MPC with One MIC

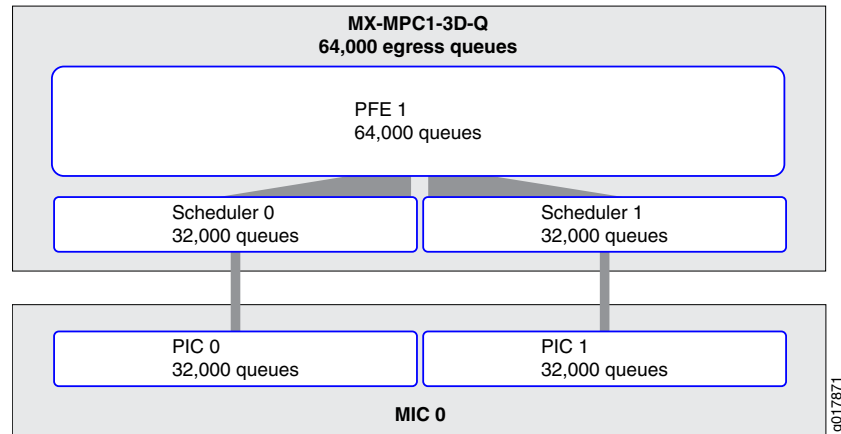
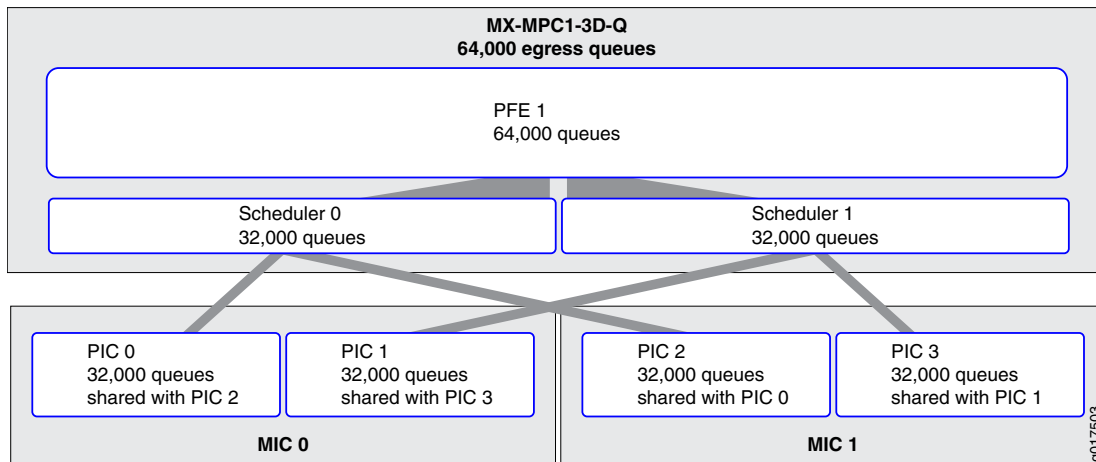


Figure 12 on page 95 shows the queue distribution on the same MPC with two MICs installed. In this case, each scheduler can supply two PICs, one on each MIC. Because the distribution of the queues across the MICs is not hard-partitioned, you can allocate from 0 to 32,000 queues from each scheduler's pool across the scheduler's associated PICs. For example, you can allocate 32,000 queues from Scheduler 0 to PIC 0, 4000 queues from Scheduler 1 to PIC 1, and 28,000 queues from Scheduler 1 to PIC 3. Alternatively, you can allocate the queues evenly across the PICs, or allocate them in other combinations with the limitation of 32,000 queues per PIC and 32,000 queues per port.

Figure 12: Distribution of Queues on the 30-Gigabit Ethernet Queuing MPC with Two MICs

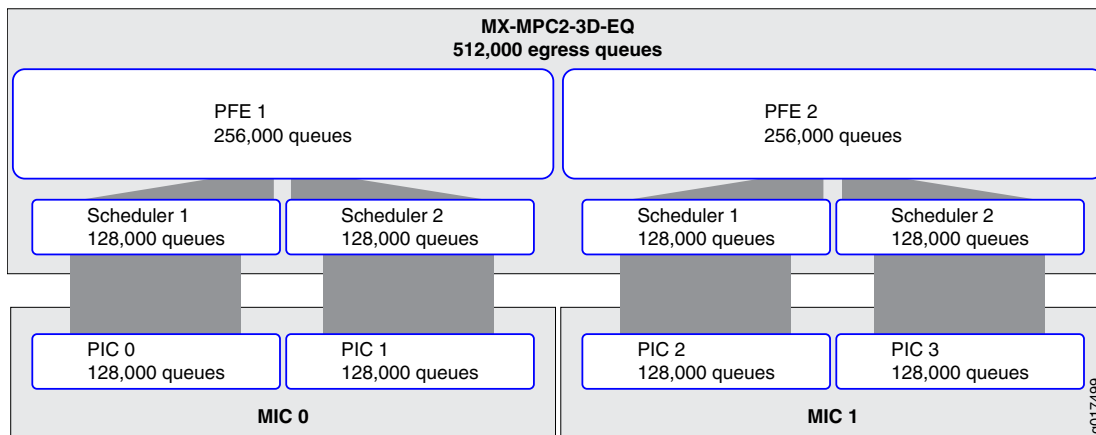


Distribution of Queues on 60-Gigabit Ethernet MPCs

On 60-Gigabit Ethernet Queuing and Enhanced Queuing Ethernet MPCs, each scheduler maps to a single PIC: PIC 0 or PIC 1 on MIC 0 and PIC 2 or PIC 3 on MIC 1. The distribution of the queues is hard-partitioned for these MPCs and other MPC2s; the only difference in distribution is in the total number of queues available.

For example, [Figure 13 on page 96](#) shows how queues are distributed on a 60-Gigabit Ethernet Enhanced Queuing MPC. Of the 512,000 egress queues on the MPC, half (256,000) are available to each of the two Packet Forwarding Engines. On each Packet Forwarding Engine, half of these queues (128,000) are managed by each scheduler. The complete scheduler complement (128,000) is available to only one PIC in a MIC. Thus the total number of queues available depends on the number of MICs installed. The MPC must have 2 MICs to achieve the maximum of 512,000 queues. With a single MIC, the MPC can achieve only 256,000 queues.

Figure 13: Distribution of Queues on the 60-Gigabit Ethernet Enhanced Queuing MPC



Determining Maximum Egress Queues and Subscriber Interfaces per Port

The number of MICs installed in an MPC and the number of ports per MIC do not affect the maximum number of queues available on a given port. These factors affect only how you are able to allocate queues (and, therefore, subscribers) for your network.

For example, a 30-Gigabit Ethernet Queuing MPC supports a maximum of 16,000 subscriber interfaces and has a maximum of 32,000 queues available per PIC. On this card, you can allocate up to 32,000 queues to a single port in each PIC. If you dedicate 4 queues per subscriber interface, you can accommodate a maximum of 8000 subscriber interfaces on a single port, and therefore need at least two ports to reach the maximum 16,000 subscriber interfaces. If you dedicate 8 queues per subscriber interface, you can accommodate a maximum of 4000 subscriber interfaces on a single port, and you need 4 ports for the maximum of 16,000 subscriber interfaces.

The 60-Gigabit Ethernet Enhanced Queuing MPC supports a maximum of 64,000 subscriber interfaces and has a maximum of 128,000 queues per PIC. You can allocate up to 128,000 queues to a single port in each PIC. However, if you dedicate 4 queues per subscriber interface, you can accommodate a maximum of only 16,000 subscriber interfaces on a single MPC port—not 32,000—because the 60-Gigabit Ethernet Enhanced Queuing MPC is limited to 16,000 subscriber interfaces per PIC. If you dedicate 8 queues per subscriber interface, you can also accommodate a maximum of 16,000 subscriber interfaces on a single MPC port. In either case, you need at least 4 ports to reach the maximum of 64,000 subscriber interfaces.

Managing Remaining Queues

When the number of available dedicated queues on the MPC drops below 10 percent, an SNMP trap is generated to notify you .

When the maximum number of dedicated queues on the MPCs is reached, a system log message, **COSD_OUT_OF_DEDICATED_QUEUES**, is generated. The system does not provide subsequent subscriber interfaces with a dedicated set of queues. For per-unit scheduling configurations, there are no configurable queues remaining on the MPC.

For hierarchical scheduling configurations, remaining queues are available when the maximum number of dedicated queues is reached on the MPC. Traffic from these logical interfaces are considered unclassified and attached to a common set of queues that are shared by all subsequent logical interfaces. These common queues are the default port queues that are created for every port. You can configure a traffic-control profile and attach that to the interface to provide CoS parameters for the remaining queues.

For example, when the 30-Gigabit Ethernet Queuing MPC is configured with 32,000 subscriber interfaces with four queues per subscriber, the MPC can support 16,000 subscribers with a dedicated set of queues. You can provide CoS shaping and scheduling parameters to the remaining queues for those subscriber interfaces by attaching a special traffic-control profile to the interface.

These subscriber interfaces remain with this traffic-control profile, even if dedicated queues become available.

Related Documentation

- For information about managing dedicated queues in a static CoS configuration, see *Managing Dedicated and Remaining Queues for Static CoS Configurations on MIC and MPC Interfaces*
- For information about managing dedicated queues in a dynamic subscriber access configuration, see [Managing Dedicated and Remaining Queues for Dynamic CoS Configurations on MIC and MPC Interfaces on page 97](#)
- *Understanding Hierarchical Scheduling for MIC and MPC Interfaces*
- [COSD System Log Messages on page ?](#)

Managing Dedicated and Remaining Queues for Dynamic CoS Configurations on MIC and MPC Interfaces

This topic describes how to manage dedicated and remaining queues for static and dynamic subscriber interfaces configured in dynamic profiles.

You manage queues at the chassis and physical port level in the static configuration hierarchies, then configure dynamic scheduling and shaping parameters for the subscriber interfaces in the dynamic profile.

- [Configuring the Maximum Number of Queues for MIC and MPC Interfaces on page 98](#)
- [Configuring Remaining Common Queues on MIC and MPC Interfaces on page 98](#)

Configuring the Maximum Number of Queues for MIC and MPC Interfaces

30-Gigabit Ethernet Queuing MPCs and 60-Gigabit Ethernet Queuing and Enhanced Queuing MPCs support a dedicated number of queues when configured for hierarchical scheduling and per-unit scheduling configurations.

To scale the number of subscriber interfaces per queue, you can modify the number of queues supported on the MIC.

To configure the number of queues:

1. Specify that you want to configure the MIC.

```
user@host# edit chassis fpc slot-number pic pic-number
```

2. Configure the number of queues.

```
[edit chassis fpc slot-number pic pic-number]  
user@host# set max-queues-per-interface (8 | 4)
```

Configuring Remaining Common Queues on MIC and MPC Interfaces

30-Gigabit Ethernet Queuing MPCs and 60-Gigabit Ethernet Queuing and Enhanced Queuing MPCs support a dedicated set of queues when configured with hierarchical scheduling.

When the number of dedicated queues is reached on the module, there can be queues remaining. Traffic from these logical interfaces are considered unclassified and attached to a common set of queues that are shared by all subsequent logical interfaces.

You can configure traffic shaping and scheduling resources for the remaining queues by attaching a special traffic-control profile to the interface. This feature enables you to provide the same shaping and scheduling to remaining queues as the dedicated queues.

To configure the remaining queues on a MIC or MPC interface:

1. Configure CoS parameters in a traffic-control profile.

```
[edit class-of-service]  
user@host# edit traffic-control-profiles profile-name
```

2. Enable hierarchical scheduling for the interface.

```
[edit interfaces interface-name]  
user@host# set hierarchical-scheduler
```

3. Attach the traffic control profiles for the dedicated and remaining queues to the port on which you enabled hierarchical scheduling.

To provide the same shaping and scheduling parameters to dedicated and remaining queues, reference the same traffic-control profile.

- a. Attach the traffic-control profile for the dedicated queues on the interface.

```
[edit class-of-service interfaces interface-name]  
user@host# set output-traffic-control-profile profile-name
```

- b. Attach the traffic-control profile for the remaining queues on the interface.

```
[edit class-of-service interfaces interface-name]
```

```
user@host# set output-traffic-control-profile-remaining profile-name
```

- Related Documentation**
- [Verifying the Number of Dedicated Queues Configured on MIC and MPC Interfaces on page 99](#)
 - [Dedicated Queue Scaling for CoS Configurations on MIC and MPC Interfaces Overview on page 93](#)
 - [Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 33](#)
 - [Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 34](#)

Verifying the Number of Dedicated Queues Configured on MIC and MPC Interfaces

Purpose Display the number of dedicated queue resources that are configured for the logical interfaces on a port.

Action user@host#[show class-of-service interface ge-1/1/0](#)

```
Physical interface: ge-1/1/0, Index: 166
Queues supported: 4, Queues in use: 4
Total non-default queues created: 4
Scheduler map: <default>, Index: 2
Chassis scheduler map: <default-chassis>, Index: 4

Logical interface: ge-1/1/0.100, Index: 72, Dedicated Queues: no
Shaping rate: 32000
Object      Name                Type                Index
Scheduler-map <remaining>          0
Classifier   ipprec-compatibility ip                    13

Logical interface: ge-1/1/0.101, Index: 73, Dedicated Queues: no
Shaping rate: 32000
Object      Name                Type                Index
Scheduler-map <remaining>          0
Classifier   ipprec-compatibility ip                    13

Logical interface: ge-1/1/0.102, Index: 74, Dedicated Queues: yes
Shaping rate: 32000
Object      Name                Type                Index
Traffic-control-profile <control_tc_prof> Output              45866
```

- Related Documentation**
- [Managing Dedicated and Remaining Queues for Static CoS Configurations on MIC and MPC Interfaces](#)
 - [Managing Dedicated and Remaining Queues for Dynamic CoS Configurations on MIC and MPC Interfaces on page 97](#)

CHAPTER 7

Preventing Bandwidth Contention on Subscriber Interfaces

- [Hierarchical CoS Shaping-Rate Adjustments Overview on page 101](#)
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Hierarchical CoS Shaping-Rate Adjustments Overview

This overview describes how MX Series 3D Universal Edge Routers installed in a subscriber access network can adjust hierarchical class-of-service (CoS) parameters to prevent bandwidth contention at subscriber interfaces.

Hierarchical CoS is supported only for subscriber interfaces on EQ DPC or MPC interfaces operating in hierarchical scheduler mode.

The characteristics of voice, data, and video applications vary widely in their requirements for traffic throughput, bandwidth management, delay and jitter tolerance, and buffer depth. To prevent bandwidth contention at subscriber interfaces, you can configure applications such as ANCP and Multicast to perform real-time adjustments to the shaping rate configured for subscriber interfaces for residential gateways. Enabling shaping-rate

adjustments on the router can prevent bandwidth contention at the interface from causing degradation of the subscriber's voice, data, or video services.

Depending on the application, shaping-rate adjustments are supported on Enhanced Queueing (EQ) DPCs on MX Series routers and MPC/MIC modules on MX Series routers.

Types of Shaping-Rate Adjustments

The ANCP application supports *absolute* adjustments to a specific shaping-rate value. You can configure ANCP to communicate the subscriber local loop speed to the MX Series router, which in turn throttles traffic destined to the associated subscriber interface so that it matches the subscriber local loop speed. ANCP acquires subscriber line rate information from DSLAMs and then communicates this data transmission rate for use with CoS.

The OIF mapping and reverse OIF mapping multicast applications support *delta* adjustments that increase or decrease the current shaping rate by a certain value. The system adjusts traffic destined to the subscriber using reverse OIF mapping enabled on a specified multicast interface. Reverse OIF mapping is used to determine the subscriber VLAN interface and the multicast traffic bandwidth on the interface.

Levels of Shaping-Rate Adjustments

Both absolute and delta adjustments are made to a subscriber's aggregate shaping rate on a level 3 scheduler node.

Adjustments that occur on the scheduler node can also impact the shaping rates for all queues. This adjustment can be undesirable for service providers who want to provide a premium level of service on specific queues.

For delta-based adjustments by multicast applications, you can control the distribution of shaping rates among queues by assigning the percentage of adjustment allowed for each queue. In addition, you can set a minimum adjusted shaping rate for each queue.

Figure 14 on page 102 shows a sample multicast network with shaping rates adjusted at the scheduler node level. The shaping rate is reduced by 4 Mbps (from 41 Mbps to 37 Mbps) at the scheduler node for subscriber interface 1, which reduces the rates of both the best effort and video on demand (VoD) service queues.

Figure 14: Scheduler Node and Queues with Adjusted Shaping Rates

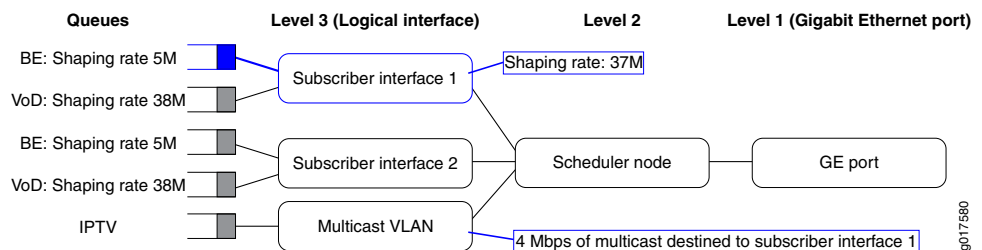
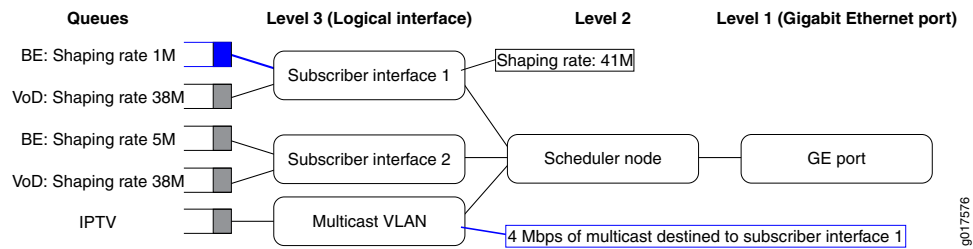


Figure 15 on page 103 shows the same network with queue-based adjustments enabled for the best-effort queue on subscriber 1. The shaping rate of the best-effort queue is reduced by 4 Mbps (from 5 Mbps to 1 Mbps). The VoD service queue is not affected.

Figure 15: Queue with Adjusted Shaping Rate



Related Documentation

- [Configuring the Minimum Adjusted Shaping Rate on Scheduler Nodes for Subscribers on page 105](#)
- [Configuring Shaping-Rate Adjustments on Queues on page 106](#)
- [Shaping Rate Adjustments for Subscriber Local Loops Overview on page 103](#)
- [Disabling Hierarchical Bandwidth Adjustment for Subscriber Interfaces with Reverse-OIF Mapping on page 113](#)
- [Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 114](#)

Shaping Rate Adjustments for Subscriber Local Loops Overview

This overview describes how an MX Series 3D Universal Edge Router installed as an edge router can adjust hierarchical CoS policy for subscriber interfaces for subscriber local loops. You can configure the router to throttle the traffic sent to subscriber local loops so that the traffic does not exceed the current data transmission rate of those lines. This feature ensures that changes to subscriber local loop speeds do not cause bandwidth contention at the subscriber's residential gateway.

In a typical subscriber access network, traffic destined to a subscriber is delivered from the access network, through an edge router, to a DSLAM. The DSLAM multiplexes subscriber traffic through a DSL, also known as a *local loop*, to the subscriber's residential gateway. When line noise or cross talk in a subcarrier causes the error rate on a DSL to exceed a certain threshold, the DSLAM can adapt itself by lowering the data transmission rate to that carrier device. A lower data transmission rate is less susceptible to induced errors.

You can configure an MX Series router to adjust the configured shaping rates on scheduler nodes for subscriber interfaces that represent subscriber local loops. Whenever a DSLAM resynchronizes a subscriber local loop speed, the router adjusts the configured shaping rate for that line so that the aggregate egress traffic to those subscribers is shaped to the local loop speed before the traffic reaches the DSLAM. Unless the maximum amount of bandwidth allocated to the subscriber interface on the router is throttled to the local loop speed, bandwidth contention can occur at the subscriber's residential gateway, which can cause the DSLAM to drop packets. This type of shaping-rate adjustment requires the topology discovery and traffic-monitoring features of the Access Node Control Protocol (ANCP).

You can configure ANCP to communicate the subscriber local loop speed to the MX Series router, which in turn throttles traffic destined to the associated subscriber interface so that it matches the subscriber local loop speed. ANCP acquires subscriber line rate information from DSLAMs and then communicates this data transmission rate for use with CoS.

**Related
Documentation**

- [Hierarchical CoS Shaping-Rate Adjustments Overview on page 101](#)
- [Guidelines for Configuring Shaping-Rate Adjustments for Subscriber Local Loops on page 104](#)
- [Enabling Shaping-Rate Adjustments for Subscriber Local Loops on page 108](#)
- [Disabling Shaping-Rate Adjustments for Subscriber Local Loops on page 113](#)
- [Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 114](#)
- For more information about the ANCP protocol, see the *ANCP and the ANCP Agent Overview*.

Guidelines for Configuring Shaping-Rate Adjustments for Subscriber Local Loops

These guidelines apply to configuring an MX Series 3D Universal Edge Router installed as an edge router to adjust the configured shaping rates on scheduler nodes for subscriber interfaces that represent subscriber local loops. This shaping-rate feature uses the topology discovery and traffic-monitoring features of ANCP.

When you enhance hierarchical CoS policy by configuring ANCP-driven shaping-rate adjustments, consider the following guidelines:

- Shaping-rate adjustments are supported on EQ DPCs and MPCs on MX Series routers.
- Shaping-rate adjustments are supported only for subscriber local loops that terminate at DSLAMs that you have configured as ANCP neighbors of the MX Series router.
- Shaping-rate adjustments are supported only for scheduler nodes for which you have configured an initial shaping rate by including the **shaping-rate** statement in a traffic-control profile applied to the scheduler node. Specify the initial shaping rate as a peak rate, in bits per second (bps), and not as a percentage. Other methods of configuring a shaping rate are not supported with this feature.
- Shaping-rate adjustments are supported only for scheduler nodes that are static logical interface sets that you have configured to operate at Level 3 of the scheduler hierarchy on the router. If an interface set is configured with a logical interface (such as unit 0) and queue, then the interface set is an internal scheduler node (as opposed to a root node or a leaf node) at Level 2 of the hierarchy. However, if there are no traffic-control profiles are configured on logical interfaces in an interface set, then the interface set is an internal scheduler node at Level 3 of the hierarchy.
- Shaping-rate adjustments are supported only for subscriber interfaces over physical interfaces that you have configured to operate in hierarchical scheduler mode. Only ports on EQ DPCs in MX Series routers support hierarchical scheduler mode.

- After shaping-rate adjustments are enabled and the router has performed shaping-rate adjustments on a scheduler node, you can configure a new shaping rate by including the **shaping-rate** statement in a traffic-control profile and then applying that profile to that scheduler node. However, this new shaping-rate value does not immediately result in shaping traffic at the new rate. The scheduler node continues to be shaped at rate set by ANCP. Only when the ANCP shaping-rate adjustment feature is disabled is the scheduler node shaped at the newly configured shaping-rate.
- The Layer 2 Tunneling Protocol (L2TP) is often used to carry traffic securely between an L2TP Network Server (LNS) and an L2TP Access Concentrator (LAC). The QoS adjustment feature supports the shaping overhead options that you can use to add a specified number of bytes to the actual packet length when determining shaped session packet length. ANCP shaping-rate adjustments are not supported for ingress traffic, only for egress traffic. To configure the number of bytes to add to the packet at the egress side of the tunnel, include the **egress-shaping-overhead** and **mode** statements at the **[edit chassis fpc slot-number pic pic-number traffic-manager]** hierarchy level. Use the shaping overhead options if you need to account for encapsulation overhead.

For more information about the ANCP protocol, see the *ANCP and the ANCP Agent Overview*.

Related Documentation

- [Hierarchical CoS Shaping-Rate Adjustments Overview on page 101](#)
- [Shaping Rate Adjustments for Subscriber Local Loops Overview on page 103](#)
- [Enabling Shaping-Rate Adjustments for Subscriber Local Loops on page 108](#)
- [Disabling Shaping-Rate Adjustments for Subscriber Local Loops on page 113](#)
- [Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 114](#)

Configuring the Minimum Adjusted Shaping Rate on Scheduler Nodes for Subscribers

- [Overview on page 105](#)
- [Configuring a Static Minimum Adjusted Shaping Rate on Scheduler Nodes on page 106](#)
- [Configuring a Dynamic Minimum Adjusted Shaping Rate on Scheduler Nodes on page 106](#)

Overview

Absolute adjustments and delta adjustments are performed at the scheduler node level. You can configure a minimum adjusted shaping rate at the scheduler node level using static or dynamic CoS parameters.

This feature is supported for adjustments performed by the ANCP and multicast applications on both EQ DPCs and MPC/MIC modules on MX Series routers.



BEST PRACTICE: For multicast traffic, you can configure a minimum adjusted shaping rate at the queue level. We recommend that you configure the minimum adjusted value at the scheduler node or the queue, but not both.

When you configure a minimum adjusted value for a node and for a scheduler that is referenced by a scheduler map in the same traffic-control-profile, the system uses the minimum value from the scheduler.

This feature is supported for adjustments performed by the ANCP and multicast applications on both EQ DPCs and MPC/MIC modules on MX Series routers.

Configuring a Static Minimum Adjusted Shaping Rate on Scheduler Nodes

To apply a minimum adjusted shaping rate for a scheduler node:

- Configure the **adjust-minimum** statement for the static traffic-control profile.

```
[edit class-of-service traffic-control-profiles profile-name]  
user@host# set adjust-minimum rate
```

Configuring a Dynamic Minimum Adjusted Shaping Rate on Scheduler Nodes

To apply a minimum adjusted shaping rate for a scheduler node:

- Configure the **adjust-minimum** statement for the dynamic traffic-control profile.

```
[edit dynamic-profiles profile-name class-of-service traffic-control-profiles profile-name]  
user@host# set adjust-minimum rate
```

Related Documentation

- [Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 23](#)
- [Configuring Shaping-Rate Adjustments on Queues on page 106](#)
- [Hierarchical CoS Shaping-Rate Adjustments Overview on page 101](#)

Configuring Shaping-Rate Adjustments on Queues

- [Overview on page 106](#)
- [Configuring a Static Shaping-Rate Adjustment for Queues on page 107](#)
- [Configuring a Dynamic Shaping-Rate Adjustment for Queues on page 107](#)

Overview

By default, the multicast application adjusts the shaping rates at the scheduler node level. This adjustment also impacts the shaping rates for all queues, which can be undesirable for service providers who want to provide a premium level of service on specific queues.

For multicast applications, you can control the distribution of shaping rates among queues by assigning the percentage of adjustment allowed for each queue. In addition, you can set a minimum adjusted shaping rate for each queue.

This feature is supported for adjustments performed by the multicast application on MPC/MIC modules on MX Series routers.



BEST PRACTICE: We recommend that you configure the minimum adjusted value at the scheduler node or the queue, but not both.

When you configure a minimum adjusted value for a node and for a scheduler that is referenced by a scheduler map in the same traffic-control-profile, the system uses the minimum value from the scheduler.

This feature is supported for adjustments performed by the multicast application on MPC/MIC modules on MX Series routers.

Configuring a Static Shaping-Rate Adjustment for Queues

To configure adjustment parameters for a queue:

1. Configure the percentage of adjustment for the shaping rate.

```
[edit class-of-service schedulers scheduler-name]
user@host# set adjust-percent percentage
```

2. Configure the minimum adjusted value for the shaping rate.

Do one of the following:

- Configure the minimum adjusted value for the queue.

```
[edit class-of-service schedulers scheduler-name]
user@host# set adjust-minimum rate
```

- Configure the minimum adjusted value for the node.

```
[edit class-of-service traffic-control-profile profile-name]
user@host# set adjust-minimum rate
```



BEST PRACTICE: Ensure that the minimum adjusted value that you configure does not exceed the shaping rate and is not lower than the configured transmit rate.

Configuring a Dynamic Shaping-Rate Adjustment for Queues

To configure adjustment parameters for a queue in a dynamic profile:

1. Configure the percentage of adjustment for the shaping rate.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set adjust-percent percentage
```

2. Configure the minimum adjusted value for the shaping rate.

Do one of the following:

- Configure the minimum adjusted value for the queue.

```
[edit dynamic-profiles profile-name class-of-service schedulers scheduler-name]
user@host# set adjust-minimum (rate | $junos-cos-adjust-minimum)
```

- Configure the minimum adjusted value for the node.

```
[edit dynamic-profiles profile-name class-of-service traffic-control-profile  
  profile-name]  
user@host# set adjust-minimum rate
```



BEST PRACTICE: Ensure that the minimum adjusted value that you configure does not exceed the shaping rate and is not lower than the configured transmit rate.

Related Documentation

- [Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 23](#)
- [Configuring the Minimum Adjusted Shaping Rate on Scheduler Nodes for Subscribers on page 105](#)
- [Hierarchical CoS Shaping-Rate Adjustments Overview on page 101](#)

Enabling Shaping-Rate Adjustments for Subscriber Local Loops

You can enhance a CoS implementation by enabling an MX Series 3D Universal Edge Router to adjust the hierarchical CoS policy shaping rate configured for static interface sets that consist of two or more VLANs and represent subscriber local loops. Whenever the digital subscriber line access multiplexer (DSLAM) resynchronizes its data transmission rate to a digital subscriber line (DSL), the router adjusts the shaping rate for the associated subscriber interface so that the maximum bandwidth allocation cannot exceed the current data rate for the associated subscriber local loop. This feature ensures that data transmission rate adjustments by the DSLAM do not cause bandwidth contention at the subscriber's residential gateway.

This topic includes the following tasks:

- [Configuring Static Logical Interface Sets to Serve as CoS Hierarchical Scheduler Nodes for Subscriber Loops on page 108](#)
- [Configuring the Logical Interfaces That Compose the Static Logical Interface Sets on page 109](#)
- [Configuring Hierarchical CoS on the Static Logical Interface Sets That Serve as Hierarchical Scheduler Nodes for Subscriber Local Loops on page 110](#)
- [Configuring ANCP Functionality That Supports and Drives Shaping-Rate Adjustments for Subscriber Local Loops on page 112](#)

Configuring Static Logical Interface Sets to Serve as CoS Hierarchical Scheduler Nodes for Subscriber Loops

To configure a logical interface set, begin by including the **interface-set** statement with the *interface-set-name* option at the **[edit interfaces]** hierarchy level.

An interface set is composed of two or more logical interfaces on the same physical interface. Each logical interface in an interface set corresponds to an individual subscriber

service, such as voice, video, or data. To specify either a list of logical unit numbers or the single outer VLAN tag used to identify the logical interfaces that compose the interface set, include statements at the **[edit interfaces interface-set interface-set-name]** hierarchy level:

- For an interface set composed of a list of logical interfaces identified by an inner VLAN tag on Ethernet frames (called the customer VLAN, or C-VLAN, tag), you must specify each logical interface by including the **unit** statement with the **logical-unit-number** option.

```
[edit]
interfaces {
  interface-set interface-set-name {
    interface ethernet-interface-name { # EQ DPC port
      unit logical-unit-number;
      unit logical-unit-number;
      ...
    }
    ...
  }
}
```

- For an interface set composed of a set of VLANs grouped at the DSLAM and identified by the same service VLAN (S-VLAN) tag), you must specify the S-VLAN tag as the outer VLAN tag for each VLAN by including the **vlan-tags-outer** statement with the **vlan-tag** option.

```
[edit]
interfaces {
  interface-set interface-set-name {
    interface ethernet-interface-name { # EQ DPC port
      vlan-tags-outer vlan-tag; # Identify the DSLAM
    }
    ...
  }
}
```

For more information, see *Configuring Hierarchical Schedulers for CoS*.

Configuring the Logical Interfaces That Compose the Static Logical Interface Sets

Each underlying physical interface must be configured to operate in hierarchical scheduler mode and to support stacked VLAN tagging on all logical interfaces. To configure, include the **hierarchical-scheduler** statement and the **stacked-vlan-tagging** statement at the **[edit interfaces ethernet-interface-name]** hierarchy level.

To associate the individual logical interfaces of an interface set with specific subscriber services provided by the subscriber local loop, bind an S-VLAN tag and a C-VLAN tag to each logical interface that belongs to a scheduler node that represents a subscriber local loop. Ethernet frames sent from the logical interfaces contain an outer VLAN tag that identifies a DSLAM and an inner VLAN tag that identifies a subscriber port on the DSLAM. To configure, include the **vlan-tags** statement at each logical interface:

```
[edit]
interfaces {
```

```

ethernet-interface-name { # EQ DPC port underlying an interface set
    hierarchical-scheduler;
    stacked-vlan-tagging; # Support 802.1Q VLAN dual-tagged frames
    unit logical-unit-number { # Bind S-VLAN and C-VLAN tags to logical interface
        vlan-tags inner tpid.vlan-id outer tpid.vlan-id;
    }
    ...
}
}

```

For more information, see *802.1Q VLANs Overview*.

Configuring Hierarchical CoS on the Static Logical Interface Sets That Serve as Hierarchical Scheduler Nodes for Subscriber Local Loops

To configure hierarchical CoS on the static logical interface set that serves as the hierarchical scheduler node for a subscriber local loop:

1. For each scheduler node that represents a subscriber local loop, configure an initial shaping rate.



NOTE: The CoS shaping-rate feature is supported only for scheduler nodes with a configured shaping rate. The initial shaping rate must be configured by applying a traffic-control profile that includes the **shaping-rate** statement. Specify the initial shaping rate as a peak rate, in bits per second (bps), and not as a percentage. Other methods of configuring a shaping rate are not supported with this feature.

- To enable traffic heading downstream (from the router to the DSLAM) to be gathered into an interface set, include the **interface-set** statement and define the logical interface set name as the **interface-set-name** option at the **[edit class-of-service interfaces]** hierarchy level.
- To apply output traffic scheduling and shaping parameters at the logical interface set level (rather than at the logical unit level), include the **output-traffic-control-profile** statement and specify the name of a traffic-control profile as the **profile-name** option at the **[edit class-of-service interfaces interface-set interface-set-name]** hierarchy level.

To configure, include the following statements:

```

interfaces { # Configure interface-specific CoS for incoming packets
    interface-set interface-set-name { # Configure a hierarchical scheduler
        output-traffic-control-profile tc-profile-name; # Level 3 scheduler node
    }
    ...
}
traffic-control-profiles { # Define traffic-control profiles
    tc-profile-name { # Specify a scheduler map and traffic-shaping parameters
        scheduler-map map-name;
        shaping-rate rate; # This is the "configured shaping rate"
        guaranteed-rate (percent percentage | rate);
        delay-buffer-rate (percent percentage | rate);
    }
}

```

```

    }
    ...
}

```

You can include the statements at the following hierarchy levels:

- [edit [class-of-service](#)]
 - [edit [dynamic-profiles](#) *profile-name* [class-of-service](#)]
2. Configure the scheduler maps referenced in the traffic-control profiles applied to the interface sets, the schedulers referenced in those scheduler maps, and the drop profiles referenced in those schedulers.
 - A scheduler map establishes the traffic output queues (forwarding classes) for a scheduler node and associates each queue with a specific scheduler map.
 - A scheduler defines queue properties (transmit rate, buffer size, priority, and drop profile) that specify how traffic is treated in the output queue.
 - A drop profile specifies how aggressively the MX Series router drops packets that are managed by a particular scheduler by defining either a segmented or interpolated graph that maps output queue fullness to packet drop probability.

To configure, include the statements at the static [edit [class-of-service](#)] hierarchy level:

```

[edit]
class-of-service {
  scheduler-maps { # Assign queuing characteristics to output queues
    map-name { # Map output queues to
      forwarding-class class-name scheduler scheduler-name;
      forwarding-class class-name scheduler scheduler-name;
      ...
    }
    ...
  }
  schedulers { # Define queuing characteristics
    scheduler-name { # Specify queuing and buffer management
      transmit-rate transmit-rate-option;
      buffer-size buffer-size-option;
      priority priority-level;
      drop-profile-map loss-priority loss-priority-option protocol any drop-profile
        drop-profile-name;
      ...
    }
  }
  drop-profiles { # Define random early detection (RED) for the delay buffer
    drop-profile-name { # Specify how to drop packets from an output queue
      drop-profile-name { # Map a queue fullness to a drop probability
        fill-level percentage drop-probability percentage; # Option 1: segmented
        fill-level percentage drop-probability percentage;
        ...
      }
      interpolate { # Option 2: interpolated
        drop-probability [ values ];
        fill-level [ values ];
      }
    }
  }
}

```

```

    }
  }
  ...
}

```

For more information about configuring scheduler maps, schedulers, and drop profiles, see *CoS Inputs and Outputs Overview*.

Configuring ANCP Functionality That Supports and Drives Shaping-Rate Adjustments for Subscriber Local Loops

To configure the Access Node Control Protocol (ANCP) functionality that supports and drives the shaping-rate adjustments for subscriber local loops:

- Enable ANCP to monitor subscriber local loop rates at the DSLAMs and communicate this information to CoS.
- Configure each DSLAM as an ANCP neighbor of the router so that TCP connections can be established between the router and each DSLAM.
- Identify the subscriber interface sets whose traffic is monitored and shaped by ANCP, and associate those interface sets with the corresponding identifiers configured on the access node (DSLAM) to uniquely identify the subscriber local loops within the access network.

ANCP uses this information to build a mapping of subscribers to subscriber interfaces. When ANCP receives port management messages from a DSLAM or other access node, it uses the access identifier contained in the message to determine which hierarchical scheduler node corresponds to the subscriber.

To configure, include statements at the **[edit protocols ancp]** hierarchy level:

```

[edit]
protocols {
  ancp {
    qos-adjust; # Enable ANCP to monitor and adjust CoS shaping rates
    neighbor ip-address; # Configure each DSLAM as an ANCP neighbor
    ...
    interfaces { # Identify subscribers for which ANCP can adjust shaping rates
      interface-set {
        interface-set-name {
          access-identifier identifier-string; # DSLAM ID for the local loop
        }
      }
      ...
    }
    ...
  }
  ...
}

```

Related Documentation • For hardware requirements and configuration guidelines, see [Guidelines for Configuring Shaping-Rate Adjustments for Subscriber Local Loops](#) on page 104

- [Shaping Rate Adjustments for Subscriber Local Loops Overview on page 103](#)
- [Verifying the Configuration of ANCP for Shaping-Rate Adjustments on page 117](#)
- [Verifying the Configuration of Shaping-Rate Adjustments for Subscriber Local Loops on page 116](#)
- [Disabling Shaping-Rate Adjustments for Subscriber Local Loops on page 113](#)
- [Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 114](#)

Disabling Shaping-Rate Adjustments for Subscriber Local Loops

To disable hierarchical CoS shaping-rate adjustments for subscriber local loops:

- Disable hierarchical CoS traffic-shaping adjustment by ANCP:

```
[edit protocols ancp]
user@host# delete qos-adjust
```

Traffic-shaping parameters for all subscriber local loops revert to their current configured values.

Related Documentation

- For hardware requirements and configuration guidelines, see [Guidelines for Configuring Shaping-Rate Adjustments for Subscriber Local Loops on page 104](#)
- [Shaping Rate Adjustments for Subscriber Local Loops Overview on page 103](#)
- [Enabling Shaping-Rate Adjustments for Subscriber Local Loops on page 108](#)
- [Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops on page 114](#)

Disabling Hierarchical Bandwidth Adjustment for Subscriber Interfaces with Reverse-OIF Mapping

You can disable hierarchical bandwidth adjustment for all subscriber interfaces with reverse OIF mapping enabled on a specified multicast interface. Reverse OIF mapping is used to determine the subscriber VLAN interface and the multicast traffic bandwidth on the interface.

To disable hierarchical bandwidth adjustment:

1. Specify that you want to access the subscriber interfaces with reverse-OIF mapping enabled.

```
[edit routing-instances routing-instance routing-options multicast interface
interface-name]
user@host# edit reverse-oif-mapping
```

2. Disable hierarchical bandwidth adjustment for all subscriber interfaces on the interface.

```
user@host# set no-qos-adjust
```

- Related Documentation**
- [Hierarchical CoS Shaping-Rate Adjustments Overview on page 101](#)
 - [Example: Configuring Multicast with Subscriber VLANs](#)

Example: Configuring Hierarchical CoS Shaping-Rate Adjustments for Subscriber Local Loops

This example shows how you can enable shaping-rate adjustments for static logical interface sets that represent subscriber local loops:

1. Configure static logical interface sets to serve as CoS hierarchical scheduler nodes for subscriber local loops.

This example uses a single scheduler node that represents two subscriber local loops. The scheduler node is a static logical interface composed of two logical interfaces. The underlying physical interface is port 0 on a Gigabit Ethernet EQ DPC in slot 4, PIC 0:

```
[edit]
interfaces {
  interface-set ifset-of-logical-interfaces {
    interface ge-4/0/0 {
      unit 1;
      unit 2;
    }
  }
  ge-4/0/0 {
    description "access interface ge-4/0/0";
    hierarchical-scheduler;
    stacked-vlan-tagging;
    unit 1 {
      description "DSL type ADSL1 = 0x01";
      proxy-arp;
      vlan-tags outer 1 inner 1; # S-VLAN tag is '1' and C-VLAN tag is '1'
      family inet { # Specify a secondary loopback address
        unnumbered-address lo0.0 preferred-source-address 192.168.7.3;
      }
    }
    unit 2 {
      description "DSL type ADSL1 = 0x01";
      proxy-arp;
      vlan-tags outer 1 inner 2; # S-VLAN tag is '1' and C-VLAN tag is '2'
      family inet { # Specify a secondary loopback address
        unnumbered-address lo0.0 preferred-source-address 192.168.7.4;
      }
    }
  }
}
```

2. Begin configuring hierarchical CoS on the static logical interface set that serves as the hierarchical scheduler node for the group of subscriber local loops.

```
[edit]
class-of-service {
  interfaces {
```

```

        interface-set ifset-of-logical-interfaces {
            output-traffic-control-profile tcp-premium-with-4-queues;
        }
    }
}

```

3. Configure the traffic-control profiles that can be applied to the scheduler node:

```

[edit]
class-of-service {
    traffic-control-profiles {
        tcp-basic-rate { # Specify a scheduler map and traffic controls
            shaping-rate 10m;
        }
        tcp-premium-with-4-queues { # Specify a scheduler map and traffic controls
            scheduler-map smap-premium-4q;
            shaping-rate 20m;
            guaranteed-rate 10m;
            delay-buffer-rate 5m;
        }
    }
}

```

In this example, the **tcp-premium-with-4-queues** traffic-control profile is applied to the interface set. The other profile provides a lower shaping rate and no guaranteed rate.

4. Configure the scheduler map **smap-premium-4q** that is referenced in the traffic-control profile for the scheduler node:

```

[edit]
class-of-service {
    scheduler-maps { # Define the queues that comprise each scheduler node
        smap-premium-4q { # Map each queue in the scheduler node to a scheduler
            forwarding-class be scheduler be_sch;
            forwarding-class af scheduler af_sch;
            forwarding-class ef scheduler ef_sch;
            forwarding-class nc scheduler nc_sch;
        }
    }
}

```

5. Configure the four schedulers (referenced in the scheduler map) that define the four output queues for the scheduler node:

```

[edit]
class-of-service {
    schedulers { # Define scheduling characteristics of each queue
        be_sch { # Transmit rate and buffer management parameters
            transmit-rate percent 10;
            buffer-size remainder;
            priority low;
        }
        ef_sch { # Transmit rate and buffer management parameters
            ...
        }
        af_sch { # Transmit rate and buffer management parameters
            ...
        }
    }
}

```

```

    }
    nc_sch { # Transmit rate and buffer management parameters
    ...
    }
  }
}

```

6. Enable ANCP to communicate with the DSLAM to adjust the CoS shaping rate for the scheduler node.

You must enable the ANCP feature for performing CoS traffic shaping adjustments, configure the DSLAM as an ANCP neighbor, and specify the DSLAM-assigned identifier for the subscriber local loop represented by the scheduler node:

```

[edit]
protocols {
  ancp {
    qos-adjust; # Enable ANCP to adjust CoS shaping rates
    neighbor 10.2.3.4; # Configure the DSLAM as an ANCP neighbor
    interfaces { # Identify subscribers for which ANCP can adjust shaping rates
      interface-set {
        ifset-of-logical-interfaces {
          access-identifier "dslam port 2/3"; # DSLAM ID for the local loop
        }
      }
    }
  }
}

```



NOTE: If ANCP is not yet enabled, the process starts when you commit a configuration that contains the `protocols ancp` stanza.

7. You can display the configured shaping rate and the adjusted shaping rate for each logical interface set configured for hierarchical CoS, issue the **show class-of-service interface-set** operational command.

Related Documentation

- [Hierarchical CoS Shaping-Rate Adjustments Overview on page 101](#)
- [Shaping Rate Adjustments for Subscriber Local Loops Overview on page 103](#)
- [Guidelines for Configuring Shaping-Rate Adjustments for Subscriber Local Loops on page 104](#)
- [Enabling Shaping-Rate Adjustments for Subscriber Local Loops on page 108](#)

Verifying the Configuration of Shaping-Rate Adjustments for Subscriber Local Loops

Purpose Display the configured shaping rate and the adjusted shaping rate for each logical interface set configured for hierarchical CoS.



NOTE: After shaping-rate adjustments are enabled and the router has performed shaping-rate adjustments on a scheduler node, you can configure a new shaping rate by including the `shaping-rate` statement in a traffic-control profile and then applying that profile to that scheduler node. However, this new shaping-rate value does not immediately result in shaping traffic at the new rate. The scheduler node continues to be shaped at rate set by ANCP. Only when the ANCP shaping-rate adjustment feature is disabled is the scheduler node shaped at the newly configured shaping-rate.

Action Issue the `show class-of-service interface-set` operational command.

Related Documentation

- [Enabling Shaping-Rate Adjustments for Subscriber Local Loops on page 108](#)

Verifying the Configuration of ANCP for Shaping-Rate Adjustments

Purpose Use to display or clear information about the ANCP configuration for shaping-rate adjustments.

- Action**
- To display ANCP neighbor information, issue the `show ancp neighbor` operational command.
 - To clear ANCP neighbors, issue the `clear ancp neighbor` operational command.
 - To display ANCP subscriber information, issue the `show ancp subscriber` operational command.
 - To display ANCP class-of-service information, issue the `show ancp cos` operational command.

If ANCP is not yet enabled, the process starts when you commit a configuration that contains the `protocols ancp` stanza.

Related Documentation

- [ANCP and the ANCP Agent Overview](#)
- [Configuring the ANCP Agent](#)

CHAPTER 8

Shaping Downstream Traffic Based on Frames or Cells

- [Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 119](#)
- [Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 121](#)
- [Example: Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 122](#)
- [Configuring Static Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 126](#)
- [Example: Configuring Static Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 127](#)
- [Setting Shaping Rate and Overhead Accounting Based on PPPoE Vendor-Specific Tags on page 129](#)
- [Configuring the Shaping Rate and Overhead Accounting Based on PPPoE Vendor-Specific Tags on Dynamic Subscriber Interfaces on page 131](#)
- [Reporting the Effective Shaping Rate for Subscribers on page 131](#)
- [Verifying the Effective Shaping Rate Reporting Configuration on page 132](#)

Bandwidth Management for Downstream Traffic in Edge Networks Overview

In a subscriber access network, traffic with different encapsulations can be passed downstream to other customer premise equipment (CPE) through the MX Series router. Managing the bandwidth of downstream ATM traffic to Ethernet interfaces can be especially difficult because of the different Layer 2 encapsulations.

The downstream network is not necessarily the directly attached network. In typical broadband network gateway (BNG) configurations, the directly attached network is an Ethernet access network, which provides access to either another frame-based network, or a cell-based network.

The *overhead accounting* feature enables you to shape traffic based on whether the downstream network is a frame-based network, like Ethernet, or a cell-based network, like ATM. It assigns a byte adjustment value to account for different encapsulations.

This feature is available on MIC and MPC interfaces.

Effective Shaping Rate

The shaping-rate, also known as peak information rate (PIR), is the maximum rate for a scheduler node or queue.

The true rate of a subscriber at the access-loop/CPE is a function of:

- The shaping-rate in effect for the subscriber's household, in bits per second.
- Whether the subscriber is connected to a frame-based or cell-based network.
- Number of bytes in each frame that are accounted for by the shaper.



NOTE: Chassis *egress-shaping-overhead* is not included in the effective rate. *Egress-shaping-overhead* accounts for the physical interface overhead (ISO OSI Layer 1). Effective shaping-rate is a Layer 2 (ISO OSI) rate.

Shaping Modes

There are two modes used for adjusting downstream traffic:

- *Frame shaping mode* is useful for adjusting downstream traffic with different encapsulations. Shaping is based on the number of bytes in the frame, without regard to cell encapsulation or padding overhead. Frame is the default shaping mode on the router.
- *Cell shaping mode* is useful for adjusting downstream cell-based traffic. In cell shaping mode, shaping is based on the number of bytes in cells, and accounts for the cell encapsulation and padding overhead.

When you specify cell mode, the resulting traffic stream conforms to the policing rates configured in downstream ATM switches, reducing the number of packet drops in the Ethernet network.

To account for ATM segmentation, the router adjusts all of the rates by 48/53 to account for 5-byte ATM AAL5 encapsulation. In addition, the router accounts for cell padding, and internally adjusts each frame by 8 bytes to account for the ATM trailer.

Byte Adjustments

When the downstream traffic has different byte sizes per encapsulation, it is useful to configure a *byte adjustment* value to adjust the number of bytes per packet to be included in or excluded from the shaping mechanism. This value represents the number of bytes that are encapsulated and decapsulated by the downstream equipment. For example, to properly account for a 4-byte header stripped by the downstream network, set the overhead-accounting bytes to -4. To properly account for a 12-byte header added by the downstream network, set the overhead-accounting bytes to 12.

We recommend that you specify a byte adjustment value that represents the difference between the CPE protocol overhead and B-RAS protocol overhead.

The system rounds up the byte adjustment value to the nearest multiple of 4. For example, a value of 6 is rounded to 8, and a value of -10 is rounded to -8.

You do not need to configure a byte adjustment value to account for the downstream ATM network. However, you can specify the byte value to account for additional encapsulations or decapsulations in the downstream network.

Relationship with Other CoS Features

Enabling the overhead accounting feature affects the resulting shaping rates, guaranteed rate, and excess rate parameters, if they are configured.

The overhead accounting feature also affects the egress shaping overhead feature that you can configure at the chassis level. We recommend that you use the egress shaping-overhead feature to account for the Layer 2 overhead of the outgoing interface, and use the overhead-accounting feature to account for downstream traffic with different encapsulations and cell-based networks.

When both features are configured, the total byte adjustment value is equal to the adjusted value of the overhead-accounting feature plus the value of the egress-shaping-overhead feature. For example, if the configured byte adjustment value is 40, and the router internally adjusts the size of each frame by 8, the adjusted overhead accounting value is 48. That value is added to the egress shaping overhead of 24 for a total byte adjustment value of 72.

Related Documentation

- To configure overhead accounting for static Ethernet interfaces, see [Configuring Static Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 126](#)
- To configure overhead accounting for dynamic subscriber access, see [Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 121](#)
- [Setting Shaping Rate and Overhead Accounting Based on PPPoE Vendor-Specific Tags on page 129](#)

Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates

You can configure the overhead accounting feature to shape downstream traffic based on either frames or cells.

You can also account for the different byte sizes per encapsulation by configuring a byte adjustment value for the shaping mode.

This feature is supported on MPCs on MX Series routers.

To configure the overhead accounting feature in a dynamic profile:

1. Do one of the following to configure the shaping mode:
 - Specify the shaping mode.

Frame shaping mode is enabled by default.

```
[edit dynamic-profiles profile-name class-of-service traffic-control-profiles  
profile-name  
user@host#set overhead-accounting (frame-mode | cell-mode)
```

- Configure a variable for the shaping mode.

```
[edit dynamic-profiles profile-name class-of-service traffic-control-profiles  
profile-name  
user@host#set overhead-accounting $junos-cos-shaping-mode
```

2. (Optional) Do one of the following to configure the byte adjustment value:

- Specify a byte adjustment value.

```
[edit dynamic-profiles profile-name class-of-service traffic-control-profiles  
profile-name  
user@host#set overhead-accounting bytes byte-value
```

- Configure a variable for the byte adjustment.

```
[edit dynamic-profiles profile-name class-of-service traffic-control-profiles  
profile-name  
user@host#set overhead-accounting bytes $junos-cos-byte-adjust
```



BEST PRACTICE: We recommend that you specify a byte adjustment value that represents the difference between the customer premise equipment (CPE) protocol overhead and B-RAS protocol overhead.

The available range is –120 through 124 bytes. The system rounds up the byte adjustment value to the nearest multiple of 4. For example, a value of 6 is rounded to 8, and a value of -10 is rounded to -8.

**Related
Documentation**

- [Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 119](#)
- [Example: Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 122](#)
- [Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 23](#)

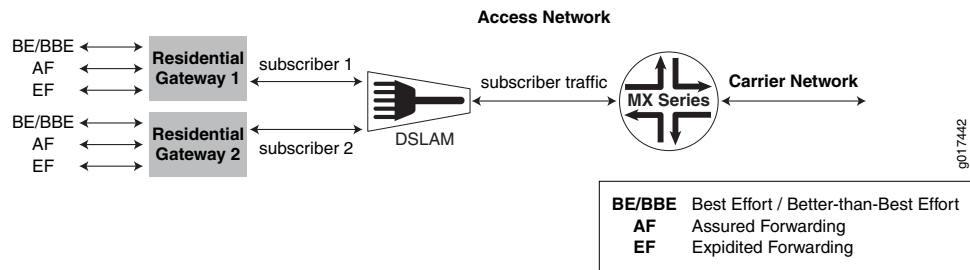
Example: Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates

This topic describes two scenarios for which you can configure dynamic shaping parameters to account for packet overhead in a downstream network.

The RADIUS administrator supplies the initial values on the RADIUS server, and the service activation is performed at subscriber login.

[Figure 16 on page 123](#) shows the sample network that the examples reference.

Figure 16: Sample Network Topology for Downstream Traffic



Managing Traffic with Different Encapsulations

In this example, the MX Series router shown in [Figure 16 on page 123](#) sends stacked VLAN frames to the DSLAM, and the DSLAM sends single-tagged VLAN frames to the residential gateway.

To accurately shape traffic at the residential gateway, the MX Series router must account for the different frame sizes. The difference between the stacked VLAN (S-VLAN) frames sent by the router and the single-tagged VLAN frames received at the residential gateway is a 4-byte VLAN tag. The residential gateway receives frames that are 4 bytes less.

To account for the different frame sizes, you configure the frame shaping mode with -4 byte adjustment:

1. Configure the traffic shaping parameters in the dynamic profile and attach them to the interface.

Enabling the overhead accounting feature affects the resulting shaping rate, guaranteed rate, and excess rate parameters, if they are configured.

```
[edit]
dynamic-profiles {
  ethernet-downstream-network {
    interfaces {
      $junos-interface-ifd-name {
        unit $junos-underlying-interface-unit {
          family inet;
        }
      }
    }
  }
  class-of-service {
    traffic-control-profiles {
      tcp-example-overhead-accounting-frame-mode {
        excess-rate percent $junos-cos-excess-rate
        guaranteed-rate $junos-cos-guaranteed-rate
        overhead-accounting $junos-cos-shaping-mode bytes $junos-cos-byte-adjust
        shaping-rate $junos-cos-shaping-rate;
      }
    }
  }
  interfaces {
    $junos-interface-ifd-name {
      unit "$junos-underlying-interface-unit" {
        output-traffic-control-profile tcp1;
      }
    }
  }
}
```

```

    }
  }
}
}
}

```

Table 24 on page 124 lists the initial values defined by the RADIUS administrator for the shaping rates.

Table 24: Initial Shaping Values at Subscriber Login For Traffic With Different Encapsulations

Predefined Variable	RADIUS Tag	Value
\$junos-cos-shaping-rate	T02	10m
\$junos-cos-guaranteed-rate	T03	2m
\$junos-cos-excess-rate	T05	50
\$junos-cos-shaping-mode	T07	frame-mode
\$junos-cos-byte-adjust	T08	-4

2. Verify the adjusted rates.

```

user@host#show class-of-service traffic-control-profile
Traffic control profile: tcp-example-overhead-accounting-frame-mode, Index:
61785
Excess rate 50
Shaping rate: 10000000
Guaranteed rate: 2000000
Overhead accounting mode: Frame Mode
Overhead bytes: -4

```

Managing Downstream Cell-Based Traffic

In this example, the DSLAM and residential gateway shown in Figure 16 on page 123 are connected through an ATM cell-based network. The MX Series router sends Ethernet frames to the DSLAM, and the DSLAM sends ATM cells to the residential gateway.

To accurately shape traffic at the residential gateway, the MX Series router must account for the different physical network characteristics.

The administrator does not need to configure a byte adjustment value to account for the downstream ATM network, but has the option of configuring a byte adjustment value to account for different encapsulations or decapsulations.

To account for the different frame sizes, configure cell shaping mode:

1. Configure the traffic shaping parameters in the dynamic profile and attach them to the interface.

Enabling the overhead accounting feature affects the resulting shaping rate, guaranteed rate, and excess rate parameters, if they are configured.


```
[edit]
dynamic-profiles {
  atm-downstream-network {
    interfaces {
      $junos-interface-ifd-name {
        unit $junos-underlying-interface-unit {
          family inet;
        }
      }
    }
  }
  class-of-service {
    traffic-control-profiles {
      tcp-example-overhead-accounting-cell-mode {
        excess-rate percent $junos-cos-excess-rate
        guaranteed-rate $junos-cos-guaranteed-rate
        overhead-accounting $junos-cos-shaping-mode
        shaping-rate $junos-cos-shaping-rate
      }
    }
    interfaces {
      $junos-interface-ifd-name {
        unit "$junos-underlying-interface-unit" {
          output-traffic-control-profile tcp1;
        }
      }
    }
  }
}
}
```

Table 25 on page 125 lists the initial values defined by the RADIUS administrator for the shaping rates.

Table 25: Initial Shaping Values at Subscriber Login For Downstream Cell-Based Traffic

Predefined Variable	RADIUS Tag	Value
\$junos-cos-shaping-rate	T02	10m
\$junos-cos-guaranteed-rate	T03	2m
\$junos-cos-excess-rate	T05	50
\$junos-cos-shaping-mode	T07	cell-mode

2. Verify the adjusted rates.

```
user@host#show class-of-service traffic-control-profile
Traffic control profile: tcp-example-overhead-accounting-cell-mode, Index:
61785
Shaping rate: 10000000
Excess rate 50
Guaranteed rate: 2000000
Overhead accounting Cell Mode
Overhead bytes: 0
```

To account for ATM segmentation, the MX Series router adjusts all of the rates by 48/53 to account for ATM AAL5 encapsulation. In addition, the router accounts for cell padding, and internally adjusts each frame by 8 bytes to account for the ATM trailer.

- Related Documentation**
- [Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 121](#)

Configuring Static Shaping Parameters to Account for Overhead in Downstream Traffic Rates

The overhead accounting feature enables you to account for downstream traffic that has different encapsulations or downstream traffic from cell-based equipment, such as ATM switches.

You can configure the overhead accounting feature to shape downstream traffic based on frames or cell shaping mode.

You can also account for the different byte sizes per encapsulation by configuring a byte adjustment value for the shaping mode.

To configure the shaping mode and byte adjustment value for static CoS configurations:

1. Specify the shaping mode.

Frame shaping mode is enabled by default.

```
[edit class-of-service traffic-control-profiles profile-name]  
user@host# set overhead-accounting (frame-mode | cell-mode)
```

2. (Optional) Specify a byte adjustment value.

```
[edit class-of-service traffic-control-profiles profile-name]  
user@host# set overhead-accounting bytes byte-value
```



BEST PRACTICE: We recommend that you specify a byte adjustment value that represents the difference between the customer premise equipment (CPE) protocol overhead and the B-RAS protocol overhead.

The available range is –120 through 124 bytes. The system rounds up the byte adjustment value to the nearest multiple of 4. For example, a value of 6 is rounded to 8, and a value of –10 is rounded to –8.

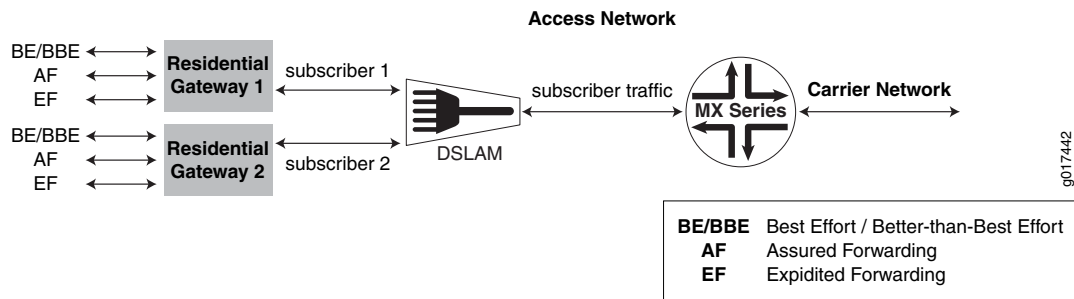
- Related Documentation**
- [Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 119](#)

Example: Configuring Static Shaping Parameters to Account for Overhead in Downstream Traffic Rates

This topic describes two scenarios for which you can configure static shaping parameters to account for packet overhead in a downstream network.

Figure 16 on page 123 shows the sample network that the examples reference.

Figure 17: Sample Network Topology for Downstream Traffic



Managing Traffic with Different Encapsulations

In this example, the MX Series router shown in Figure 16 on page 123 sends stacked VLAN frames to the DSLAM, and the DSLAM sends single-tagged VLAN frames to the residential gateway.

To accurately shape traffic at the residential gateway, the MX Series router must account for the different frame sizes. The difference between the stacked VLAN (S-VLAN) frames sent by the router and the single-tagged VLAN frames received at the residential gateway is a 4-byte VLAN tag. The residential gateway receives frames that are 4 bytes less.

To account for the different frame sizes, the network administrator configures the frame shaping mode with -4 byte adjustment:

1. The network administrator configure the traffic shaping parameters and attaches them to the interface.

Enabling the overhead accounting feature affects the resulting shaping rate, guaranteed rate, and excess rate parameters, if they are configured.

```
[edit]
class-of-service {
  traffic-control-profiles {
    tcp-example-overhead-accounting-frame-mode {
      shaping-rate 10m;
      shaping-rate-priority-high 4m;
      guaranteed-rate 2m;
      excess-rate percent 50;
      overhead-accounting frame-mode bytes -4;
    }
  }
  interfaces {
    ge-1/0/0 {
```

```

        output-traffic-control-profile tcp-example-overhead-accounting-frame-mode;
    }
}
}

```

2. The network administrator verifies the adjusted rates.

```

user@host#show class-of-service traffic-control-profile
Traffic control profile: tcp-example-overhead-accounting-frame-mode, Index:
61785
Shaping rate: 10000000
Shaping rate priority high: 4000000
Excess rate 50
Guaranteed rate: 2000000
Overhead accounting mode: Frame Mode
Overhead bytes: -4

```

Managing Downstream Cell-Based Traffic

In this example, the DSLAM and residential gateway shown in [Figure 16 on page 123](#) are connected through an ATM cell-based network. The MX Series router sends Ethernet frames to the DSLAM, and the DSLAM sends ATM cells to the residential gateway.

To accurately shape traffic at the residential gateway, the MX Series router must account for the different physical network characteristics.

To account for the different frame sizes, the network administrator configures the cell shaping mode with -4 byte adjustment:

1. Configure the traffic shaping parameters and attach them to the interface.

Enabling the overhead accounting feature affects the resulting shaping rate, guaranteed rate, and excess rate parameters, if they are configured.

```

[edit]
class-of-service {
  traffic-control-profiles {
    tcp-example-overhead-accounting-cell-mode {
      shaping-rate 10m;
      shaping-rate-priority-high 4m;
      guaranteed-rate 2m;
      excess-rate percent 50;
      overhead-accounting cell-mode;
    }
  }
  interfaces {
    ge-1/0/0 {
      output-traffic-control-profile tcp-example-overhead-accounting-cell-mode;
    }
  }
}

```

2. Verify the adjusted rates.

```

user@host#show class-of-service traffic-control-profile

```

```
Traffic control profile: tcp-example-overhead-accounting-cell-mode, Index:
61785
Shaping rate: 10000000
Shaping rate priority high: 4000000
Excess rate 50
Guaranteed rate: 2000000
Overhead accounting mode: Cell Mode
Overhead bytes: 0
```

To account for ATM segmentation, the MX Series router adjusts all of the rates by 48/53 to account for ATM AAL5 encapsulation. In addition, the router accounts for cell padding, and internally adjusts each frame by 8 bytes to account for the ATM trailer.

- Related Documentation**
- [Configuring Static Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 126](#)

Setting Shaping Rate and Overhead Accounting Based on PPPoE Vendor-Specific Tags

You can use access line parameters in PPPoE discovery packets to set the shaping-rate and overhead-accounting class-of-service attributes on dynamic subscriber interfaces in a broadband access network. This feature is supported on MPC/MIC interfaces on MX Series routers.

The shaping rate is based on the `actual-data-rate-downstream` attribute.

The overhead accounting value is based on the `access-loop-encapsulation` attribute and specifies whether the access loop uses Ethernet (frame mode) or ATM (cell mode).

You can configure class-of-service attributes, for example the shaping-rate, using the CLI, RADIUS vendor-specific attributes, ANCP, multicast, or in this case, PPPoE vendor-specific tags.

CLI Interaction with PPPoE Vendor-Specific Tags

When you enable this feature, the values supplied by the PPPoE vendor-specific tags override the parameters that you have configured in the CLI for the **shaping-rate** and **overhead-accounting** statements at the `[edit dynamic-profiles profile-name class-of-service traffic-control-profiles]` hierarchy level. The shaping rate is based on the `actual-data-rate-downstream` attribute, and is only overridden if the `vs-tag` value is less than the configured value.

To enable this feature, include the **actual-data-rate-downstream** or **access-loop-encapsulation** option with the **vendor-specific-tags** statement at the `[edit dynamic-profiles profile-name class-of-service dynamic-class-of-service-options]` hierarchy level.

RADIUS Interaction with PPPoE Vendor-Specific Tags

When you enable this feature, the PPPoE vendor-specific tags override the dynamic configuration of the shaping-rate and overhead-accounting values in RADIUS

vendor-specific attributes. The shaping-rate value is only overridden if the vs-tag value is less than the RADIUS value.

RADIUS CoA can overwrite the existing values. Upon receipt of a RADIUS CoA, the RADIUS value overrides the value set from the PPPoE vendor-specific tags.

PPPoE vendor-specific tags can override the RADIUS values, but a later RADIUS CoA request can then override that value.

ANCP Interaction with PPPoE Vendor-Specific Tags

You can mix ANCP and PPPoE vendor-specific tags on dynamic PPPoE interfaces, dynamically instantiated PPPoE interfaces, and ACI-sets. ANCP values override the PPPoE values. In this case, the ANCP shaping rate value overrides the PPPoE value.

Multicast QoS Adjustment Interaction with PPPoE Vendor-Specific Tags

Multicast QoS adjustments are not affected by this feature. The multicast adjustments adjust the shaping-rate set by PPPoE vendor-specific tags.

Shaping Rate Restrictions

Shaping rate has the following restrictions regarding the downstream-rate:

- If the downstream-rate is less than the configured shaping-rate (as set in the CLI or using RADIUS attributes) then it is applied, subject to other restrictions. If the downstream-rate is greater than or equal to the configured shaping-rate, no changes are performed.
- The downstream-rate cannot be less than a configured guaranteed-rate. If it is, the downstream-rate is set to the guaranteed-rate.
- The downstream-rate cannot be less than a configured adjust-minimum-rate. If it is, the downstream-rate is set to the adjust-minimum-rate.
- The downstream-rate cannot be less than 1000 bps. If it is, the downstream-rate is set to 1000 bps.
- The downstream-rate cannot be less than the sum of the transmit-rates of all queues.

Related Documentation

- [Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 119](#)
- [Configuring the Shaping Rate and Overhead Accounting Based on PPPoE Vendor-Specific Tags on Dynamic Subscriber Interfaces on page 131](#)

Configuring the Shaping Rate and Overhead Accounting Based on PPPoE Vendor-Specific Tags on Dynamic Subscriber Interfaces

To configure the PPPoE vendor-specific tags feature in a dynamic profile:



NOTE: When you enable this feature, the values supplied by the PPPoE vendor-specific tags override the parameters that you have configured for shaping-rate and overhead-accounting statements at the [edit dynamic-profiles *profile-name* class-of-service traffic-control-profile] hierarchy level.

1. (Optional) To configure the shaping rate based on access line information:

```
[edit dynamic-profiles profile-name class-of-service dynamic-class-of-service-options]
user@host# set vendor-specific-tags actual-data-rate-downstream
```

2. (Optional) To configure the overhead-accounting based on access-line information:

```
[edit dynamic-profiles profile-name class-of-service dynamic-class-of-service-options]
user@host# set vendor-specific-tags access-loop-encapsulation
```

Related Documentation

- [Setting Shaping Rate and Overhead Accounting Based on PPPoE Vendor-Specific Tags on page 129](#)
- [Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 119](#)

Reporting the Effective Shaping Rate for Subscribers

The Effective-Shaping-Rate VSA [26–177] provides the best estimate for a subscriber's downstream traffic rate for accounting purposes. The VSA is included in RADIUS Acct-Start, Acct-Stop, and Interim-Acct messages. The reported rate is the rate enforced on the L3, L2, or L1 node according to local policy. The value of the VSA varies depending on your configuration:

- Actual rate—When effective shaping rate reporting is enabled.
- Advisory rate—When the advisory rate is configured and effective shaping rate reporting is not enabled.
- Port speed—When the advisory rate is not configured and effective shaping rate reporting is not enabled.

When you disable reporting, the VSA reports either the advisory rate or port speed for both existing subscribers and new subscribers that log in after reporting is disabled.

To enable reporting of the actual downstream traffic rate:

- Enable reporting.

```
[edit chassis]
user@host1# set effective-shaping-rate
```



NOTE: When the traffic control profile for the subscriber specifies cell-mode, the effective shaping rate does not account for cell padding according to the encapsulation type. The rate includes the 48/53 cell tax.

Related Documentation

- [Verifying the Effective Shaping Rate Reporting Configuration on page 132](#)
- [Hierarchical CoS Shaping-Rate Adjustments Overview on page 101](#)
- [Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 119](#)
- *Juniper Networks VSAs Supported by the AAA Service Framework*
- *AAA Accounting Messages and Supported RADIUS Attributes and Juniper Networks VSAs for Junos OS*

Verifying the Effective Shaping Rate Reporting Configuration

Purpose Verify whether reporting is enabled for the effective shaping rate. Display the effective shaping rate when reporting is enabled.

Action • To display configuration information for effective shaping rate reporting:

```
[edit]
user@host# show chassis
...
effective-shaping-rate;
...
```

- To display the effective shaping rate in kilobits per second when reporting is enabled:

```
user@host> show subscribers extensive
Type: VLAN
Logical System: default
Routing Instance: default
Interface: demux0.1073741837
Interface type: Dynamic
Interface Set: ifset-1
Underlying Interface: ae1
Dynamic Profile Name: svlan-dhcp-test
State: Active
Session ID: 1
Stacked VLAN Id: 0x8100.201
VLAN Id: 0x8100.201
Login Time: 2011-11-30 00:18:04 PST
Effective shaping-rate: 31000000
...
```

Related Documentation

- [Reporting the Effective Shaping Rate for Subscribers on page 131](#)

CHAPTER 9

Applying CoS to Households or Individual Subscribers Using ACI-Based Dynamic VLANs

- [Agent Circuit Identifier-Based Dynamic VLANs Bandwidth Management Overview on page 133](#)
- [Restrictions for Configuring Adjustment of CoS Shaping Rate and Overhead Accounting for Dynamic ACI Interface Sets on page 136](#)
- [Adjusting the CoS Shaping Rate and Overhead Accounting Parameters for Agent Circuit Identifier-Based Dynamic VLANs on page 137](#)

Agent Circuit Identifier-Based Dynamic VLANs Bandwidth Management Overview

A router in a subscriber access network ensures class of service (CoS) for dynamic subscriber interfaces. An MX Series router with Modular Port Concentrator/Modular Interface Card (MPC/MIC) interfaces ensures that subscribers receive an adequate minimum bandwidth, referred to as the *guaranteed rate*, and maximum bandwidth, referred to as the *shaping rate*. For dynamic VLAN subscriber interfaces based on agent circuit identifier (ACI) information, you can shape the bandwidth either at a per-household level for a dynamic ACI interface set, or at a per-subscriber level for a dynamic VLAN subscriber interface associated with an ACI interface set.

To help you manage bandwidth more efficiently and economically for ACI-based dynamic VLAN subscriber interfaces for PPPoE subscribers, you can configure the router to use specific PPPoE vendor-specific attributes (VSAs) found in PPPoE control packets to adjust the CoS shaping-rate and overhead-accounting attributes for dynamic ACI interface sets and their associated ACI-based dynamic VLAN subscriber interfaces.

This overview covers the following topics:

- [CoS Shaping Rate Adjustment on page 134](#)
- [CoS Overhead Accounting Adjustment on page 134](#)
- [Dynamic Profiles and Adjustment of CoS Shaping Rate and Overhead Accounting on page 135](#)
- [Guidelines for Configuring Adjustment of CoS Shaping Rate and Overhead Accounting on page 136](#)

CoS Shaping Rate Adjustment

The CoS shaping rate adjustment is based on the value of the Actual-Data-Rate-Downstream DSL Forum VSA [26-130] found in PPPoE Active Discovery Initiation (PADI) and PPPoE Active Discovery Request (PADR) control packets for PPPoE traffic. The Actual-Data-Rate-Downstream VSA contains the actual downstream data rate, in bits per second, of the subscriber's synchronized digital subscriber line (DSL) link.

To configure the router to use the Actual-Data-Rate-Downstream VSA to adjust the CoS shaping-rate attribute, include the **vendor-specific-tags** statement with the **actual-data-rate-downstream** option at the **[edit dynamic-profiles *profile-name* class-of-service dynamic-class-of-service-options]** hierarchy level in either the dynamic profile that defines the ACI interface set or the dynamic profile that configures the associated dynamic PPPoE (**pp0**) subscriber interface.

When you enable this feature, the value of the Actual-Data-Rate-Downstream VSA overrides the **shaping-rate** value configured at the **[edit dynamic-profiles *profile-name* class-of-service traffic-control-profiles]** hierarchy level only if the Actual-Data-Rate-Downstream VSA value is less than the **shaping-rate** value configured with the CLI.

CoS Overhead Accounting Adjustment

The CoS overhead accounting adjustment is based on the value of the Access-Loop-Encapsulation DSL Forum VSA [26-144] found in PADI and PADR control packets for PPPoE traffic. The Access-Loop-Encapsulation VSA identifies the encapsulation used by the subscriber associated with the digital subscriber line access multiplexer (DSLAM) access loop from which requests are initiated.

The value of the Data Link subfield in the Access-Loop-Encapsulation VSA determines the overhead accounting mode in use on the access loop. If the Data Link subfield value is 0 (ATM Adaptation Layer 5, or AAL5), the access loop uses cell-mode encapsulation. If the Data Link subfield value is 1 (Ethernet), the access loop uses frame-mode encapsulation.

In subscriber access networks where the router passes downstream ATM traffic to Ethernet interfaces, the different Layer 2 encapsulations between the router and the PPPoE Intermediate Agent on the DSLAM make managing the bandwidth of downstream ATM traffic difficult. Using the Access-Loop-Encapsulation VSA to shape traffic based on frames or cells enables the router to adjust the overhead-accounting attribute in order to apply the correct downstream rate for the subscriber.

To configure the router to use the Access-Loop-Encapsulation VSA to adjust the CoS overhead-accounting attribute, include the **vendor-specific-tags** statement with the **access-loop-encapsulation** option at the **[edit dynamic-profiles *profile-name* class-of-service dynamic-class-of-service-options]** hierarchy level in either the dynamic profile that defines the ACI interface set or the dynamic profile that configures the associated dynamic PPPoE (**pp0**) subscriber interface.

When you enable this feature, the value of the Access-Loop-Encapsulation VSA always overrides the **overhead-accounting** value configured at the **[edit dynamic-profiles profile-name class-of-service traffic-control-profiles]** hierarchy level.

Dynamic Profiles and Adjustment of CoS Shaping Rate and Overhead Accounting

When you configure the router to use one or both of the Actual-Data-Rate-Downstream VSA value and Access-Loop-Encapsulation VSA value to adjust the CoS shaping rate and overhead accounting attributes, respectively, the router adjusts these attributes when the dynamic ACI interface set is created and the router receives the PADI and PADR packets from the first subscriber interface belonging to the ACI interface set.

You can configure CoS adjustment based on either or both VSAs in either or both of the following dynamic profiles:

- To configure adjustment of the CoS shaping rate and overhead accounting on a per-household basis, use the dynamic profile that defines the dynamic ACI interface set.
- To configure adjustment of the CoS shaping rate and overhead accounting on a per-subscriber basis, use the dynamic profile that defines the ACI-based dynamic PPPoE (**pp0**) subscriber interface associated with the ACI interface set.

[Table 26 on page 135](#) summarizes how the dynamic profile in which you configure CoS adjustment for ACI-based dynamic VLANs using one or both VSAs affects the router behavior.

Table 26: CoS Adjustment in Dynamic Profiles for ACI Interface Sets and ACI-Based Subscriber Interfaces

VSAs Specified in ACI Interface Set Dynamic Profile	VSAs Specified in PPPoE Subscriber Interface Dynamic Profile	Result
Yes	No	Router adjusts specified CoS attributes only for dynamic ACI interface set
No	Yes	Router adjusts specified CoS attributes only for ACI-based dynamic PPPoE subscriber interface
Yes	Yes	Router adjusts specified CoS attributes for both dynamic ACI interface set and ACI-based dynamic PPPoE subscriber interface
No	No	Router does not adjust CoS attributes for either the dynamic ACI interface set or the ACI-based dynamic PPPoE subscriber interface

Guidelines for Configuring Adjustment of CoS Shaping Rate and Overhead Accounting

You can also configure the router to use the Actual-Data-Rate-Downstream VSA and Access-Loop-Encapsulation VSA values in PPPoE control packets to adjust the CoS shaping rate and overhead accounting attributes, respectively, for dynamic subscriber interfaces *not* associated with dynamic ACI interface sets.

With the exception of the constraints described in [“Restrictions for Configuring Adjustment of CoS Shaping Rate and Overhead Accounting for Dynamic ACI Interface Sets” on page 136](#), most of the guidelines and restrictions that apply to this feature for use with non-ACI-based dynamic subscriber interfaces also apply to its use for dynamic ACI interface sets and their associated ACI-based dynamic VLAN subscriber interfaces.

- | | |
|------------------------------|--|
| Related Documentation | <ul style="list-style-type: none">• Setting Shaping Rate and Overhead Accounting Based on PPPoE Vendor-Specific Tags on page 129• Adjusting the CoS Shaping Rate and Overhead Accounting Parameters for Agent Circuit Identifier-Based Dynamic VLANs on page 137• Restrictions for Configuring Adjustment of CoS Shaping Rate and Overhead Accounting for Dynamic ACI Interface Sets on page 136 |
|------------------------------|--|

Restrictions for Configuring Adjustment of CoS Shaping Rate and Overhead Accounting for Dynamic ACI Interface Sets

The following restrictions apply when you configure the router to use the Actual-Data-Rate-Downstream VSA and Access-Loop-Encapsulation vendor-specific attribute (VSA) values in PPPoE control packets to adjust the CoS shaping rate and overhead accounting attributes, respectively, for dynamic ACI interface sets and their associated agent circuit identifier (ACI)-based dynamic VLAN subscriber interfaces:

- You cannot configure adjustment of CoS shaping rate and overhead accounting attributes based on Actual-Data-Rate-Downstream VSA and Access-Loop-Encapsulation VSA values that the router receives from the following sources:
 - RADIUS servers
 - Access Node Control Protocol (ANCP) access loop information
 - Dynamic Host Configuration Protocol (DHCP) discovery packets
- You cannot use this feature to report information about the PPPoE VSA values to RADIUS.
- You cannot use this feature to configure CoS adjustment of upstream data traffic on a dynamic ACI interface set.

- | | |
|------------------------------|--|
| Related Documentation | <ul style="list-style-type: none">• Agent Circuit Identifier-Based Dynamic VLANs Bandwidth Management Overview on page 133 |
|------------------------------|--|

- [Setting Shaping Rate and Overhead Accounting Based on PPPoE Vendor-Specific Tags on page 129](#)
- [Adjusting the CoS Shaping Rate and Overhead Accounting Parameters for Agent Circuit Identifier-Based Dynamic VLANs on page 137](#)

Adjusting the CoS Shaping Rate and Overhead Accounting Parameters for Agent Circuit Identifier-Based Dynamic VLANs

You can configure the router to use either or both of the Actual-Data-Rate-Downstream [26-130] or Access-Loop-Encapsulation [26-144] DSL Forum vendor-specific attribute (VSA) values in PPPoE control packets to adjust the CoS shaping-rate and overhead-accounting attributes, respectively, for dynamic agent circuit identifier (ACI) interface sets and their associated ACI-based dynamic VLAN subscriber interfaces.

Before you begin:

- To configure adjustment of the CoS shaping rate and overhead accounting attributes on a per-household basis, create a dynamic profile that defines the dynamic ACI interface set.

See *Defining Agent Circuit Identifier Interface Sets*.

- To configure adjustment of the CoS shaping rate and overhead accounting attributes on a per-subscriber basis, create a dynamic profile that defines the ACI-based dynamic PPPoE (pp0) subscriber interface associated with the ACI interface set.

See *Configuring Dynamic VLAN Subscriber Interfaces Based on Agent Circuit Identifier Information*.

To configure the router to use the Actual-Data-Rate-Downstream or Access-Loop-Encapsulation VSA values in PPPoE control packets to adjust the CoS shaping-rate and overhead-accounting attributes for dynamic ACI interface sets and associated ACI-based dynamic VLAN subscriber interfaces, do either or both of the following:

- In a dynamic profile for an ACI interface set or a dynamic profile for an ACI-based PPPoE subscriber interface, configure adjustment of the CoS shaping-rate attribute based on the value of the Actual-Data-Rate-Downstream VSA.

```
[edit dynamic-profiles profile-name class-of-service dynamic-class-of-service-options]
user@host# set vendor-specific-tags actual-data-rate-downstream
```

- In a dynamic profile for an ACI interface set or a dynamic profile for an ACI-based PPPoE subscriber interface, configure adjustment of the CoS overhead-accounting attribute based on the value of the Access-Loop-Encapsulation VSA.

```
[edit dynamic-profiles profile-name class-of-service dynamic-class-of-service-options]
user@host# set vendor-specific-tags access-loop-encapsulation
```

Related Documentation

- [Agent Circuit Identifier-Based Dynamic VLANs Bandwidth Management Overview on page 133](#)

- [Restrictions for Configuring Adjustment of CoS Shaping Rate and Overhead Accounting for Dynamic ACI Interface Sets on page 136](#)
- *Configuring Dynamic VLANs Based on Agent Circuit Identifier Information*

CHAPTER 10

Managing Excess Bandwidth Distribution and Traffic Bursts

- [Excess Bandwidth Distribution on MIC and MPC Interfaces Overview on page 139](#)
- [Traffic Burst Management on MIC and MPC Interfaces Overview on page 140](#)
- [Managing Excess Bandwidth Distribution for Dynamic CoS on MIC and MPC Interfaces on page 142](#)

Excess Bandwidth Distribution on MIC and MPC Interfaces Overview

Service providers often used tiered services to provide bandwidth for excess traffic as traffic patterns vary. By default, excess bandwidth between a configured guaranteed rate and shaping rate is shared equally among all queues on MIC and MPC interfaces, which might not be optimal for all subscribers to a service.

You can adjust this distribution by configuring the rates and priorities for the excess bandwidth.

By default, when traffic exceeds the shaping or guaranteed rates, the system demotes traffic with guaranteed high (GH) priority and guaranteed medium (GM) priority. You can disable this priority demotion for the MIC and MPC interfaces in your router.

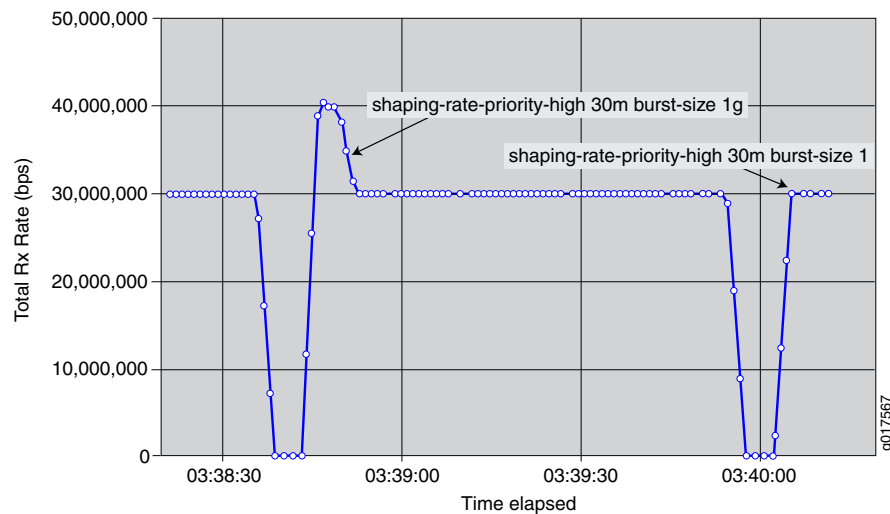
Related Documentation

- [*Managing Excess Bandwidth Distribution on Static Interfaces on MICs and MPCs*](#)
- [Managing Excess Bandwidth Distribution for Dynamic CoS on MIC and MPC Interfaces on page 142](#)
- [Per-Priority Shaping on MIC and MPC Interfaces Overview](#)
- [Traffic Burst Management on MIC and MPC Interfaces Overview on page 140](#)

Traffic Burst Management on MIC and MPC Interfaces Overview

You can manage the impact of bursts of traffic on your network by configuring a burst-size value with the shaping rate or the guaranteed rate. The value is the maximum bytes of rate credit that can accrue for an idle queue or scheduler node. When a queue or node becomes active, the accrued rate credits enable the queue or node to catch up to the configured rate.

Figure 18: Sample Burst Shaping Rates



In [Figure 18 on page 140](#), the network administrator configures a large burst-size value for the shaping rate, then configures a small burst-size value. The larger burst size is subject to a maximum value. The smaller burst size is subject to a minimum value that enables the system to achieve the configured rates.

In both configurations, the scheduler node can burst beyond its shaping rate for a brief interval. The burst of traffic beyond the shaping rate is more noticeable with the larger burst size than the smaller burst size.

- [Guidelines for Configuring the Burst Size on page 140](#)
- [How the System Calculates the Burst Size on page 141](#)

Guidelines for Configuring the Burst Size

Typically, the default burst-size (100 ms) for both scheduler nodes and queues on MIC and MPC interfaces is adequate for most networks. However, if you have intermediate equipment in your network that has very limited buffering and is intolerant of bursts of traffic, you might want to configure a lower value for the burst size.

Use caution when selecting a different burst size for your network. A burst size that is too high can overwhelm downstream networking equipment, causing dropped packets and inefficient network operation. Similarly, a burst size that is too low can prevent the network from achieving your configured rate.

When configuring a burst size, keep the following considerations in mind:

- The system uses an algorithm to determine the actual burst size that is implemented for a node or queue. For example, to reach a shaping rate of 8 Mbps, you must allocate 1Mb of rate credits every second. A shaping rate of 8 Mbps with a burst size of 500,000 bytes of rate-credit per seconds enables the system to transmit at most 500,000 bytes, or 4 Mbps. The system cannot implement a burst size that prevents the rate from being achieved.

For more information, see [“How the System Calculates the Burst Size” on page 141](#).

- There are minimum and maximum burst sizes for each platform, and different nodes and queue types have different scaling factors. For example, the system ensures the burst cannot be set lower than 1 Mbps for a shaping rate of 8 Mbps. To smoothly shape traffic, rate credits are sent much faster than once per second. The interval at which rate credits are sent varies depending on the platform, the type of rate, and the scheduler level.
- When you have configured adjustments for the shaping rate (either by percentage or through an application such as ANCP or Multicast OIF), the system bases the default and minimum burst-size calculations on the adjusted shaping rate.
- When you have configured cell shaping mode to account for ATM cell tax, the system bases the default and minimum burst-size calculations on the post-tax shaping rate.
- The guaranteed rate and shaping rate share the value specified for the burst size. If the guaranteed rate has a burst size specified, that burst size is used for the shaping rate; if the shaping rate has a burst size specified, that burst size is used for the guaranteed rate. If you have specified a burst size for both rates, the system uses the lesser of the two values.
- The burst size configured for the guaranteed rate cannot exceed the burst-size configured for the shaping rate. The system generates a commit error.
- If you have not configured a guaranteed rate, logical interfaces and interface sets receive a default guaranteed rate from the port speed. Queues receive a default guaranteed rate from the parent logical interface or interface set.

How the System Calculates the Burst Size

When calculating the burst size, the system uses an exponent of a power of two. For example:

$$\text{Shaping-rate in bps} * 100 \text{ ms} / (8 \text{ bits/byte} * 1000 \text{ ms/s}) = 1,875,000 \text{ bytes}$$

The system then rounds this value up. For example, the system uses the following calculation to determine the burst size for a scheduler node with a shaping rate of 150 Mbps:

$$\text{Max (Shaping rate, Guaranteed rate) bps} * 100 \text{ ms} / (8 \text{ bits/byte} * 1000 \text{ ms/s}) = 1,875,000 \text{ bytes}$$

$$\text{Rounded up to the next higher power of two} = 2,097,150 \text{ (which is } 2^{21}, \text{ or } 0x2000000)$$

The system assigns a single burst size to each of the following rate pairs:

- Shaping rate and guaranteed rate
- Guaranteed high (GH) and guaranteed medium (GM)
- Excess high (EH) and excess low (EL)
- Guaranteed low (GL)

To calculate the burst size for each pair, the system:

- Uses the configured burst-size if only one of the pair is configured.
- Uses the lesser of the two burst sizes if both values are configured.
- Uses the next lower power of two.
- To calculate the minimum burst size, the system uses the greater of the two rates.

**Related
Documentation**

- *Per-Priority Shaping on MIC and MPC Interfaces Overview*
- *Managing Excess Bandwidth Distribution on Static Interfaces on MICs and MPCs*

Managing Excess Bandwidth Distribution for Dynamic CoS on MIC and MPC Interfaces

Service providers often used tiered services that must utilize excess bandwidth as traffic patterns vary. By default, excess bandwidth between a configured guaranteed rate and shaping rate is shared equally among all queues with the same excess priority value, which might not be optimal for all subscribers to a service.

This feature is supported for MIC and MPC interfaces on MX Series routers.

To configure parameters to manage excess bandwidth for subscriber interfaces:

1. Configure the parameters for the interface.
 - a. Configure the guaranteed and shaping rates.
 - i. Configure the guaranteed rate:

```
[edit dynamic-profiles profile-name class-of-service traffic-control-profiles  
  profile-name]  
user@host# set guaranteed-rate(rate | $junos-cos-guaranteed-rate) <burst-size  
  (bytes | $junos-cos-guaranteed-rate-burst) >
```

- ii. Configure the shaping rate:

```
[edit dynamic-profiles profile-name class-of-service traffic-control-profiles  
  profile-name]  
user@host# set shaping-rate(rate | $junos-cos-shaping-rate) <burst-size (bytes  
  | $junos-cos-shaping-rate-burst) >
```



TIP: On MPC/MIC interfaces, the guaranteed rate and the shaping rate share the value specified for the burst size. If the guaranteed rate has

a burst size specified, it is used for the shaping rate; if the shaping rate has a burst size specified, it is used for the guaranteed rate. If you have specified a burst for both rates, the system uses the lesser of the two values.

- b. Configure a rate for excess bandwidth.

You can configure an excess rate for all priorities of traffic:

```
[edit dynamic-profiles profile-name class-of-service traffic-control-profiles
profile-name]
user@host# set excess-rate (percent percentage | $junos-cos-excess-rate) |
proportion value )
```

Optionally, you can configure an excess rate specifically for high- and low-priority traffic. When you configure the **excess-rate** statement for an interface, you cannot also configure the **excess-rate-low** and **excess-rate-high** statements.

```
[edit dynamic-profiles profile-name class-of-service traffic-control-profiles
profile-name]
user@host# set excess-rate-high(percent percentage |
$junos-cos-excess-rate-high) | proportion value )
user@host# set excess-rate-low (percent percentage | $junos-cos-excess-rate-low)
| proportion value )
```



BEST PRACTICE: We recommend that you configure either a percentage or a proportion of the excess bandwidth for all schedulers with the same parent in the hierarchy. For example, if you configure interface 1.1 with twenty percent of the excess bandwidth, configure interface 1.2 with eighty percent of the excess bandwidth.

2. (Optional) Configure parameters for the queue.

- a. Configure the shaping rate.

```
[edit dynamic-profiles profile-name class-of-service scheduler scheduler-name]
user@host# set shaping-rate (rate | $junos-cos-scheduler-shaping-rate) <burst-size
bytes>
```

- b. Configure the excess rate.

```
[edit dynamic-profiles profile-name class-of-service scheduler scheduler-name]
user@host# set excess-rate (percent percentage | percent
$junos-cos-scheduler-excess-rate)
```

- c. (Optional) Configure the priority of excess bandwidth for the queue.

```
[edit dynamic-profiles profile-name class-of-service scheduler scheduler-name]
user@host# set excess-priority (low | high | $junos-cos-scheduler-excess-priority
| none)
```



TIP:

For queues, you cannot configure the excess rate or excess priority in these cases:

- When the `transmit-rate exact` statement is configured. In this case, the shaping rate is equal to the transmit rate and the queue does not operate in the excess region.
- When the scheduling priority is configured as `strict-high`. In this case, the queue gets all available bandwidth and never operates in the excess region.

By default, when traffic exceeds the shaping or guaranteed rates, the system demotes traffic configured with high or medium priority. To disable priority demotion, specify the `none` option. You cannot configure this option for queues configured with `transmit-rate` expressed as a percent and when the parent's guaranteed rate is set to zero.

Related Documentation

- For hardware requirements and configuration guidelines, see [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)

CHAPTER 11

Configuring Targeted Distribution of Demux Subscribers on Aggregated Ethernet Interfaces

- [Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 145](#)
- [Providing Accurate Scheduling for a Demux Subscriber Interface of Aggregated Ethernet Links on page 148](#)
- [Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 149](#)
- [Configuring Link and Module Redundancy for Demux Subscribers in an Aggregated Ethernet Interface on page 150](#)
- [Configuring Rebalancing of Demux Subscribers in an Aggregated Ethernet Interface on page 150](#)
- [Example: Separating Targeted Multicast Traffic for Demux Subscribers on Aggregated Ethernet Interfaces on page 151](#)
- [Verifying the Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 161](#)
- [Configuring the Distribution Type for PPPoE Subscribers on Aggregated Ethernet Interfaces on page 161](#)
- [Verifying the Distribution of PPPoE Subscribers in an Aggregated Ethernet Interface on page 162](#)

Distribution of Demux Subscribers in an Aggregated Ethernet Interface

This topic describes the distribution options available for demux subscriber interfaces over aggregated Ethernet.

Distribution Models

By default, the system supports hash-based distribution for all subscriber interface types in an aggregated Ethernet bundle configured without link protection. In this model, traffic for a logical interface can be distributed over multiple links in the bundle. This model is desirable when there are many flows through the logical interface and you need to load balance those flows.

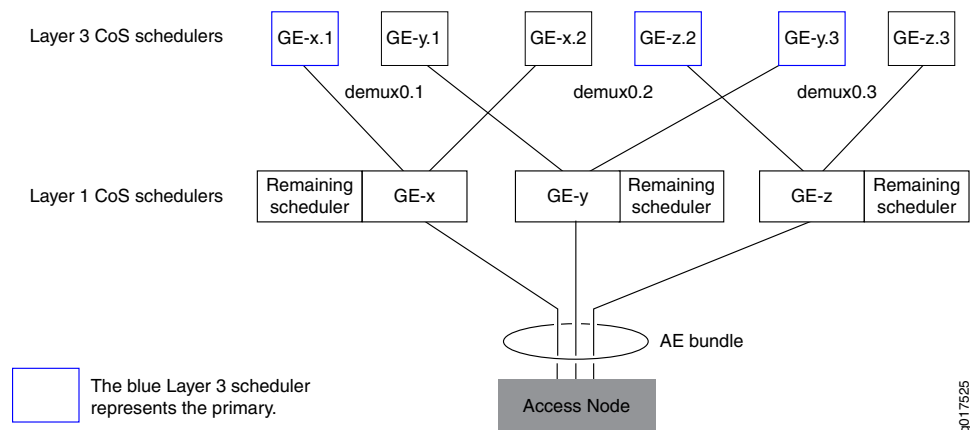
Note that if the distribution flows are not even, egress CoS scheduling can be inaccurate. In addition, scheduler resources are required on every link of the aggregated Ethernet interface. For example, if subscriber traffic is allocated 10 MB for a triple-play service over four links in a bundle, each of the links could receive 2.5 MB of traffic. High-density services such as video could be limited by the bandwidth on one of the links.

Targeted distribution enables you to target the egress traffic for an IP or VLAN demux subscriber on a single member link, using a single scheduler resource. To achieve load balancing over the member links, the system distributes the subscriber interfaces equally among the links. This enables the subscriber that is allocated 10 MB to be accurately scheduled as the traffic flows through.

Sample Targeted Distribution Topology

Figure 19 on page 146 displays a sample targeted distribution of subscriber traffic across links in an aggregated Ethernet interface. A primary and backup link is allocated for each subscriber.

Figure 19: Targeted Subscriber Links



For example, if link **GE-x** went down, subscriber 1 can begin forwarding over the backup, which is link **GE-y**. When link **GE-y** comes back up, subscriber 1 switches back to its primary link, **GE-x**.

In the event that both **GE-x** and **GE-y** go down, subscriber 3 starts forwarding through its backup, **GE-z**. Subscriber 1 will have lost its primary and backup links, and will also begin forwarding out the **GE-z** link. A new level 3 scheduler is assigned for this subscriber on link **GE-z**. If there is a momentary lapse between the time that a new scheduler is allocated and forwarding switches to **GE-z**, the traffic will be forwarding through to the remaining scheduler. Subscriber 2 continues to forward through its primary link, **GE-z**.

Redundancy and Redistribution Mechanisms

Two types of redundancy are available in the targeted distribution model: link redundancy and module redundancy.

By default, an aggregated Ethernet interface is enabled with link redundancy. Backup links for a subscriber are chosen based on the link with the least number of subscribers, which provides redundancy if a link fails.

The module redundancy option enables you to provide redundancy if a module or a link fails. Backup links for a subscriber are chosen on a different DPC or MPC from the primary link, based on the link with the least number of subscribers among the links on different modules. You can enable this for the aggregated Ethernet interface.

When links are removed, affected subscribers are redistributed among the active remaining backup links. When links are added to the system, no automatic redistribution occurs. New subscribers are assigned to the links with the fewest subscribers (which are typically the new links).

Considerations and Best Practices

Keep the following guidelines in mind when configuring targeted distribution for demux subscribers:

- You can manage subscribers with both hash-based and targeted distribution models in the same network. For example, you can allocate subscribers with interface types such as PPPoE with hash-based distribution, and enable demux subscribers with targeted distribution.
- We recommend that you configure module redundancy to protect against module failures. When module redundancy is enabled, you can ensure an even distribution of subscribers if you allocate no more than 50 percent of the links on a single DPC or MPC.
- During normal network operations, the system maintains an even balance of subscribers among the links in a bundle, even as subscribers log in and out. However, if the distribution of a bundle becomes uneven (for example, when a link goes down and new subscribers are logging in), you can perform a manual rebalance of the bundle. In addition, you can configure periodic rebalancing of the bundle with a specific time interval.
- When you anticipate that a link will be down for an extended time, and you want to ensure that backup links are provisioned for all subscribers, we recommend that you remove the failed link from the bundle. This forces the affected subscribers to redistribute to other links.
- We recommend that you apply a remaining traffic-control profile to the logical interface to ensure that minimal scheduling parameters are applied to the remaining subscriber traffic. This provides scheduling for subscribers that do not have schedulers allocated because they have not been configured or they have been over-provisioned, or because of scheduler transitions on multiple link failures.
- If you perform a cold restart on the router when it is forwarding active subscribers, the subscriber interfaces with targeted distribution are assigned to the first links that become available when the system is initializing so forwarding can begin. To rebalance the system following a cold restart, perform a manual rebalance of the bundle. In addition, we recommend that you configure Graceful Routing Engine switchover (GRES) on the router to enable nonstop forwarding during switchover, and avoid performing cold restarts.

- To ensure appropriate and predictable targeted distribution, you must configure chassis network services to use **enhanced-ip** mode.
- Unless specifically separated, multicast traffic egresses in parallel with unicast traffic, sharing the CoS hierarchy and aggregated Ethernet flow distribution.

Related Documentation

- [Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 149](#)
- [Configuring Link and Module Redundancy for Demux Subscribers in an Aggregated Ethernet Interface on page 150](#)
- [Configuring Rebalancing of Demux Subscribers in an Aggregated Ethernet Interface on page 150](#)
- [Static or Dynamic Demux Subscriber Interfaces over Aggregated Ethernet Overview](#)

Providing Accurate Scheduling for a Demux Subscriber Interface of Aggregated Ethernet Links

Unlike VLAN subscriber interfaces, enabling link protection is not required for configuring hierarchical CoS on demux interfaces. Instead, we recommend that you enable targeted distribution on the demux interface to provide accurate scheduling for the aggregated Ethernet links.

Before you begin, configure the subscriber interface with aggregated Ethernet:

- For static and dynamic IP demux interfaces, see *Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet*.
- For static and dynamic VLAN demux interfaces, see *Configuring a Static or Dynamic VLAN Demux Subscriber Interface over Aggregated Ethernet*.

To provide accurate scheduling for a demux subscriber interface of aggregated Ethernet links:

1. Enable targeted distribution for the demux interface.
[See “Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces” on page 149.](#)
2. Enable hierarchical scheduling on the link aggregation bundle.
[See “Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links” on page 36.](#)
3. (Optional) Enable module redundancy to ensure that CoS resources are provisioned for the aggregated Ethernet links if a module or a link fails. By default, link redundancy is supported.
[See “Configuring Link and Module Redundancy for Demux Subscribers in an Aggregated Ethernet Interface” on page 150.](#)

4. (Optional) Configure rebalancing periodically or manually for the subscribers. See [“Configuring Rebalancing of Demux Subscribers in an Aggregated Ethernet Interface” on page 150](#).
5. Attach static or dynamic traffic shaping and scheduling parameters at the aggregated Ethernet logical interface or its underlying physical interface. See:
 - [Configuring Traffic Scheduling and Shaping for Subscriber Access on page 11](#)
 - [Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13](#)
 - [Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile on page 223](#)
 - [Applying Minimal Shaping and Scheduling to Remaining Subscriber Traffic on page 224](#)

Related Documentation

- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [Verifying the Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 161](#)

Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces

By default, the system supports hash-based distribution of subscriber traffic in aggregated Ethernet bundles. You can configure the system to target the egress traffic for a subscriber on a single member link, using a single scheduler resource. The system distributes the subscriber interfaces equally among the member links.

To configure targeted distribution:

1. Edit the chassis hierarchy level.

```
[edit]  
user@host#edit chassis
```
2. Enable chassis network services for **enhanced-ip** mode.

```
[edit chassis]  
user@host#set network-services enhanced-ip
```
3. Access the logical interface.

```
[edit]  
user@host#edit interfaces demux0 unit logical-unit-number
```
4. Enable targeted distribution for the interface.

```
[edit interfaces demux0 unit logical-unit-number]  
user@host#set targeted-distribution
```

Related Documentation

- [Verifying the Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 161](#)
- [Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 145](#)

Configuring Link and Module Redundancy for Demux Subscribers in an Aggregated Ethernet Interface

By default, an aggregated Ethernet bundle with targeted distribution is enabled with link redundancy. Backup links for a subscriber are chosen based on the link with the fewest subscribers, which provides redundancy if a link fails.

We recommend that you configure the module redundancy option to provide redundancy if a module or a link fails. Backup links for a subscriber are chosen on a different DPC or MPC from the primary link, based on the link with the fewest subscribers among the links on different modules.

To configure module redundancy for an aggregated Ethernet bundle:

1. Access the aggregated Ethernet bundle for which you want to configure module redundancy.

```
edit
user@host# edit interfaces aex aggregated-ether-options
```

2. Enable module redundancy for the bundle.

```
[edit interfaces aex aggregated-ether-options]
user@host# logical-interface-fpc-redundancy
```

Related Documentation

- [Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 149](#)
- [Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 145](#)

Configuring Rebalancing of Demux Subscribers in an Aggregated Ethernet Interface

In a targeted distribution model, the system allocates demux subscriber interfaces equally among the member links in the aggregated Ethernet interface. When links are removed, affected subscribers are redistributed among the active remaining backup links. When links are added to the system, no automatic redistribution occurs. New subscribers are assigned to the links with the fewest subscribers (which are typically the new links).

During normal network operations, the system maintains an even balance of traffic among the links in a bundle, even as subscribers log in and out. However, if the distribution of a bundle becomes uneven (for example, when a link goes down for a period of time and new subscribers are logging in), you can perform a manual rebalance of the bundle. In addition, you can configure periodic rebalancing of the bundle with a specific interval.

- [Configuring Periodic Rebalancing of Subscribers in an Aggregated Ethernet Interface on page 151](#)
- [Configuring Manual Rebalancing of Subscribers on an Aggregated Ethernet Interface on page 151](#)

Configuring Periodic Rebalancing of Subscribers in an Aggregated Ethernet Interface

If subscribers are frequently logging in and logging out of your network, you can configure the system to periodically rebalance the links based on a specific time and interval.

To configure periodic rebalancing:

1. Access the aggregated Ethernet interface for which you want to configure periodic rebalancing.

```
edit
user@host# edit interfaces aenumber aggregated-ether-options
```

2. Configure the rebalancing parameters for the interface, including the time and the interval between rebalancing actions.

```
[edit interfaces aenumber aggregated-ether-options]
user@host# rebalance-periodic time hour:minute <interval hours>
```

Configuring Manual Rebalancing of Subscribers on an Aggregated Ethernet Interface

To manually rebalance the subscribers among the links in an aggregated Ethernet bundle with targeted distribution:

- Issue the **request interface rebalance** command:

```
user@host# request interface rebalance interface <interface-name>
```

Related Documentation

- [Verifying the Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 161](#)
- [Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 149](#)
- [Distribution of Demux Subscribers in an Aggregated Ethernet Interface on page 145](#)

Example: Separating Targeted Multicast Traffic for Demux Subscribers on Aggregated Ethernet Interfaces

This example shows how to separate targeted multicast traffic from targeted unicast traffic and send that multicast traffic to a different interface through the use of OIF maps.

- [Requirements on page 151](#)
- [Overview on page 152](#)
- [Configuration on page 152](#)
- [Verification on page 157](#)

Requirements

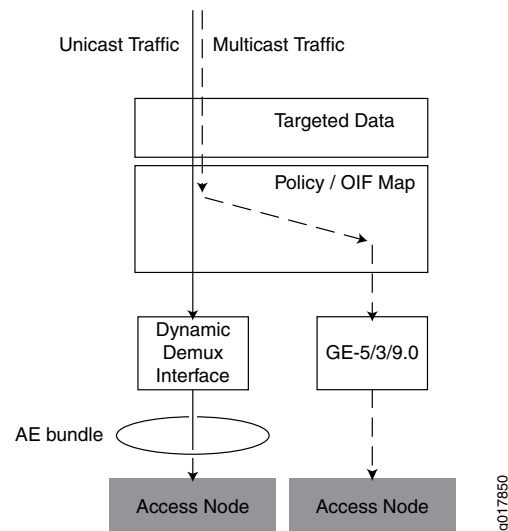
Before configuring this example, make sure to configure the distribution type for the interface. See “[Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces](#)” on page 149 for instructions.

Overview

In this example, targeted traffic distribution is already configured on the router. Dynamically created interfaces each carry their unicast traffic but all multicast traffic is sent to the GE-5/3/9.0 interface.

Figure 20 on page 152 shows the sample network.

Figure 20: Multicast Traffic Separation Using OIF Mapping



Configuration

- [Configure an OIF Map Policy on page 153](#)
- [Configure a DHCP VLAN Dynamic Profile on page 154](#)
- [Configure a VLAN Demux Dynamic Profile on page 155](#)

CLI Quick Configuration

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

```
set policy-options policy-statement OIF-v4-all term oif539 from route-filter 224.0.0.0/4
orlonger
set policy-options policy-statement OIF-v4-all term oif539 then map-to-interface
ge-5/3/9.0
set policy-options policy-statement OIF-v4-all term oif539 then accept
set dynamic-profiles dhcp-vlan-prof interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit" family inet unnumbered-address lo0.0
set dynamic-profiles dhcp-vlan-prof interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit" family inet unnumbered-address preferred-sour
ce-address 100.20.0.2
set dynamic-profiles demux-vlan-prof interfaces demux0 unit "$junos-interface-un it"
vlan-id "$junos-vlan-id"
set dynamic-profiles demux-vlan-prof interfaces demux0 unit "$junos-interface-un it"
demux-options underlying-interface "$junos-interface-ifd-name"
```

```

set dynamic-profiles demux-vlan-prof interfaces demux0 unit "$junos-interface-un it"
  targetted-distribution
set dynamic-profiles demux-vlan-prof interfaces demux0 unit "$junos-interface-un it"
  family inet unnumbered-address lo0.0
set dynamic-profiles demux-vlan-prof interfaces demux0 unit "$junos-interface-un it"
  family inet unnumbered-address preferred-source-address 100.20.0.2
set dynamic-profiles demux-vlan-prof protocols igmp interface "$junos-interface- name"
  version 2
set dynamic-profiles demux-vlan-prof protocols igmp interface "$junos-interface- name"
  promiscuous-mode
set dynamic-profiles demux-vlan-prof protocols igmp interface "$junos-interface- name"
  passive allow-receive
set dynamic-profiles demux-vlan-prof protocols igmp interface "$junos-interface- name"
  passive send-group-query
set dynamic-profiles demux-vlan-prof protocols igmp interface "$junos-interface- name"
  oif-map OIF-v4-all

```

Configure an OIF Map Policy

Step-by-Step Procedure

The following example requires you to navigate various levels in the configuration hierarchy.

To configure the OIF map:

1. Access the router policy options:

```

[edit]
user@host#edit policy-options

```

2. Edit a policy statement.

```

[edit policy-options]
user@host edit policy-statement OIF-v4-all

```

3. Create a term for mapping incoming multicast traffic to a specific interface.

```

[edit policy-options OIF-v4-all]
user@host edit term oif539

```

4. Define the match condition for the term. In this case, the term matches any route prefix of 224/4 or longer (all multicast traffic).

```

[edit policy-options OIF-v4-all term oif539]
user@host set from route-filter 224/4 orlonger

```

5. Define the action for the term. In this case, when a match occurs, the term accepts the traffic and maps it to interface GE-5/3/9.0.

```

[edit policy-options OIF-v4-all term oif539]
user@host set then map-to-interface ge-5/3/9.0
user@host set then accept

```

Results

Confirm your configuration by issuing the **show policy-options** commands. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```

[edit]
user@host# show policy-options

```

```

policy-statement OIF-v4-all {
  term oif539 {
    from {
      route-filter 224.0.0.0/4 orlonger;
    }
    then {
      map-to-interface ge-5/3/9.0;
      accept;
    }
  }
}

```

Configure a DHCP VLAN Dynamic Profile

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy.

To configure a DHCP VLAN dynamic profile for client access:

1. Create a dynamic VLAN demux profile.

```

[edit]
user@host#edit dynamic-profiles dhcp-vlan-prof

```

2. Edit the dynamic profile interface.

```

[edit dynamic-profiles dhcp-vlan-prof]
user@host edit interfaces $junos-ifd-name

```

3. Edit the interface unit dynamic variable.

```

[edit dynamic-profiles demux-vlan-prof interfaces $junos-ifd-name]
user@host edit unit $junos-underlying-interface-unit

```

4. Edit the interface family.

```

[edit dynamic-profiles demux-vlan-prof interfaces $junos-ifd-name unit
 $junos-underlying-interface-unit]
user@host edit family inet

```

5. Define the loopback address.

```

[edit dynamic-profiles demux-vlan-prof interfaces $junos-ifd-name unit
 $junos-underlying-interface-unit ]
user@host set unnumbered-address lo0.0 preferred-source-address 100.20.0.2

```

Results Confirm your configuration by issuing the **show dynamic-profiles** command. If the output for the dhcp-vlan-prof dynamic profile does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```

[edit]
user@host# show dynamic-profiles
dhcp-vlan-prof {
  interfaces {
    "$junos-interface-ifd-name" {
      unit "$junos-underlying-interface-unit" {
        family inet {

```

```

        unnumbered-address lo0.0 preferred-source-address 100.20.0.2;
    }
}
}
}
}

```

Configure a VLAN Demux Dynamic Profile

Step-by-Step Procedure The following example requires you to navigate various levels in the configuration hierarchy.

To configure the OIF map:

1. Create a dynamic VLAN demux profile.

```

[edit]
user@host#edit dynamic-profiles demux-vlan-prof

```

2. Edit the dynamic profile demux0 interface.

```

[edit dynamic-profiles demux-vlan-prof]
user@host edit interfaces demux0

```

3. Edit the interface unit dynamic variable.

```

[edit dynamic-profiles demux-vlan-prof interfaces demux0]
user@host edit unit $junos-interface-unit

```

4. Specify the VLAN ID dynamic variable.

```

[edit dynamic-profiles demux-vlan-prof interfaces demux0 unit
 "$junos-interface-unit"]
user@host set vlan-id $junos-vlan-id

```

5. Access the demux options.

```

[edit dynamic-profiles demux-vlan-prof interfaces demux0 unit
 "$junos-interface-unit"]
user@host edit demux-options

```

6. Define the demux underlying interface.

```

[edit dynamic-profiles demux-vlan-prof interfaces demux0 unit
 "$junos-interface-unit" demux-options]
user@host set underlying-interface $junos-interface-ifd-name

```

7. Specify that dynamically created VLANs are using targeted distribution.

```

[edit dynamic-profiles demux-vlan-prof interfaces demux0 unit
 "$junos-interface-unit"]
user@host set targeted-distribution

```

8. Edit the interface family.

```

[edit dynamic-profiles demux-vlan-prof interfaces demux0 unit
 "$junos-interface-unit"]
user@host edit family inet

```

9. Define the loopback address.

```
[edit dynamic-profiles demux-vlan-prof interfaces demux0 unit
 "$junos-interface-unit" family inet]
user@host set unnumbered-address lo0.0 preferred-source-address 100.20.0.2
```

10. Edit the dynamic profile IGMP protocol.

```
[edit dynamic-profiles demux-vlan-prof]
user@host edit protocols igmp
```

11. Enable IGMP on dynamically created interfaces.

```
[edit dynamic-profiles demux-vlan-prof protocols igmp]
user@host edit interface $junos-interface-name
```

12. Specify the IGMP version that you want dynamically created interfaces to use.

```
[edit dynamic-profiles demux-vlan-prof protocols igmp interface
 $junos-interface-name]
user@host set version 2
```

13. Specify the OIF map that you want dynamically created IGMP interfaces to use.

```
[edit dynamic-profiles demux-vlan-prof protocols igmp interface
 $junos-interface-name]
user@host set oif-map OIF-v4-all
```

14. Specify that IGMP selectively sends and receives control traffic such as IGMP reports, queries, and leaves.

```
[edit dynamic-profiles demux-vlan-prof protocols igmp interface
 $junos-interface-name]
user@host set passive allow-receive send-group-query
```

15. Specify that the interface accepts IGMP reports from hosts on any subnetwork.

```
[edit dynamic-profiles demux-vlan-prof protocols igmp interface
 $junos-interface-name]
user@host set promiscuous-mode
```

Results Confirm your configuration by issuing the **show dynamic-profiles** commands. If the output for the **dhcp-vlan-prof** dynamic profile does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
[edit]
user@host# show dynamic-profiles
demux-vlan-prof {
  interfaces {
    demux0 {
      unit "$junos-interface-unit" {
        vlan-id "$junos-vlan-id";
        demux-options {
          underlying-interface "$junos-interface-ifd-name";
        }
        targetted-distribution;
        family inet {
          unnumbered-address lo0.0 preferred-source-address 100.20.0.2;
```



```

    }
  }
}
protocols {
  igmp {
    interface "$junos-interface-name" {
      version 2;
      promiscuous-mode;
      passive allow-receive send-group-query;
      oif-map OIF-v4-all;
    }
  }
}
}
...

```

Verification

Confirm that the configuration is working properly.

- [Locate the Multicast Group Member on page 157](#)
- [Ensure the Targeting Aggregated Ethernet Interface for the Subscriber is Functional on page 158](#)
- [View the Packets for the Targeted Interface on page 158](#)

Locate the Multicast Group Member

Purpose Locate the dynamic interface and ensure that it is associated with the appropriate IGMP group.

Action user@host>show igmp group

```

Interface: demux0.1073741824, Groups: 1
  Group: 225.0.0.1
    Source: 0.0.0.0
    Last reported by: 100.20.0.10
    Timeout:      52 Type: Dynamic
Interface: local, Groups: 2
  Group: 224.0.0.2
    Source: 0.0.0.0
    Last reported by: Local
    Timeout:      0 Type: Dynamic
  Group: 224.0.0.22
    Source: 0.0.0.0
    Last reported by: Local
    Timeout:      0 Type: Dynamic

```

Meaning The first **Interface** field shows the dynamically created demux interface, **demux0.1073741824**, and the **Group** field immediately below the first **Interface** field shows the group, **225.0.0.1**, to which the subscriber belongs.

Ensure the Targeting Aggregated Ethernet Interface for the Subscriber is Functional

Purpose Use the dynamic subscriber interface value to ensure that the targeting aggregated interface is functional.

Action `user@host>show interfaces demux0.1073741824 extensive`

```
Logical interface demux0.1073741824 (Index 810) (SNMP ifIndex 1613)
(Generation 170)
  Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.1 ] Encapsulation: ENET2
  Demux:
    Underlying interface: ae0 (Index 708)
  Link:
    ge-1/0/0
    ge-5/3/7
  Targeting summary:
    ge-1/0/0, backup, Physical link is Up
    ge-5/3/7, primary, Physical link is Up
  Traffic statistics:
    Input bytes :                862
    Output bytes :               3160
    Input packets:                 3
    Output packets:              30
  Local statistics:
    Input bytes :                862
    Output bytes :               3160
    Input packets:                 3
    Output packets:              30
  Transit statistics:
    Input bytes :                 0          0 bps
    Output bytes :                 0          0 bps
    Input packets:                 0          0 pps
    Output packets:                0          0 pps
  Protocol inet, MTU: 1500, Generation: 212, Route table: 0
  Flags: Sendbcst-pkt-to-re, Unnumbered
  Donor interface: lo0.0 (Index 802)
  Preferred source address: 100.20.0.2
```

Meaning The **Targeting summary** field shows that the primary interface, **ge-5/3/7**, is up.

View the Packets for the Targeted Interface

Purpose Verify that packet traffic sent to targeted interface GE-5/3/9 consists only of multicast packets.

Action user@host>show interfaces ge-5/3/9 extensive

```
Physical interface: ge-5/3/9, Enabled, Physical link is Up
Interface index: 704, SNMP ifIndex: 1605, Generation: 197
Link-level type: Ethernet, MTU: 1514, Speed: 1000mbps, BPDU Error: None,
MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled,
Flow control: Disabled, Auto-negotiation: Enabled, Remote fault: Online
Device flags   : Present Running
Interface flags: SNMP-Traps Internal: 0x4000
Link flags     : None
CoS queues     : 8 supported, 8 maximum usable queues
Schedulers    : 0
Hold-times     : Up 0 ms, Down 0 ms
Current address: 00:21:59:ab:85:2a, Hardware address: 00:21:59:ab:85:2a
Last flapped   : 2012-09-26 17:32:24 EDT (6d 20:44 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes   :          97857650          1320 bps
Output bytes  :              0          0 bps
Input packets:          889615          1 pps
Output packets:              0        889620 pps
IPv6 transit statistics:
Input bytes   :              0
Output bytes  :              0
Input packets:              0
Output packets:              0
Dropped traffic statistics due to STP State:
Input bytes   :              0
Output bytes  :              0
Input packets:              0
Output packets:              0
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0,
L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
FIFO errors: 0, Resource errors: 0
Output errors:
Carrier transitions: 1, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,

FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
Egress queues: 8 supported, 4 in use
Queue counters:      Queued packets  Transmitted packets      Dropped packets

0 best-effort          0              0              0

1 expedited-fo          0              0              0

2 assured-forw          0              0              0

3 network-cont          0              0              0

Queue number:      Mapped forwarding classes
0                  best-effort
1                  expedited-forwarding
2                  assured-forwarding
3                  network-control
Active alarms   : None
Active defects  : None
MAC statistics:
Total octets      Receive      Transmit
Total packets     0          113871616
Unicast packets   0          889620
                  0          0
```

```

Broadcast packets                0                0
Multicast packets              0              889620
CRC/Align errors                 0                0
FIFO errors                      0                0
MAC control frames               0                0
MAC pause frames                 0                0
Oversized frames                 0
Jabber frames                    0
Fragment frames                  0
VLAN tagged frames               0
Code violations                   0
Total errors                     0                0
Filter statistics:
  Input packet count              0
  Input packet rejects            0
  Input DA rejects                0
  Input SA rejects                0
  Output packet count             0                889620
  Output packet pad count         0
  Output packet error count       0
  CAM destination filters: 0, CAM source filters: 0
Autonegotiation information:
  Negotiation status: Complete
  Link partner:
    Link mode: Full-duplex, Flow control: Symmetric, Remote fault: OK
  Local resolution:
    Flow control: None, Remote fault: Link OK
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)
CoS information:
  Direction : Output
  CoS transmit queue             Bandwidth          Buffer Priority  Limit
                                %          bps          %          usec
  0 best-effort                  95          950000000    95          0          low    none
  3 network-control              5           500000000     5           0          low    none
Interface transmit statistics: Disabled

Logical interface ge-5/3/9.0 (Index 818) (SNMP ifIndex 1597) (Generation 149)
Flags: SNMP-Traps 0x4004000 Encapsulation: ENET2
Traffic statistics:
  Input bytes :                0
  Output bytes :              97857650
  Input packets:                0
  Output packets:             889620
Local statistics:
  Input bytes :                0
  Output bytes :                0
  Input packets:                0
  Output packets:                0
Transit statistics:
  Input bytes :                0                0 bps
  Output bytes :              97857650          1320 bps
  Input packets:                0                0 pps
  Output packets:             889615            1 pps
Protocol aenet, AE bundle: ae4.0, Generation: 180, Route table: 0

```

Meaning The MAC statistics **Unicast packet** field shows that the interface is not transmitting any

unicast packet traffic and the **Multicast packet** field shows that the total number of packets being transmitted from the interface are multicast packets.

- Related Documentation**
- [Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 149](#)

Verifying the Distribution of Demux Subscribers in an Aggregated Ethernet Interface

Purpose View the distribution status of subscribers that are targeted to links in an aggregated Ethernet interface.

- Action**
- To display a summary of the distribution of links on the demux interface:
`user@host> show interfaces demux0 extensive`
 - To display the targeted distribution on a specific aggregated Ethernet interface:
`user@host> show interfaces targeting aex`

- Related Documentation**
- [Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 149](#)
 - [Configuring Rebalancing of Demux Subscribers in an Aggregated Ethernet Interface on page 150](#)

Configuring the Distribution Type for PPPoE Subscribers on Aggregated Ethernet Interfaces

By default, the system supports hash-based distribution of subscriber traffic in aggregated Ethernet bundles. You can configure the system to target the egress traffic for a subscriber on a single member link, using a single scheduler resource. The system distributes the subscriber interfaces equally among the member links.

To configure targeted distribution:

1. Edit the chassis hierarchy level.

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

2. Enable chassis network services for **enhanced-ip** mode.

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

3. Access the logical interface.

```
[edit]
user@host#edit interfaces pp0 unit logical-unit-number
```

4. Enable targeted distribution for the interface.

```
[edit interfaces pp0 unit logical-unit-number]
user@host#set targeted-distribution
```

- Related Documentation**
- [CoS for PPPoE Subscriber Interfaces Overview on page 9](#)
 - [Verifying the Distribution of PPPoE Subscribers in an Aggregated Ethernet Interface on page 162](#)

Verifying the Distribution of PPPoE Subscribers in an Aggregated Ethernet Interface

- Purpose** View the distribution status of subscribers that are targeted to links in an aggregated Ethernet interface.
- Action**
- To display a summary of the distribution of links on the demux interface:
`user@host> show interfaces pp0 extensive`
 - To display the targeted distribution on a specific aggregated Ethernet interface:
`user@host> show interfaces targeting aex`
- Related Documentation**
- [CoS for PPPoE Subscriber Interfaces Overview on page 9](#)
 - [Configuring the Distribution Type for PPPoE Subscribers on Aggregated Ethernet Interfaces on page 161](#)

CHAPTER 12

Applying CoS Using Parameters Received from RADIUS

- [Subscriber Interfaces That Provide Initial CoS Parameters Dynamically Obtained from RADIUS on page 163](#)
- [Changing CoS Services Overview on page 167](#)
- [CoS Traffic Shaping Attributes for Dynamic Interface Sets and Member Subscriber Sessions Overview on page 170](#)
- [Guidelines for Configuring CoS Traffic Shaping Attributes for Dynamic Interface Sets and Member Subscriber Sessions on page 172](#)
- [Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 173](#)
- [Configuring User-Defined CoS Variables in a Dynamic Service Profile on page 174](#)
- [Applying CoS Traffic-Shaping Attributes to Dynamic Interface Sets and Member Subscriber Sessions on page 177](#)
- [CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets on page 179](#)
- [Example: Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 185](#)

Subscriber Interfaces That Provide Initial CoS Parameters Dynamically Obtained from RADIUS

You can configure interface-specific CoS parameters that the router obtains when subscribers log in at appropriately configured static or dynamic subscriber interfaces. This feature is supported only for interfaces on Enhanced Queuing Dense Port Concentrators (EQ DPCs) in MX Series 3D Universal Edge Routers.

To configure a dynamic profile to provide initial CoS Services, make sure you understand the following concepts:

- [Dynamic Configuration of Initial CoS in Access Profiles on page 164](#)
- [Predefined Variables for Dynamic Configuration of Initial Traffic Shaping on page 164](#)
- [Predefined Variables for Dynamic Configuration of Initial Scheduling and Queuing on page 165](#)

Dynamic Configuration of Initial CoS in Access Profiles

When a router interface receives a join message from a DHCP subscriber, the Junos OS applies the values configured in the dynamic profile associated with that router interface. A dynamic profile that is activated through its association with a subscriber interface is known as an *access dynamic profile*. You can associate a dynamic profile with a subscriber interface on the router by including statements at the `[edit dynamic-profiles profile-name class-of-service interfaces]` hierarchy level.

The Junos OS supports predefined variables for obtaining a scheduler-map name and traffic-shaping parameters from the RADIUS authentication server and predefined variables for obtaining a scheduler name and scheduler parameters from the RADIUS authentication server. When a client authenticates over a router interface associated with the access dynamic profile, the router replaces the predefined variables with interface-specific values obtained from the RADIUS server.



NOTE: To associate dynamically configured initial CoS features with a subscriber interface, reference *Junos OS predefined variables*—and not *user-defined variables*—in an access dynamic profile for that interface.

Predefined Variables for Dynamic Configuration of Initial Traffic Shaping

You can configure an access dynamic profile that provides initial traffic-shaping parameters when a subscriber logs in. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.

If you define the Juniper Networks authentication and authorization VSA for CoS traffic-shaping parameter values (attribute number 26–108) on the RADIUS authentication server, the RADIUS server includes the values in RADIUS Access-Accept messages it sends to the router when a subscriber successfully authenticates over the interface.

To provide an initial scheduler map name and traffic shaping parameters obtained from the RADIUS authentication server when a subscriber logs in, reference the Junos OS predefined variables for CoS listed in [Table 27 on page 164](#) in an access dynamic profile associated with the subscriber interface.

Table 27: CoS Predefined Variables for Scheduler Map and Traffic Shaping

Variable	Description
\$junos-cos-scheduler-map	Scheduler-map name to be dynamically configured in a traffic-control profile in the access dynamic profile when a subscriber logs in.
<p>NOTE: The scheduler map referenced by the <code>scheduler-map</code> statement can be defined dynamically (at the <code>[edit dynamic-profiles profile-name class-of-service scheduler-maps]</code> hierarchy level) or statically (at the <code>[edit class-of-service scheduler-maps]</code> hierarchy level).</p>	

Table 27: CoS Predefined Variables for Scheduler Map and Traffic Shaping (*continued*)

Variable	Description
\$junos-cos-shaping-rate	Shaping rate to be dynamically configured in a traffic-control profile in the access dynamic profile when a subscriber logs in. You can configure a RADIUS authentication server to include this information in the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
\$junos-cos-guaranteed-rate	Guaranteed rate to be dynamically configured in a traffic-control profile in the access dynamic profile when a subscriber logs in. You can configure a RADIUS authentication server to include this information in the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
\$junos-cos-delay-buffer-rate	Delay-buffer rate to be dynamically configured in a traffic-control profile in the access dynamic profile when a subscriber logs in. You can configure a RADIUS authentication server to include this information in the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.

Predefined Variables for Dynamic Configuration of Initial Scheduling and Queuing

You can configure an access dynamic profile that provides initial traffic-shaping parameters when a subscriber logs in. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.

If you define the Juniper Networks authentication and authorization VSA for CoS scheduling and queuing parameter values (attribute number 26–146) on the RADIUS authentication server, the RADIUS server includes the values in RADIUS Access-Accept messages it sends to the router when a subscriber successfully authenticates over the interface.

To provide an initial scheduler name and scheduler and queuing parameters obtained from the RADIUS authentication server when a subscriber logs in, reference the Junos OS predefined variables listed in [Table 28 on page 165](#) in an access dynamic profile associated with the subscriber interface.

Table 28: CoS Predefined Variables for Scheduling and Queuing

Variable	Description
\$junos-cos-scheduler	Name of a scheduler to be dynamically configured in the access dynamic profile. You can configure a RADIUS authentication server to include this information in the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
\$junos-cos-scheduler-transmit-rate	Transmit rate to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information in the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.

Table 28: CoS Predefined Variables for Scheduling and Queuing (*continued*)

Variable	Description
\$junos-cos-scheduler-bs	Buffer size, as a percentage of total buffer, to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information in the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
\$junos-cos-scheduler-pri	Packet-scheduling priority value to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information in the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
\$junos-cos-scheduler-dropfile-low	<p>Name of the drop profile for RED for loss-priority level low to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information in the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service schedulers scheduler-name drop-profiles] hierarchy level) for loss-priority low.</p>
\$junos-cos-scheduler-dropfile-medium-low	<p>Name of the drop profile for RED for loss-priority level medium-low to be dynamically configured for the scheduler in the access dynamic profile. The Junos OS obtains this information from the RADIUS server when a subscriber authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service schedulers scheduler-name drop-profiles] hierarchy level).</p>
\$junos-cos-scheduler-dropfile-medium-high	<p>Name of the drop profile for RED for loss-priority level medium-high to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information in the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service schedulers scheduler-name drop-profiles] hierarchy level).</p>
\$junos-cos-scheduler-dropfile-high	<p>Name of the drop profile for RED for loss-priority level high to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information in the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.</p> <p>NOTE: The drop profile must be configured statically (at the [edit class-of-service schedulers scheduler-name drop-profiles] hierarchy level).</p>

Table 28: CoS Predefined Variables for Scheduling and Queuing (*continued*)

Variable	Description
\$junos-cos-scheduler-dropfile-any	Name of the drop profile for RED for loss-priority level any to be dynamically configured for the scheduler in the access dynamic profile. You can configure a RADIUS authentication server to include this information in the Accept-Accept message when a subscriber successfully authenticates over the static or dynamic subscriber interface to which the access dynamic profile is attached.
	NOTE: The drop profile must be configured statically (at the [edit class-of-service schedulers scheduler-name drop-profiles] hierarchy level).

Related Documentation

- *Subscriber Activation and Service Management in an Access Network*
- *Dynamic Profiles Overview*
- *Dynamic Variables Overview*
- *Junos OS Predefined Variables*
- [Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 173](#)
- [Example: Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 185](#)

Changing CoS Services Overview

This topic describes how to provide CoS when subscribers dynamically upgrade or downgrade services in an access environment.

You can configure your network with an *access profile* that provides all subscribers with default CoS parameters when they log in. For example, all subscribers can receive a basic data service. By configuring the access profile with Junos OS predefined variables for RADIUS-provided CoS parameters, you also enable the service to be activated for those subscribers at login.

To enable subscribers to activate a service or upgrade to different services through RADIUS change-of-authorization (CoA) messages after login, configure a *service profile* that includes user-defined variables.

Types of CoS Variables Used in a Service Profile

You can configure variables for the following CoS parameters in a service profile:

- Shaping rate
- Delay buffer rate
- Guaranteed rate
- Scheduler map

For each CoS parameter, you must associate a RADIUS vendor ID. For each vendor ID, you must assign an attribute number and a tag. The tag is used to differentiate between

values for different CoS variables when you specify the same attribute number for those variables. These values are matched with the values supplied by RADIUS during subscriber authentication. All of the values in the dynamic profile must be defined in RADIUS or none of the values are passed.

Optionally, you can configure default values for each parameter. Configuring default values is beneficial if you do not configure RADIUS to enable service changes. During service changes, RADIUS takes precedence over the default value that is configured.

Static and Dynamic CoS Configurations

Depending on how you configure CoS parameters in the access and service profiles, certain CoS parameters are replaced or merged when subscribers change or activate new services.

Static configuration is when you configure the scheduler map and schedulers in the static **[edit class-of-service]** hierarchy and reference the scheduler map in the dynamic profile. Dynamic configuration is when you configure the scheduler map and schedulers within the dynamic profile.

The CoS configuration also depends on whether you have enabled multiple subscribers on the same logical interface using the **aggregate-clients** statements in the dynamic profile referenced by DHCP. When you specify the **aggregate-clients replace** statement, the scheduler map names are replaced. In both cases, if the length of the scheduler map name exceeds 128 characters, subscribers cannot log in. When you specify the **aggregate-clients merge** statement, the scheduler map names specified in the dynamic profile are appended.



BEST PRACTICE: To improve CoS performance in IPv4, IPv6, and dual-stack networks, we recommend that you use the **aggregate-clients replace** statement rather than the **aggregate-clients merge** statement.

Scenarios for Static and Dynamic Configuration of CoS Parameters

Table 29 on page 169 lists the scenarios for static and dynamic configuration of CoS parameters in access profiles and service profiles at subscriber login. The table also lists the behavior for each configuration for service activation and service modification using RADIUS CoA messages.

Table 29: CoS Services and Variables

Scenario	Static CoS Configuration (Single Subscriber)	Dynamic CoS Configuration (Single Subscriber)	Dynamic CoS Configuration (Multiple Subscribers Enabled on a Logical Interface with the aggregate-clients merge Statement)	Dynamic CoS Configuration (Multiple Subscribers Enabled on a Logical Interface with the aggregate-clients replace Statement)
Subscriber login	<ul style="list-style-type: none"> Configure RADIUS values or default values for all parameters in access profile Configure scheduler map in edit class-of-service hierarchy and reference in access profile 	<ul style="list-style-type: none"> Configure RADIUS values or default values for all parameters in access profile Configure scheduler map and schedulers in access profile 	<ul style="list-style-type: none"> Configure RADIUS values or default values for all parameters in access profile Configure scheduler map and schedulers in access profile 	<ul style="list-style-type: none"> Configure RADIUS values or default values for all parameters in access profile Configure scheduler map and schedulers in access profile
RADIUS CoA for service or variable change	Replaces the following parameters: <ul style="list-style-type: none"> Delay buffer rate Guaranteed rate Scheduler map Shaping rate 	Replaces the following parameters: <ul style="list-style-type: none"> Delay buffer rate Guaranteed rate Shaping rate Scheduler map 	Combines the values of the following parameters to their maximum scalar value: <ul style="list-style-type: none"> Delay buffer rate Guaranteed rate Shaping rate Appends the scheduler map parameter	Replaces the following parameters: <ul style="list-style-type: none"> Delay buffer rate Guaranteed rate Shaping rate Scheduler map
RADIUS CoA for service activation	Does not merge queues NOTE: In this case, use a similar configuration to the access profile, including the same name for the traffic-control-profile. During service activation, this configuration replaces the original configuration in the access profile.	Merge queues if the queue specified in the service profile is not already in use for the subscriber NOTE: Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.	Merge queues if the queue specified in the service profile is not already in use for the subscriber NOTE: Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.	Merge queues if the queue specified in the service profile is not already in use for the subscriber NOTE: Do not instantiate a CoA request using a service dynamic profile that is already in use on the same logical interface.

Related Documentation

- [Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 33](#)
- [Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 34](#)
- [Dynamic Profile Attachment to DHCP Subscriber Interfaces Overview](#)

- [RADIUS Attributes and Juniper Networks VSAs Supported by the AAA Service Framework](#)
- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)

CoS Traffic Shaping Attributes for Dynamic Interface Sets and Member Subscriber Sessions Overview

To control bandwidth at a household level in a subscriber access network, you can apply RADIUS dynamic class of service (CoS) traffic-shaping attributes to a dynamic interface set and its member subscriber sessions when the subscriber sessions are authenticated. (The dynamic interface set itself does not go through the authentication process.)

A *household* is represented by either a dynamic interface set or a dynamic agent-circuit-identifier (ACI) interface set from which the subscriber sessions originate. For this feature, dynamic interface sets and dynamic ACI interface sets are mapped to Level 2 of the Junos OS CoS scheduler hierarchy, which enables you to use CoS traffic-shaping to shape the bandwidth at the household (interface set) level.

The *subscriber sessions*, also referred to as *subscriber interfaces* or *client sessions*, can be dynamic VLAN, PPPoE, or IP demultiplexing (IP demux) subscriber interfaces. The subscriber interfaces are mapped to Level 3 of the Junos OS CoS scheduler hierarchy.

- [Supported Network Configurations on page 170](#)
- [Traffic-Control Profiles in Subscriber Interface Dynamic Profiles on page 170](#)
- [CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets and Member Subscriber Sessions on page 171](#)

Supported Network Configurations

Applying RADIUS dynamic CoS traffic-shaping attributes to a dynamic interface set and its member subscriber sessions is supported for the following network configurations:

- Dynamic IP demux subscriber interfaces (for DHCP subscribers) over either a dynamic interface set or a dynamic ACI interface set
- Dynamic PPPoE subscriber interfaces over either a dynamic interface set or a dynamic ACI interface set

Traffic-Control Profiles in Subscriber Interface Dynamic Profiles

To apply dynamic CoS traffic-shaping attributes to a dynamic interface set and its member subscriber sessions, you must define and attach the traffic-control profiles for *both* the dynamic interface set and the dynamic subscriber sessions within the dynamic profile for the subscriber interface.

At the `[edit dynamic-profiles profile-name class-of-service traffic-control-profiles]` hierarchy level in the dynamic profile, configure both of the following:

- Traffic-control profile for the dynamic VLAN, PPPoE, or IP demux subscriber interfaces

- Traffic-control profile for the dynamic interface set or dynamic ACI interface set to which the subscriber interfaces belong

RADIUS tag values for the Junos OS CoS traffic shaping predefined variables used in both traffic-control profiles must be in the 100s range, as described in [“CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets” on page 179](#).

At the **[edit dynamic-profiles *profile-name* interfaces]** hierarchy level in the dynamic profile, use the **output-traffic-control-profile** statement to apply the traffic-control profiles to the dynamic subscriber interface and the dynamic interface set or dynamic ACI interface set.

CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets and Member Subscriber Sessions

The set of **\$junos-cos-parameter** predefined dynamic variables has been duplicated and assigned a RADIUS tag value in the 100s range for use with this feature. The RADIUS tag value is the only difference between the existing CoS traffic-shaping predefined dynamic variables and the predefined dynamic variables that you must use with this feature.

Both RADIUS instances of the **\$junos-cos-parameter** predefined dynamic variables are available, but you must use the dynamic variables with tag values in the 100s range to apply CoS traffic-shaping attributes to both the dynamic interface set and member subscriber sessions in a subscriber interface dynamic profile.

For example, the existing **\$junos-cos-shaping-rate** predefined variable is assigned RADIUS vendor ID 4874, attribute number 108, and tag value 2. To apply CoS traffic-shaping attributes to the dynamic interface set and its member subscriber sessions, you must instead use the **\$junos-cos-shaping-rate** predefined variable that is assigned RADIUS vendor ID 4874, attribute number 108, and tag value 102.



NOTE: Do not configure a combination of **\$junos-cos-parameter** predefined dynamic variables with RADIUS tag values in the 100s range and **\$junos-cos-parameter** predefined dynamic variables with tag values not in the 100s range in the same traffic-control profile. If you do so, the subscriber authentication process fails.

Related Documentation

- [Guidelines for Configuring CoS Traffic Shaping Attributes for Dynamic Interface Sets and Member Subscriber Sessions on page 172](#)
- [Applying CoS Traffic-Shaping Attributes to Dynamic Interface Sets and Member Subscriber Sessions on page 177](#)
- [CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets on page 179](#)

Guidelines for Configuring CoS Traffic Shaping Attributes for Dynamic Interface Sets and Member Subscriber Sessions

Observe the following guidelines when you apply dynamic CoS traffic-shaping attributes to a dynamic interface set or a dynamic ACI interface set and its member subscriber sessions. For complete information about the Junos OS CoS traffic-shaping predefined dynamic variables and RADIUS tag values used with this feature, see [“CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets” on page 179](#).

- This feature is supported only for dynamically configured and instantiated subscriber interfaces.
- Do not configure a combination of **\$junos-cos-parameter** predefined dynamic variables with RADIUS tag values in the 100s range and **\$junos-cos-parameter** predefined dynamic variables with tag values not in the 100s range in the same traffic-control profile. If you do so, the subscriber authentication process fails.
- Use the **\$junos-cos-adjust-minimum** predefined variable (tag 109) only in traffic-control profiles for dynamic subscriber interfaces. Using this variable in a traffic-control profile for a dynamic interface set or dynamic ACI interface set has no effect.
- Do not configure the **\$junos-cos-excess-rate-high** predefined variable (tag 110) when the **\$junos-cos-excess-rate** predefined variable (tag 105) is configured, and vice-versa.
- Do not configure the **\$junos-cos-excess-rate-low** predefined variable (tag 111) when the **\$junos-cos-excess-rate** predefined variable (tag 105) is configured, and vice-versa.
- Do not configure the **\$junos-cos-byte-adjust-frame** predefined variable (tag 114) when the **\$junos-cos-byte-adjust** predefined variable (tag 108) is configured, and vice-versa.
- Do not configure the **\$junos-cos-byte-adjust-cell** predefined variable (tag 115) when the **\$junos-cos-byte-adjust** predefined variable (tag 108) is configured, and vice-versa.
- Use the per-priority **\$junos-cos-shaping-rate-parameter** predefined variables (tags 116 through 125) only in traffic-control profiles for dynamic interface sets or dynamic ACI interface sets. Using these variables in traffic-control profiles for a dynamic logical subscriber interface causes the subscriber session to fail.

Related Documentation

- [Applying CoS Traffic-Shaping Attributes to Dynamic Interface Sets and Member Subscriber Sessions on page 177](#)
- [CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets on page 179](#)
- [CoS Traffic Shaping Attributes for Dynamic Interface Sets and Member Subscriber Sessions Overview on page 170](#)

Configuring Initial CoS Parameters Dynamically Obtained from RADIUS

You can configure a subscriber interface so that subscribers receive initial CoS parameters that the router obtains from the RADIUS authentication server when subscribers log in using that logical interface on the router.

1. Configure external RADIUS server VSAs with values that you expect subscribers to log in with.
 - To configure a RADIUS authentication server to include CoS traffic-shaping parameters in authentication grants on certain subscriber interfaces, configure Juniper Networks VSA 26–108.
 - To configure a RADIUS authentication server to include CoS scheduling and queuing parameters in authentication grants a certain subscriber interfaces, configure Juniper Networks VSA 28–146.

See *Configuring Router or Switch Interaction with RADIUS Servers* and *Configuring RADIUS Server Parameters for Subscriber Access*.

2. Configure a subscriber interface that supports hierarchical CoS.
 - For static VLAN interfaces, see *Configuring Static Subscriber Interfaces in Dynamic Profiles*.
 - For static VLAN interfaces over aggregated Ethernet, see *Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet*.
 - For static IP demux interface sets, see *Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles*.
 - For dynamic IP demux interface sets, see *Configuring a Subscriber Interface Using a Set of Static IP Demux Interfaces*.
3. Associate a traffic-control profile with the interface.

See [“Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile” on page 223](#).
4. Configuring initial traffic-shaping parameters to be obtained from RADIUS.

See [“Configuring Dynamic Traffic Shaping and Scheduling Parameters in a Dynamic Profile” on page 12](#).
5. Configure forwarding classes and scheduler maps statically.

See *Configuring Forwarding Classes* and *Configuring Scheduler Maps*.
6. Configure a scheduler to specify initial scheduling and queuing parameters to be dynamically obtained from RADIUS when a subscriber logs in.

See [“Configuring Dynamic Schedulers with Variables in a Dynamic Profile” on page 15](#).

Related Documentation

- [Subscriber Interfaces That Provide Initial CoS Parameters Dynamically Obtained from RADIUS on page 163](#)

- [Example: Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 185](#)
- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- *Subscriber Activation and Service Management in an Access Network*
- *Juniper Networks VSAs Supported by the AAA Service Framework*
- *Dynamic Profiles Overview*
- *Dynamic Variables Overview*
- *Junos OS Predefined Variables*

Configuring User-Defined CoS Variables in a Dynamic Service Profile

You can configure user-defined variables in the dynamic service profile for traffic scheduling and shaping parameters.

You can use variables in a dynamic service profile in two ways:

- To enable subscribers to upgrade or downgrade services after login using a RADIUS change of authorization (CoA), configure user-defined variables for CoS parameters as RADIUS attributes.
- To provide subscribers with default values for CoS parameters, configure user-defined variables for CoS parameters with static default values. If you have configured values to be supplied by a RADIUS CoA, subscribers can receive the previously configured default value when deactivating a service.

You activate the variables by referencing them in the traffic-control profile configured in the dynamic service profile.

To configure user-defined variables for CoS in a dynamic profile:

1. Specify that you want to configure variables in the dynamic profile.

[edit [dynamic-profiles](#) residential-silver variables]

2. Do one of the following to configure variables for the shaping rate:

- Enable RADIUS to modify the shaping rate based on service changes.

- a. Configure the attribute:

[edit [dynamic-profiles](#) residential-silver variables]

user@host# set srate radius vendor-id 4874 attribute 108

- b. Configure the tag:

[edit [dynamic-profiles](#) residential-silver variables]

user@host# set srate radius vendor-id 4874 tag 2



NOTE: You can configure user-defined values for RADIUS tags that are different than the values that are required in access profiles with predefined variables. For example, in a dynamic service profile, you can assign the shaping rate with a tag of 1 rather than 2, which is required for the `$junos-shaping-rate` variable. When you configure user-defined values, the VSA that is sent from RADIUS must share the same definition.

- Configure a default value for the shaping rate.

```
[edit dynamic-profiles residential-silver variables]
user@host# set srate default-value 10m
```

3. Do one of the following to configure variables for the guaranteed rate:

- Enable RADIUS to modify the guaranteed rate based on service changes.
 - a. Configure the attribute.

```
[edit dynamic-profiles residential-silver variables]
user@host# set grate radius vendor-id 4874 attribute 108
```

- b. Configure the tag.

```
[edit dynamic-profiles residential-silver variables]
user@host# set grate radius vendor-id 4874 tag 3
```

- Configure a default value for the guaranteed rate.

```
[edit dynamic-profiles residential-silver variables]
user@host# set grate default-value 5m
```

4. Do one of the following to configure variables for the delay buffer rate:

- Enable RADIUS to modify the delay buffer rate based on service changes.
 - a. Configure the attribute.

```
[edit dynamic-profiles residential-silver variables]
user@host# set dbrate radius vendor-id 4874 attribute 108
```

- b. Configure the tag.

```
[edit dynamic-profiles residential-silver variables]
user@host# set dbrate radius vendor-id 4874 tag 4
```

- Configure a default value for the delay buffer rate.

```
[edit dynamic-profiles residential-silver variables]
user@host# set dbrate default-value 10m
```

5. Do one of the following to configure variables for the scheduler map:

- Enable RADIUS to modify the scheduler map based on service changes.
 - a. Configure the attribute.

```
[edit dynamic-profiles residential-silver variables]
user@host# set smap radius vendor-id 4874 attribute 108
```

- b. Configure the tag.

```
[edit dynamic-profiles residential-silver variables]
user@host# set smap radius vendor-id 4874 tag 1
```

- Configure a default value for the scheduler map.

```
[edit dynamic-profiles residential-silver variables]
user@host# set smap default-value triple-play
```

6. Configure the variables for the CoS parameters in the traffic-control profile.

Either the shaping rate or the guaranteed rate is required in the traffic-control profile.

- a. Specify that you want to configure CoS parameters in the dynamic profile.

```
user@host# edit dynamic-profiles residential-silver class-of-service
traffic-control-profiles tcp1
```

- b. Configure the scheduler map variable.

```
[edit dynamic-profiles residential-silver class-of-service traffic-control-profiles
tcp1]
user@host# set scheduler-map "$smap"
```

- c. Configure the shaping rate variable.

```
[edit dynamic-profiles residential-silver class-of-service traffic-control-profiles
tcp1]
user@host# set shaping-rate "$srate"
```

- d. Configure the guaranteed rate variable.

```
[edit dynamic-profiles residential-silver class-of-service traffic-control-profiles
tcp1]
user@host# set guaranteed-rate "$grate"
```

- e. Configure the delay buffer rate variable.

```
[edit dynamic-profiles residential-silver class-of-service traffic-control-profiles
tcp1]
user@host# set delay-buffer-rate "$dbrate"
```

**Related
Documentation**

- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [Changing CoS Services Overview on page 167](#)

Applying CoS Traffic-Shaping Attributes to Dynamic Interface Sets and Member Subscriber Sessions

To control bandwidth at a household level in a subscriber access network, you can apply RADIUS dynamic class of service (CoS) traffic-shaping attributes to a dynamic interface set or agent-circuit-identifier (ACI) interface set and its member subscriber sessions when the member sessions are authenticated. The dynamic interface set or ACI interface set represents the *household* from which the subscriber sessions originate. The *subscriber sessions*, also referred to as *client sessions* or *subscriber interfaces*, can be dynamic VLAN, PPPoE, or IP demultiplexing (IP demux, for DHCP) subscriber interfaces.

To apply RADIUS dynamic CoS traffic-shaping attributes to both the dynamic interface set and its member subscriber sessions, you must configure two traffic-control profiles in the dynamic profile for the subscriber interface: one traffic-control profile for the “parent” dynamic interface set, and a second traffic-control profile for the dynamic subscriber interfaces. RADIUS tag values for the Junos OS CoS traffic shaping predefined variables used in both traffic-control profiles must be in the 100s range.

Before you begin:

- Create a dynamic profile that defines the VLAN, PPPoE, or IP demux logical subscriber interface.

See the following topics:

- [Configuring a Basic Dynamic Profile](#)
- [Configuring VLAN Dynamic Profiles](#)
- [Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles](#)
- [Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles](#)

To apply dynamic CoS traffic-shaping attributes to a dynamic ACI or non-ACI interface set and its member subscriber sessions in a dynamic profile for the subscriber interface:

1. Configure two traffic-control profiles at the **[edit dynamic-profiles *profile-name* class-of-service traffic-control profiles]** hierarchy level:
 - Traffic-control profile for the VLAN, PPPoE, or IP demux dynamic subscriber interfaces
 - Traffic-control profile for the dynamic interface set or dynamic ACI interface set to which the subscriber interfaces belong
2. In the traffic-control profiles configured for the dynamic interface set and the subscriber interfaces, reference Junos OS CoS traffic-shaping predefined variables with RADIUS tag values in the 100s range.

See [“CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets”](#) on page 179 for a complete list of the Junos OS predefined variables and RADIUS tag values that

you must use in the traffic-control profiles for the dynamic subscriber interfaces and the dynamic interface set.

3. At the **[edit dynamic-profiles *profile-name* interfaces]** hierarchy level, use the **output-traffic-control-profile** statement to apply the traffic-control profiles to the dynamic subscriber interface and the dynamic interface set or dynamic ACI interface set.

Example: Dynamic PPPoE Subscriber Interface over Dynamic ACI Interface Set

The following example shows a dynamic profile named `pppoe-subscriber` that configures a dynamic PPPoE (**pp0**) subscriber interface over a dynamic ACI interface set.

The **traffic-control-profiles** stanza defines two traffic-control profiles: `tcp-pppoe-session` for the dynamic PPPoE subscriber interface, and `tcp-parent-aci-set` for the dynamic “parent” ACI interface set. The **\$junos-cos-shaping-rate** predefined variable included in each of these traffic-control profiles is assigned RADIUS vendor ID 4874, attribute number 108, and tag value 102. The **\$junos-cos-shaping-mode** variable is assigned RADIUS vendor ID 4874, attribute number 108, and tag value 107.

The **interfaces** stanza applies output traffic-control profile `tcp-pppoe-session` to the dynamic PPPoE (**pp0**) subscriber interface, and output traffic-control profile `tcp-parent-aci-set` to the dynamic ACI interface set.

```
[edit dynamic-profiles]
pppoe-subscriber {
  interfaces {
    interface-set "$junos-interface-set-name" {
      interface pp0 {
        unit "$junos-interface-unit";
      }
    }
    pp0 {
      unit "$junos-interface-unit" {
        ppp-options {
          pap;
        }
        pppoe-options {
          underlying-interface "$junos-underlying-interface";
          server;
        }
        no-keepalives;
        family inet {
          unnumbered-address lo0.0;
        }
      }
    }
  }
}
class-of-service {
  traffic-control-profiles {
    tcp-pppoe-session {
```

```

    scheduler-map smap-1;
    shaping-rate $junos-cos-shaping-rate;
    overhead-accounting $junos-cos-shaping-mode frame-mode-bytes -4
    cell-mode-bytes 12;
  }
  tcp-parent-aci-set {
    shaping-rate $junos-cos-shaping-rate;
    overhead-accounting $junos-cos-shaping-mode frame-mode-bytes -4
    cell-mode-bytes 12;
  }
}
interfaces {
  pp0 {
    unit "$junos-interface-unit" {
      output-traffic-control-profile tcp-pppoe-session;
    }
  }
  interface-set $junos-interface-set-name {
    output-traffic-control-profile tcp-parent-aci-set;
  }
}
}
}
}

```

Related Documentation

- [CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets on page 179](#)
- [CoS Traffic Shaping Attributes for Dynamic Interface Sets and Member Subscriber Sessions Overview on page 170](#)
- [Guidelines for Configuring CoS Traffic Shaping Attributes for Dynamic Interface Sets and Member Subscriber Sessions on page 172](#)

CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets

To control bandwidth at a household level in a subscriber access network, you can apply RADIUS CoS traffic-shaping attributes to a dynamic interface set and its member subscriber sessions when the member sessions are authenticated. The dynamic interface set, which represents the household level in a subscriber access network, can be either a dynamic agent-circuit-identifier (ACI) interface set or a non-ACI-based dynamic interface set. The subscriber sessions belonging to the interface set can be dynamic VLAN, DHCP, or PPPoE subscriber interfaces.

To apply RADIUS CoS traffic-shaping attributes to both the dynamic interface set and its member subscriber sessions, you must configure two traffic-control profiles in the dynamic profile for the subscriber interface: one traffic-control profile for the "parent" dynamic interface set, and a second traffic-control profile for the dynamic subscriber interfaces. RADIUS tag values for the Junos OS CoS traffic-shaping predefined variables used in these traffic-control-profiles must be in the 100s range, as described in [Table 30 on page 180](#).

To accommodate this feature, the set of existing **\$junos-cos-parameter** predefined dynamic variables for traffic shaping have been duplicated and assigned a tag value in

the 100s range, as listed in [Table 30 on page 180](#). The tag value is the only difference between the existing predefined dynamic variables and the predefined dynamic variables that you must use with this feature.

For example, the existing **\$junos-cos-shaping-rate** predefined variable is assigned RADIUS vendor ID 4874, attribute number 108, and tag value 2. To apply RADIUS CoS traffic-shaping attributes to the dynamic interface set and its member subscriber sessions, you must instead use the **\$junos-cos-shaping-rate** predefined variable that is assigned RADIUS vendor ID 4874, attribute number 108, and tag value 102.

[Table 30 on page 180](#) describes the Junos OS predefined dynamic variables and RADIUS tag values that you can use in a dynamic profile to apply RADIUS CoS traffic-shaping attributes to the dynamic interface set and its member subscriber sessions. The table lists the predefined dynamic variables in ascending order by tag value.



NOTE: All of the predefined variables listed in [Table 30 on page 180](#) use RADIUS vendor ID 4874 and RADIUS attribute value 108.

Table 30: Junos OS CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets

Predefined Variable	RADIUS Tag Value	Description
\$junos-cos-scheduler-map	101	Scheduler-map name configured in a traffic-control profile in a dynamic profile.
\$junos-cos-shaping-rate	102	Shaping rate configured in a traffic-control profile in a dynamic profile. Represents the maximum bandwidth of a CoS scheduler node.
\$junos-cos-guaranteed-rate	103	Guaranteed rate configured in a traffic-control profile in a dynamic profile. Represents the minimum bandwidth of a CoS scheduler node.
\$junos-cos-delay-buffer-rate	104	Delay-buffer rate configured in a traffic-control profile in a dynamic profile.

Table 30: Junos OS CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets (*continued*)

Predefined Variable	RADIUS Tag Value	Description
\$junos-cos-excess-rate	105	<p>Excess rate configured in a traffic-control profile in a dynamic profile; scheduler weighting when operating in the excess region between the guaranteed rate and the shaping rate.</p> <p>NOTE: Do not configure the \$junos-cos-excess-rate variable when either the \$junos-cos-excess-rate-high variable or the \$junos-cos-excess-rate-low variable is configured.</p>
\$junos-cos-traffic-control-profile	106	Traffic-control profile configured in a dynamic profile for subscriber access.
\$junos-cos-shaping-mode	107	Overhead-accounting mode configured in a traffic-control profile in a dynamic profile to shape downstream ATM traffic based on either frames (frame-mode) or cells (cell-mode).
\$junos-cos-byte-adjust	108	<p>Byte adjustment value for the cell or frame shaping mode configured in a traffic-control profile in a dynamic profile.</p> <p>NOTE: Do not configure the \$junos-cos-byte-adjust variable when either the \$junos-cos-byte-adjust-frame variable or the \$junos-cos-byte-adjust-cell variable is configured.</p>
\$junos-cos-adjust-minimum	109	Minimum adjusted shaping rate configured in a traffic-control profile for a dynamic subscriber interface. Specifying this variable in a traffic-control profile for a dynamic interface set has no effect.

Table 30: Junos OS CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets (*continued*)

Predefined Variable	RADIUS Tag Value	Description
\$junos-cos-excess-rate-high	110	Shaping rate configured for excess high-priority traffic in a traffic-control profile in a dynamic profile. NOTE: Do not configure the \$junos-cos-excess-rate-high variable when the \$junos-cos-excess-rate variable is configured.
\$junos-cos-excess-rate-low	111	Shaping rate configured for excess low-priority traffic in a traffic-control profile in a dynamic profile. NOTE: Do not configure the \$junos-cos-excess-rate-low variable when the \$junos-cos-excess-rate variable is configured.
\$junos-cos-shaping-rate-burst	112	Burst size for the shaping rate configured in a traffic-control profile in a dynamic profile.
\$junos-cos-guaranteed-rate-burst	113	Burst size for the guaranteed rate configured in a traffic-control profile in a dynamic profile.
\$junos-cos-byte-adjust-frame	114	Overhead bytes when downstream ATM traffic is in frame-mode. NOTE: Do not configure the \$junos-cos-byte-adjust-frame variable when the \$junos-cos-byte-adjust variable is configured.
\$junos-cos-byte-adjust-cell	115	Overhead bytes when downstream ATM traffic is in cell-mode. NOTE: Do not configure the \$junos-cos-byte-adjust-cell variable when the \$junos-cos-byte-adjust variable is configured.

Table 30: Junos OS CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets *(continued)*

Predefined Variable	RADIUS Tag Value	Description
\$junos-cos-shaping-rate-priority-high	116	Shaping rate configured for high-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-priority-high-burst	117	Shaping rate burst size configured for high-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-priority-medium	118	Shaping rate configured for medium-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-priority-medium-burst	119	Shaping rate burst size configured for medium-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-priority-low	120	Shaping rate configured for low-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.

Table 30: Junos OS CoS Traffic Shaping Predefined Variables for Dynamic Interface Sets *(continued)*

Predefined Variable	RADIUS Tag Value	Description
\$junos-cos-shaping-rate-priority-low-burst	121	Shaping rate burst size configured for low-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-excess-high	122	Shaping rate configured for excess high-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-excess-high-burst	123	Shaping rate burst size configured for excess high-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-excess-low	124	Shaping rate configured for excess low-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.
\$junos-cos-shaping-rate-excess-low-burst	125	Shaping rate burst size configured for excess low-priority traffic in a traffic-control profile for a dynamic interface set or dynamic ACI interface set at a household level. Specifying this variable in a traffic-control profile for a dynamic subscriber interface is prohibited.

Related Documentation

- [Applying CoS Traffic-Shaping Attributes to Dynamic Interface Sets and Member Subscriber Sessions on page 177](#)
- [CoS Traffic Shaping Attributes for Dynamic Interface Sets and Member Subscriber Sessions Overview on page 170](#)

- [Guidelines for Configuring CoS Traffic Shaping Attributes for Dynamic Interface Sets and Member Subscriber Sessions on page 172](#)
- *Junos OS Predefined Variables*

Example: Configuring Initial CoS Parameters Dynamically Obtained from RADIUS

The following configuration is an example of a client dynamic profile in which initial CoS parameters are dynamically obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is applied.

For this example, assume that the RADIUS authentication server has been configured with traffic-shaping parameters (at Juniper Networks VSA 26-108) and CoS scheduling and queuing parameters (at Juniper Networks VSA 26-146).

The subscriber interface is a single-unit static gigabit Ethernet VLAN interface on an EQ DPC port:

```
[edit]
interfaces {
  ge-9/0/3 {
    hierarchical-scheduler;
    vlan-tagging;
    unit 100 {
      vlan-id 100;
      family inet {
        address 192.168.32.2/24;
      }
    }
  }
}
```

The client dynamic profile **residential_silver** attaches the traffic-control profile **tcp_1** to the subscriber interface that is defined in the dynamic profile using the **\$junos-interface-ifd-name** predefined variable.

```
[edit]
dynamic-profiles {
  residential_silver {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet;
        }
      }
    }
    class-of-service {
      interfaces {
        "$junos-interface-ifd-name" {
          unit "$junos-underlying-interface-unit" {
            output-traffic-control-profile tcp_1;
          }
        }
      }
    }
  }
}
```

```

    }
  }
}

```

The traffic-control profile **tcp_1**, references Junos OS predefined variables to obtain a scheduler-map name and traffic-shaping parameter values from RADIUS when a subscriber logs in. For this example, assume that the RADIUS server replaces the Junos OS predefined variable **\$junos-cos-scheduler-map** scheduler-map name **business_smap_1**. The scheduler map **business_smap_1** is configured in the client dynamic profile:

```

[edit]
dynamic-profiles {
  residential_silver {
    class-of-service {
      traffic-control-profiles {
        tcp_1 {
          scheduler-map "$junos-cos-scheduler-map"; # 'business_smap_1'
          shaping-rate "$junos-cos-shaping-rate";
          guaranteed-rate "$junos-cos-guaranteed-rate";
          delay-buffer-rate "$junos-cos-delay-buffer-rate";
        }
      }
    }
    scheduler-maps {
      business_smap_1 {
        forwarding-class best-effort scheduler be_sched;
        forwarding-class ef scheduler home_sched
      }
    }
  }
}

```

A scheduler definition references Junos OS predefined variables to obtain scheduler configurations from RADIUS when a subscriber logs in. For this example, assume that the RADIUS server provides scheduler configurations for schedulers named **be_sched** and **home_sched**, which are included in the scheduler map **business_smap_1**:

```

[edit]
dynamic-profiles {
  residential_silver {
    class-of-service {
      schedulers {
        "$junos-cos-scheduler" { # 'be_sched' and 'home_sched'
          transmit-rate "$junos-cos-scheduler-tx";
          buffer-size "$junos-cos-scheduler-bs";
          priority "$junos-cos-scheduler-pri";
          drop-profile-map loss-priority low protocol any drop-profile
            "$junos-cos-scheduler-dropfile-low";
          drop-profile-map loss-priority medium-low protocol any drop-profile
            "$junos-cos-scheduler-dropfile-medium-low";
          drop-profile-map loss-priority medium-high protocol any drop-profile
            "$junos-cos-scheduler-dropfile-medium-high";
          drop-profile-map loss-priority high protocol any drop-profile
            "$junos-cos-scheduler-dropfile-high";
        }
      }
    }
  }
}

```

```

    }
}

```

Static configurations for CoS consist of configurations for the forwarding classes used in the scheduler map **business_smap_1** and configurations for drop-profile names provided by RADIUS for as part of the scheduler configurations provided (for **be_sched** and **home_sched**) when a subscriber logs in:

```

[edit]
  class-of-service {
    forwarding-classes {
      queue 0 best-effort;
      queue 1 ef;
    }
    drop-profiles {
      ...configurations_for_drop_profile_names_provided_by_RADIUS...
    }
  }
}

```

Related Documentation

- *Subscriber Activation and Service Management in an Access Network*
- *Dynamic Profiles Overview*
- *Dynamic Variables Overview*
- *Junos OS Predefined Variables*
- [Subscriber Interfaces That Provide Initial CoS Parameters Dynamically Obtained from RADIUS on page 163](#)
- [Configuring Initial CoS Parameters Dynamically Obtained from RADIUS on page 173](#)

Modifying a Subscriber's Shaping Characteristics After a Subscriber is Instantiated

- [CoS Adjustment Control Profiles Overview on page 189](#)
- [Configuring CoS Adjustment Control Profiles on page 191](#)
- [Verifying the CoS Adjustment Control Profile Configuration on page 191](#)

CoS Adjustment Control Profiles Overview

CoS adjustment control profiles control which applications and algorithms can modify a subscriber's shaping characteristics after a subscriber is instantiated. Subscriber shaping characteristics are configured using the Junos OS CLI or by RADIUS messages. Adjustment control profiles enable subscriber shaping characteristics by to be adjusted by other applications like ANCP, PPPoE tags, and RADIUS Change of Authorization (CoA) after a subscriber is instantiated. Adjustment control profiles are router-wide and apply to both static and dynamic interfaces.

[Table 31 on page 189](#) describes the applications and their associated default algorithms that can be configured to perform rate adjustments after the subscriber is instantiated.

Table 31: Adjustment Control Profile Applications and Algorithms

Application	Default Priority	Default Algorithm	Description
RADIUS-CoA	1	Adjust-always	RADIUS CoA messages can update the subscriber's attributes (like shaping rate) after the subscriber is authenticated and QoS parameters (like shaping rate) are assigned.
ANCP	1	Adjust-always	The ANCP application can modify the existing shaping rate for both static and dynamic logical interfaces, and static interface sets. By default, ANCP can override all other applications. The shaping rate must be specified in order to override it.

Table 31: Adjustment Control Profile Applications and Algorithms (*continued*)

Application	Default Priority	Default Algorithm	Description
PPPoE-Tags	2	Adjust-less	The PPPoE IA tag access-rate-downstream can modify the Junos OS CLI configured shaping-rate value, as well as the RADIUS shaping-rate value. By default, these values can be modified by subsequent RADIUS CoA messages and ANCP actions. These values are conveyed in PPPoE (PADI) discovery packets.



NOTE: The lower the priority value, the higher the priority.

Applications and Associated Algorithms in Adjustment Control Profiles

You must enable each application to perform rate adjustments. Rate adjustments are global and affect all static and dynamically instantiated subscribers. The following rules apply to adjustment control profiles:

- If no adjustment control profile is configured, the default adjustment control profile is used.
- You can configure a maximum of one adjustment control profile; a commit error occurs if you configure more than one adjustment control profile.
- If an application is not configured with an adjustment control profile, Junos OS uses its default values for priority and algorithm. For example, if ANCP is not configured in the adjustment control profile, the ANCP application is set to a priority of 1 and the algorithm is set to adjust-always.
- Adjustment control profiles apply to both static and dynamic interfaces.
- You can configure the algorithm to the following values:
 - Adjust-never
 - Adjust-always
 - Adjust less
 - Adjust less than or equal
 - Adjust greater
 - Adjust greater than or equal
- When you modify an adjustment control profile, the changes take effect immediately and the modified profile is used for all further adjustments. However, existing adjustments are not reevaluated when you modify the adjustment control profile.

For example, if you have an ANCP adjustment that overrides a PPPoE adjustment on interface ge-1/1/0.100, and then you use the adjustment control profile to change the priority so that the ANCP priority is now lower than the PPPoE priority, Junos OS does not go back and reevaluate the adjustment on ge-1/1/0.100.

- Related Documentation**
- [Configuring CoS Adjustment Control Profiles on page 191](#)
 - [Verifying the CoS Adjustment Control Profile Configuration on page 191](#)
 - [adjustment-control-profiles on page 491](#)

Configuring CoS Adjustment Control Profiles

To configure adjustment control profiles:



NOTE: You can only configure one adjustment control profile.

1. Configure the adjustment control profile name.

```
[edit]
user@host# edit class-of-service adjustment-control-profiles profile-name
```

2. (Optional) Configure the adjustment controls for the Access Node Control Protocol (ANCP) application:

```
[edit class-of-service adjustment-control-profiles profile-name ]
user@host# set application ancp priority priority algorithm algorithm
```

3. (Optional) Configure the adjustment controls for the RADIUS CoA application:

```
[edit class-of-service adjustment-control-profiles profile-name ]
user@host# set application radius-coa priority priority algorithm algorithm
```

4. (Optional) Configure the adjustment controls for the PPPoE tags:

```
[edit class-of-service adjustment-control-profiles profile-name ]
user@host# set application pppoe-tags priority priority algorithm algorithm
```

5. (Optional) Verify your configuration.

```
user@host> show class-of-service adjustment-control-profiles
name: ANCP, priority: 1, algorithm: less;
name: RADIUS CoA, priority: 1, algorithm: always;
name: PPPoE IA tags, priority: 2, algorithm: less;
```

- Related Documentation**
- [CoS Adjustment Control Profiles Overview on page 189](#)
 - [Verifying the CoS Adjustment Control Profile Configuration on page 191](#)
 - [adjustment-control-profiles on page 491](#)
 - [overhead-accounting \(Dynamic Traffic Shaping\) on page 614](#)

Verifying the CoS Adjustment Control Profile Configuration

Purpose View the class-of-service (CoS) adjustment control profile.

Action • To display the CoS adjustment control profile:

```
user@host> show class-of-service adjustment-control-profile profile-name
```

```
user@host> show class-of-service adjustment-control-profile acp1
name: ANCP, priority: 1, algorithm: less
name: RADIUS CoA, priority: 1, algorithm: always
name: PPPoE IA tags, priority: 2, algorithm: less

user@host>
```

**Related
Documentation**

- [CoS Adjustment Control Profiles Overview on page 189](#)
- [Configuring CoS Adjustment Control Profiles on page 191](#)
- [adjustment-control-profiles on page 491](#)
- [application \(Adjustment Control Profiles\) on page 496](#)

Configuring Dynamic CoS for L2TP

- [CoS for L2TP LAC Subscriber Interfaces Overview on page 193](#)
- [CoS for L2TP LNS Inline Services Overview on page 195](#)
- [Configuring Dynamic CoS for an L2TP LAC Tunnel on page 196](#)
- [Configuring Dynamic CoS for an L2TP LNS Inline Service on page 198](#)

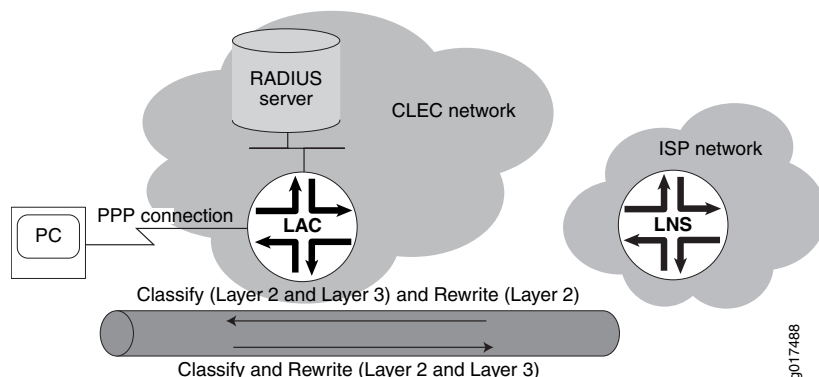
CoS for L2TP LAC Subscriber Interfaces Overview

You can apply CoS to the Layer 2 Tunnel Protocol (L2TP) access concentrator (LAC) component.

In Layer 2 Tunnel Protocol (L2TP) configurations, IP and L2TP headers are added to packets arriving at a PPP subscriber interface on the L2TP access concentrator (LAC) before being tunneled to the L2TP network server (LNS). You can manage the IP header by configuring classifiers and rewrite-rules that transfer the ToS (Type of Service) value or the 802.1p value from the *inner* IP header to the *outer* IP header of the L2TP packet.

[Figure 21 on page 193](#) shows the classifier and rewrite rules that you can configure from the LAC to the LNS, and from the LNS to the LAC.

Figure 21: CoS Configuration for L2TP LAC Topology



- [Traffic from LAC to LNS on page 194](#)
- [LAC Tunnels: Traffic from LNS to LAC on page 194](#)

Traffic from LAC to LNS

To set the ToS value or the 802.1p value on the inner IP header, you can configure both fixed and behavior aggregate (BA) classifiers for subscribers at Layer 2 or Layer 3 of the network.

[Table 32 on page 194](#) lists the configuration options for applying classifiers to a subscriber interface on an ingress LAC tunnel.

Table 32: Ingress LAC Tunnel Classifier Options

Classifier	Subscriber Interface
Fixed	Either of the following: <ul style="list-style-type: none"> • PPP interface • Underlying VLAN interface
Layer 2	Either of the following: <ul style="list-style-type: none"> • PPP interface • Underlying VLAN interface
Layer 3	Family of PPP interfaces

You cannot configure a Layer 2 and fixed classifier together.

The behavior of the Layer 2 and Layer 3 classifiers depends on the configuration. For example, a Layer 3 classifier for a family of PPP interfaces overrides a Layer 2 classifier configured at the PPP interface, except for the unknown packets and control packets.

If you do not configure a classifier for Layer 2, the system applies the default Layer 3 classifier so that tunneled and terminated subscribers have the same behavior. To prevent unknown packets and control packets from being discarded, the system assigns them to the best-effort forwarding class.

For egress tunnels, you configure rewrite rules at the PPP interface to set the ToS or 802.1p value of the outer IP header. Rewrite rules are applied accordingly to the forwarding class, packet loss priority (PLP), and code point.

LAC Tunnels: Traffic from LNS to LAC

On a LAC, mapping the inner IP header to the outer IP header of the L2TP packet depends on the classifier and rewrite-rule configurations. For example, [Table 33 on page 195](#) lists the values for the classifier and rewrite rules for a VLAN interface. For assured forwarding, the inner 802.1p value (**ob001**) is classified with the assured-forwarding class and low loss priority at the ingress interface. Based on the assured-forwarding class and low loss priority in the rewrite rule, the ToS value in the outer IP header is set to **ob001**.

Table 33: Sample Result for the Classifier and Rewrite Rules for a VLAN Interface

Inner .Ip Value	Forwarding Class	Loss Priority	Code Point	Outer ToS Value
ob000	best-effort	low	000	ob000
ob001	assured-forwarding	low	001	ob001
ob101	expedited-forwarding	low	101	ob101
ob111	network-control	low	11	ob111

Related Documentation

- [Configuring Dynamic CoS for an L2TP LAC Tunnel on page 196](#)

CoS for L2TP LNS Inline Services Overview

You can apply hierarchical scheduling and per-session shaping to Layer 2 Tunnel Protocol (L2TP) network server (LNS) inline services using a static or dynamic CoS configuration.

This feature is supported on MIC and MPC interfaces on MX240, MX480, and MX960 routers.

- [Guidelines for Applying CoS to the LNS on page 195](#)
- [Hardware Requirements for Inline Services on the LNS on page 196](#)

Guidelines for Applying CoS to the LNS

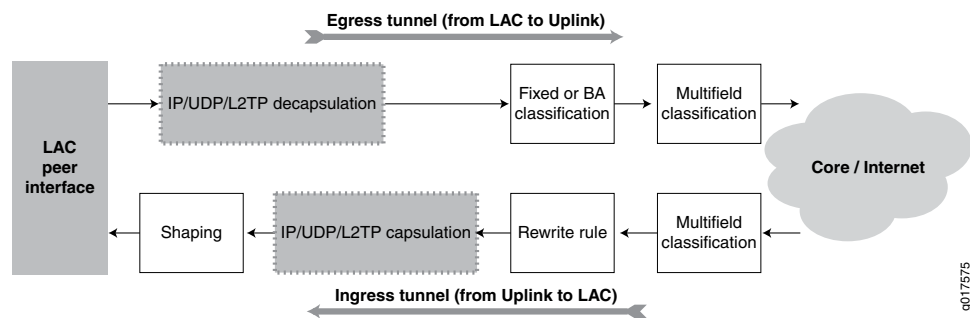
In L2TP configurations, IP, UDP, and L2TP headers are added to packets arriving at a PPP subscriber interface on the L2TP access concentrator (LAC) before being tunneled to the LNS.

When a service interface is configured for an L2TP LNS session, it has an *inner* IP header and an outer IP header. You can configure CoS for an LNS session that corresponds to the inner IP header only. The *outer* IP header is used for L2TP tunnel processing only.

However, we recommend that you configure classifiers and rewrite-rules to transfer the ToS (type of service) value from the inner IP header to the outer IP header of the L2TP packet.

[Figure 22 on page 196](#) shows the classifier and rewrite rules that you can configure on an LNS inline service.

Figure 22: Processing of CoS Parameters in an L2TP LNS Inline Service



By default, the shaping calculation on the service interface includes the L2TP encapsulation. If necessary, you can configure additional adjustments for downstream ATM traffic from the LAC or differences in Layer 2 protocols.

Hardware Requirements for Inline Services on the LNS

Hierarchical scheduling for L2TP LNS inline services is supported on MIC and MPC interfaces only. The services that you can configure depend on the hardware combination. [Table 34 on page 196](#) lists the supported inline services and peer interfaces for each MIC and MPC combination.

Table 34: Hardware Requirements for L2TP LNS Inline Services

MPC Module	Inline Service Support—With Per-Session Shaping	Inline Service Support—Without Per-Session Shaping
MX-MPC1-3D	No	Yes
MX-MPC2-3D		
MX-MPC1-3D-Q	Yes	Yes
MX-MPC2-3D-Q		
MX-MPC2-3D-EQ		
MX80		
MPC-3D-16XGE-SFPP	No	No

- Related Documentation**
- [Configuring Static CoS for an L2TP LNS Inline Service](#)
 - [Configuring Dynamic CoS for an L2TP LNS Inline Service on page 198](#)

Configuring Dynamic CoS for an L2TP LAC Tunnel

In L2TP configurations, IP and L2TP headers are added to packets arriving at a PPP subscriber interface on the LAC before being tunneled to the L2TP network server (LNS).

Classifiers and rewrite rules enable you to properly transfer the ToS (Type of Service) value or the 802.1p value from the inner IP header to the outer IP header of the L2TP packet.

Before you begin, configure the L2TP LAC. See *Configuring an L2TP LAC*.

To manage the IP header values for a LAC tunnel:

1. Configure the classifier for the inner tunnel.
 - a. Define the fixed or behavior aggregate (BA) classifier.
 - To configure a fixed classifier:


```
[edit class-of-service interfaces interface-name unit logical-unit-number]
user@host# set forwarding-class class-name
```
 - To configure a BA classifier:


```
[edit class-of-service]
user@host# set classifiers (ieee-802.1 | inet-precedence) classifier-name
forwarding-class class-name loss-priority level code-points [ aliases ] [
bit-patterns]
```
 - b. Apply the classifier to the Layer 2 interface or Layer 3 interface. For Layer 2, you can apply the classifier at the PPP interface or an underlying VLAN interface. For Layer 3, you can apply classifiers to a family of PPP interfaces.
 - To apply the classifier for the IEEE 802.1p value:


```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name
unit logical-unit-number classifiers]
user@host# set ieee-802.1 (classifier-name | default) vlan-tag (inner | outer)
```
 - To apply the classifier for the ToS value:


```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name
unit logical-unit-number classifiers]
user@host# set inet-precedence (classifier-name | default)
```
2. Configure the rewrite rule for the egress tunnel.
 - a. Configure the rewrite rule with the forwarding class and the loss priority value.


```
[edit class-of-service]
user@host# set rewrite-rules (ieee-802.1 | inet-precedence) rewrite-name
forwarding-class class-name loss-priority level code-point (alias | bits)
```
 - b. Apply the rewrite rule to the PPP interface for which the L2TP tunnel is configured.
 - To apply the rewrite-rule for the IEEE 802.1p value:


```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name
unit logical-unit-number rewrite-rules]
user@host# set ieee-802.1 (rewrite-name | default) vlan-tag (outer |
outer-and-inner)
```
 - To apply the rewrite rule for the ToS value:


```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name
unit logical-unit-number rewrite-rules]
```

```
user@host# set inet-precedence (rewrite-name | default)
```

- Related Documentation**
- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
 - [CoS for L2TP LAC Subscriber Interfaces Overview on page 193](#)

Configuring Dynamic CoS for an L2TP LNS Inline Service

You can configure hierarchical scheduling for an L2TP LNS inline service and manage the IP header values using rewrite rules and classifiers.

Before you begin, configure the L2TP LNS inline service interface. See *Configuring an L2TP LNS with Inline Service Interfaces*.

To configure CoS for an L2TP LNS inline service in a dynamic profile:

1. Configure the hierarchical scheduler for the service interface (si) interface.

```
[edit interfaces si-fpc/port/pic ]
```

```
user@host# set hierarchical-scheduler maximum-hierarchy-levels 2
```



BEST PRACTICE: To enable Level 3 nodes in the LNS scheduler hierarchy and to provide better scaling, we recommend that you also specify a maximum of two hierarchy levels.

2. Configure the LNS to reflect the IP ToS value in the inner IP header to the outer IP header.

```
[edit services l2tp tunnel-group name]
```

```
user@host# set tos-reflect
```

3. Configure the classifier for egress traffic from the LAC.

- a. Define the fixed or behavior aggregate (BA) classifier.

- To configure a fixed classifier:

```
[edit class-of-service interfaces interface-name unit logical-unit-number]
```

```
user@host# set forwarding-class class-name
```

- To configure a BA classifier:

```
[edit class-of-service]
```

```
user@host# set classifiers (dscp | dscp-ipv6 | inet-precedence) classifier-name
forwarding-class class-name loss-priority level code-points [ aliases ] [
bit-patterns]
```

- b. Apply the classifier to the service interface.

- To apply the classifier for the DSCP or DSCP IPv6 value:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name
unit logical-unit-number classifiers]
```

```
user@host# set dscp (classifier-name | default)
```

```
user@host# set dscp-ipv6 (classifier-name | default)
```

- To apply the classifier for the ToS value:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name
  unit logical-unit-number classifiers]
user@host# set inet-precedence (classifier-name | default)
```

4. Configure and apply a rewrite-rule to ingress traffic to the LAC:

- Configure the rewrite rule with the forwarding class and the loss priority value.

```
[edit class-of-service]
user@host# set rewrite-rules (dscp | dscp-ipv6 | inet-precedence) rewrite-name
  forwarding-class class-name loss-priority level code-point (alias | bits)
```

- Apply the rewrite rule to the service interface.

- To apply the rewrite rule for the DSCP or DSCP IPv6 value:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name
  unit logical-unit-number rewrite-rules]
user@host# set dscp (rewrite-name | default)
user@host# set dscp-ipv6 (rewrite-name | default)
```

- To apply the rewrite rule for the ToS value:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name
  unit logical-unit-number rewrite-rules]
user@host# set inet-precedence (rewrite-name | default)
```

5. (Optional) Configure additional adjustments for downstream ATM traffic.

By default, the shaping calculation on the service interface includes the L2TP encapsulation. If necessary, you can configure additional adjustments for downstream ATM traffic from the LAC or differences in Layer 2 protocols.

```
[edit dynamic-profiles profile-name class-of-service traffic-control-profiles profile-name]
user@host# set overhead-accounting (frame-mode | cell-mode |
  $junos-cos-shaping-mode) <bytes (byte-value | $junos-cos-byte-adjust)
```

6. Apply the traffic-control profile.

```
[edit dynamic-profiles profile-name class-of-service interfaces
  $junos-interface-ifd-name unit $junos-interface-unit]
user@host# set output-traffic-control-profile profile-name
```

**Related
Documentation**

- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [CoS for L2TP LNS Inline Services Overview on page 195](#)
- [Example: Configuring an L2TP LNS](#)
- [Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 121](#)

Applying CoS to Groups of Subscriber Interfaces

- [CoS for Interface Sets of Subscribers Overview on page 201](#)
- [Configuring an Interface Set of Subscribers in a Dynamic Profile on page 204](#)
- [Example: Configuring a Dynamic Interface Set of VLAN Subscribers on page 205](#)
- [Example: Configuring a Dynamic Service VLAN Interface Set of Subscribers in a Dynamic Profile on page 217](#)

CoS for Interface Sets of Subscribers Overview

Interface sets enable service providers to group logical interfaces so they can apply CoS parameters to all of the traffic in the group.

Interface sets are beneficial for various scenarios in a subscriber access network. For example, you can use an interface set to configure a local loop with a small number of subscribers. Interface sets are also useful for grouping a large number of subscribers into a particular service class or for defining traffic engineering aggregates for DSLAMs.

- [Guidelines for Configuring Dynamic Interface Sets in a Subscriber Access Network on page 202](#)

Guidelines for Configuring Dynamic Interface Sets in a Subscriber Access Network

Interface sets enable service providers to group logical interfaces so they can apply CoS parameters to all of the traffic in the group.

Interface sets are beneficial for various scenarios in a subscriber access network. For example, you can use an interface set to configure a local loop with a small number of subscribers. Interface sets are also useful for grouping a large number of subscribers into a particular service class or for defining traffic engineering aggregates for DSLAMs.

When configuring interface sets for subscriber access, keep the following guidelines in mind:

- You can configure interface sets of VLAN demux, PPPoE, or demux interfaces over aggregated Ethernet interfaces.
- An interface can only belong to one interface set. If you try to add the same interface to different interface sets, the commit operation fails.
- You configure the interface set and the traffic scheduling and shaping parameters in a dynamic profile. However, you must apply the traffic-control profile to the interface set in the static **[edit class-of-service]** hierarchy.



NOTE: This rule applies to all interface sets except ACI sets.

- The **\$junos-interface-set-name** predefined variable is available only for RADIUS Accept messages; change of authorization (CoA) requests are not supported.
- The **\$junos-svlan-interface-set-name** predefined variable locally generates an interface set name for use by dual-tagged VLAN interfaces based on the outer tag of the dual-tagged VLAN. The format of the generated variable is ***physical_interface_name - outer_VLAN_tag***. For example, an aggregated Ethernet interface “ae0,” with a dual-tagged VLAN interface that has an outer tag of “111,” results in a **\$junos-svlan-interface-set-name** dynamic variable of “ae0-111”. Similarly, a non-aggregated Ethernet interface of ge-1/1/0, with the same dual-tagged VLAN interface that has an outer tag of “111,” results in a **\$junos-svlan-interface-set-name** dynamic variable of “ge-1/1/0-111”.
- The **\$junos-tagged-vlan-interface-set-name** predefined variable locally generates an interface set name used for grouping logical interfaces stacked over logical stacked VLAN demux interfaces for either a 1:1 (dual-tagged; individual client) VLAN or N:1 (single tagged; service) VLAN. The format of the generated variable differs with VLAN type as follows:
 - Dual-tagged (client) VLAN—***physical_interface_name - outer_VLAN_tag - inner_VLAN_tag***. For example, an aggregated Ethernet interface “ae0,” with a dual-tagged VLAN interface that has an outer tag of “111” and an inner tag of “200,” results in a **\$junos-tagged-vlan-interface-set-name** dynamic variable of “ae0-200-111”. Similarly, a non-aggregated Ethernet interface of ge-1/1/0, with the same dual-tagged

VLAN interface that has an outer tag of “111” and an inner tag of “200,” results in a `$junos-tagged-vlan-interface-set-name` dynamic variable of “ge-1/1/0-200-111”.

- Single tagged (service) VLAN—*physical_interface_name - VLAN_tag*. For example, an aggregated Ethernet interface “ae0,” with an N:1 VLAN using the single tag of “200,” results in a `$junos-tagged-vlan-interface-set-name` dynamic variable of “ae0-200”. Similarly, a non-aggregated Ethernet interface of ge-1/1/0, with the same N:1 VLAN using the single tag of “200,” results in a `$junos-tagged-vlan-interface-set-name` dynamic variable of “ge-1/1/0-200”.
- All dynamic demux, dual-tagged VLAN logical interfaces with the same outer VLAN tag and physical interface are assigned to the same interface set and all CoS values provisioned with the dynamic profile are applied to the interfaces that are part of the set.
- The interface set name must be explicitly referenced in the CoS configuration as part of the static configuration outside of the dynamic profile. The CoS configuration is static and the interface set name must be statically referenced.



NOTE: This rule applies to all interface sets except ACI sets.

- RADIUS can return an *access-accept* message under certain conditions. A configured RADIUS VSA for the interface set name takes precedence over the locally generated variable on the router. This means that if the interface-set-name VSA is configured on RADIUS, the router continues to use this variable instead of the locally generated value from the dynamic variable.
- Sets of aggregated Ethernet interfaces are supported on MPC/MIC interfaces on MX Series routers only.
- The supported interface stacks for aggregated Ethernet in an interface set include VLAN demux interfaces, IP demux interfaces, and PPPoE logical interfaces over VLAN demux interfaces.
- The link membership list and scheduler mode of the interface set are inherited from the underlying aggregated Ethernet interface over which the interface set is configured.
- When an aggregated Ethernet interface operates in link protection mode, or if the scheduler mode is configured to replicate member links, the scheduling parameters of the interface set are copied to each of the member links.
- If the scheduler mode of the aggregated Ethernet interface is set to scale member links, the scheduling parameters are scaled based on the number of active member links and applied to each of the aggregated interface member links.

Related Documentation

- [Configuring an Interface Set of Subscribers in a Dynamic Profile on page 204](#)
- [Example: Configuring a Dynamic Service VLAN Interface Set of Subscribers in a Dynamic Profile on page 217](#)

Configuring an Interface Set of Subscribers in a Dynamic Profile

Interface sets enable you to provide hierarchical scheduling to a group of subscriber interfaces.

Before you begin, configure the subscriber interfaces that you intend to include in the interface set.

- For static VLAN interfaces, see *Configuring Static Subscriber Interfaces in Dynamic Profiles*.
- For dynamic VLAN interfaces, see *Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet*.
- For dynamic IP demux interfaces, see *Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles* and *Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet*.
- For dynamic VLAN demux interfaces, see *Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles*.
- For dynamic PPPoE interfaces, see *Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles*.
- For aggregated Ethernet interfaces, see [“Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links” on page 36](#)

To configure an interface set of subscriber interfaces:

1. Configure the interface set in the dynamic profile.

```
[edit dynamic-profiles profile-name interfaces]
user@host# edit interface-set interface-set-name
```

Replacing the *interface-set-name* variable with the `$junos-interface-set-name`, `$junos-svlan-interface-set-name`, or `$junos-tagged-vlan-interface-set-name` predefined variable. The interface set is created dynamically when the subscriber logs in.

2. Include the interfaces within the dynamic interface-set.

```
[edit dynamic-profiles profile-name interfaces interface-set $junos-interface-set-name]
user@host# set interface interface-name unit logical-unit-number
```

3. Apply traffic shaping and queuing parameters to the interface set.



TIP: You must configure the interface set in the static [edit class-of-service] hierarchy, not in the [edit dynamic-profiles] hierarchy.

```
[edit class-of-service interfaces]
user@host# edit interface-set interface-set-name
[edit class-of-service interfaces interface-set interface-set-name]
user@host# set output-traffic-control-profile profile-name
```


Related Documentation

- [CoS for Interface Sets of Subscribers Overview on page 201](#)
- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [CoS for Interface Sets of Subscribers Overview on page 201](#)
- [Example: Configuring a Dynamic Interface Set of VLAN Subscribers on page 205](#)
- [CoS for Aggregated Ethernet Subscriber Interfaces Overview on page 8](#)

Example: Configuring a Dynamic Interface Set of VLAN Subscribers

- [Requirements on page 205](#)
- [Overview on page 205](#)
- [Configuring the Dynamic VLANs on page 205](#)
- [Configuring Dynamic Traffic Scheduling and Shaping on page 207](#)
- [Configuring the Interface Set in the Dynamic Profile on page 210](#)
- [Configuring DHCP Access on page 211](#)
- [Configuring RADIUS Authentication on page 213](#)
- [Verification on page 217](#)

Requirements

This example uses the following software and hardware components:

- MX Series Router with MPCs

Overview

In this example, the network administrator groups dynamic VLAN interfaces in an interface set. The interface set is configured in a dynamic profile, and enables hierarchical scheduling for the VLAN interfaces for a multiplay service.

DHCP is used as the access method, and RADIUS is used as the authentication method for the interfaces associated with the interface set.

Configuring the Dynamic VLANs

CLI Quick Configuration

To quickly configure the dynamic VLANs, copy the following commands and paste them into the router terminal window:

```
[edit]
edit dynamic-profiles vlan-prof
edit interfaces $junos-interface-ifd-name unit $junos-interface-unit
set vlan-id $junos-vlan-id
set demux-source inet
set family inet unnumbered-address lo0.0 preferred-source-address 100.20.32.2
top
edit interfaces ge-1/0/0
set hierarchical-scheduler
set vlan-tagging
```

```
edit auto-configure vlan-ranges dynamic-profile vlan-prof
set ranges any
set accept inet
top
set interfaces lo0 unit 0 family inet address 100.20.32.2/32
```

Configuring the Dynamic Profile for the Autoconfigured VLANs

Step-by-Step Procedure In this section, you create a dynamic profile for the VLAN IDs to be automatically assigned when subscribers log in.

To configure the dynamic profile for the VLANs:

1. Configure the dynamic profile.

```
[edit]
user@host#edit dynamic-profile vlan-prof
```
2. Configure the interfaces.

```
[edit dynamic-profiles vlan-prof]
user@host#edit interfaces $junos-interface-ifd-name unit $junos-interface-unit
```
3. Add the VLAN ID variable.

```
[edit dynamic-profiles vlan-prof interfaces $junos-interface-ifd-name unit
$junos-interface-unit]
user@host#set vlan-id $junos-vlan-id
```
4. Configure the demux source as IPv4.

```
[edit dynamic-profiles vlan-prof interfaces $junos-interface-ifd-name unit
$junos-interface-unit]
user@host#set demux-source inet
```
5. Configure the family.

```
[edit dynamic-profiles vlan-prof interfaces $junos-interface-ifd-name unit
$junos-interface-unit]
user@host#set family inet unnumbered-address lo0.0 preferred-source-address
100.20.32.2
```

Configuring the VLAN Interfaces

Step-by-Step Procedure To configure the VLAN interfaces:

1. Create the VLAN interface.

```
[edit]
user@host# edit interfaces ge-1/0/0
```
2. Enable hierarchical scheduling.

```
[edit interfaces ge-1/0/0]
user@host# set hierarchical-scheduler
```
3. Configure VLAN tagging.

```
[edit interfaces ge-1/0/0]
user@host# set vlan-tagging
```

4. Configure auto-configuration for the dynamic profile.

```
[edit interfaces ge-1/0/0]
user@host# edit auto-configure vlan-ranges dynamic-profile vlan-prof
```
5. Configure any VLAN ID range.

```
[edit interfaces ge-1/0/0 auto-configure vlan-ranges dynamic-profile vlan-prof]
user@host# set ranges any
```
6. Specify IPv4 traffic for the VLAN.

```
[edit interfaces ge-1/0/0 auto-configure vlan-ranges dynamic-profile vlan-prof]
user@host# set accept inet
```

Configuring the Loopback Interface

Step-by-Step Procedure

To configure the loopback interface:

1. Create the loopback interface.

```
[edit]
user@host# edit interfaces lo0
```
2. Configure the unit and the family.

```
[edit interfaces lo0]
user@host# set unit 0 family inet address 100.20.32.2/32
```

Configuring Dynamic Traffic Scheduling and Shaping

CLI Quick Configuration

To quickly configure the traffic scheduling and shaping parameters, copy the following commands and paste them into the router terminal window:

```
[edit]
edit dynamic-profiles multiplay class-of-service schedulers be_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up
edit ef_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up
edit af_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up
edit nc_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up
edit voice_sch
set transmit-rate percent 12
set buffer-size percent 12
```

```
set priority low
up
edit video_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up
edit game_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up
edit data_sch
set transmit-rate percent 12
set buffer-size percent 12
set priority low
up 2
edit scheduler-maps all_smap
set forwarding-class be scheduler be_sch
set forwarding-class ef scheduler ef_sch
set forwarding-class af scheduler af_sch
set forwarding-class nc scheduler nc_sch
set forwarding-class voice scheduler voice_sch
set forwarding-class video scheduler video_sch
set forwarding-class game scheduler game_sch
set forwarding-class data scheduler data_sch
up 2
edit traffic-control-profiles multiplay
set scheduler-map all_smap
set shaping-rate 100m
set guaranteed-rate 20m
```

Configuring the Schedulers in the Dynamic Profile

Step-by-Step Procedure In this section, you create a dynamic profile for the multiplay service and configure scheduling and shaping.

To configure the schedulers:

1. Create the **multiplay** dynamic profile.

```
[edit]
user@host# edit dynamic-profiles multiplay class-of-service schedulers
```

2. Configure the best effort scheduler.

```
[edit dynamic-profiles multiplay class-of-service schedulers]
user@host# edit be_sch
user@host# set transmit-rate percent 12
user@host# set buffer-size percent 12
user@host# set priority low
```

3. Configure the expedited forwarding scheduler.

```
[edit dynamic-profiles multiplay class-of-service schedulers]
user@host# edit ef_sch
user@host# set transmit-rate percent 12
```

```
user@host# set buffer-size percent 12
user@host# set priority low
```

4. Configure the assured forwarding scheduler.

```
[edit dynamic-profiles multiplay class-of-service schedulers]
user@host# edit af_sch
user@host# set transmit-rate percent 12
user@host# set buffer-size percent 12
user@host# set priority low
```

5. Configure the network control scheduler.

```
[edit dynamic-profiles multiplay class-of-service schedulers]
user@host# edit nc_sch
user@host# set transmit-rate percent 12
user@host# set buffer-size percent 12
user@host# set priority low
```

6. Configure the voice scheduler.

```
[edit dynamic-profiles multiplay class-of-service schedulers]
user@host# edit voice_sch
user@host# set transmit-rate percent 12
user@host# set buffer-size percent 12
user@host# set priority low
```

7. Configure the video scheduler.

```
[edit dynamic-profiles multiplay class-of-service schedulers]
user@host# edit video_sch
user@host# set transmit-rate percent 12
user@host# set buffer-size percent 12
user@host# set priority low
```

8. Configure the gaming scheduler.

```
[edit dynamic-profiles multiplay class-of-service schedulers]
user@host# edit game_sch
user@host# set transmit-rate percent 12
user@host# set buffer-size percent 12
user@host# set priority low
```

9. Configure the data scheduler.

```
[edit dynamic-profiles multiplay class-of-service schedulers]
user@host# edit data_sch
user@host# set transmit-rate percent 12
user@host# set buffer-size percent 12
user@host# set priority low
```

Configuring the Scheduler Map in the Dynamic Profile

Step-by-Step Procedure

To configure the scheduler map:

1. Configure the scheduler map for all of the services.

```
[edit dynamic-profiles multiplay class-of-service]
user@host# edit scheduler-maps all_smap
```

2. Configure the forwarding classes for each service in the scheduler map.

```
[edit dynamic-profiles multiplay class-of-service scheduler-maps all_smap]
user@host# set forwarding-class be scheduler be_sch
user@host# set forwarding-class ef scheduler ef_sch
user@host# set forwarding-class af scheduler af_sch
user@host# set forwarding-class nc scheduler nc_sch
user@host# set forwarding-class voice scheduler voice_sch
user@host# set forwarding-class video scheduler video_sch
user@host# set forwarding-class game scheduler game_sch
user@host# set forwarding-class data scheduler data_sch
```

Configuring the Traffic-Control Profile in the Dynamic Profile

Step-by-Step Procedure

To configure the traffic-control profile the interface set:

1. Configure the traffic-control profile.

```
[edit dynamic-profiles multiplay class-of-service]
user@host# edit traffic control-profiles multiplay
```

2. Configure the scheduler map.

```
[edit dynamic-profiles multiplay class-of-service traffic control-profiles multiplay]
user@host# set scheduler-map all_smap
```

3. Configure the shaping rate.

```
[edit dynamic-profiles multiplay class-of-service traffic control-profiles multiplay]
user@host# set shaping-rate 100m
```

4. Configure the guaranteed rate.

```
[edit dynamic-profiles multiplay class-of-service traffic control-profiles multiplay]
user@host# set guaranteed-rate 20m
```

Configuring the Interface Set in the Dynamic Profile

CLI Quick Configuration

To quickly configure the interface set, copy the following commands and paste them into the router terminal window:

```
[edit]
edit dynamic-profiles multiplay
edit interfaces interface-set $junos-interface-set-name
set interface $junos-interface-ifd-name unit $junos-underlying-interface-unit
top
edit class-of-service interfaces interface-set
set output-traffic-control-profile multiplay
```

Configuring the Interfaces for the Interface Set

Step-by-Step Procedure

To configure the interface variable for the interface set:

1. Configure the dynamic profile for the interface set.

```
[edit]
user@host#edit dynamic-profiles multiplay
```

2. Configure the interface using the Junos OS predefined variable.


```
[edit dynamic-profiles multiplay]
user@host#edit interfaces $junos-interface-ifd-name unit
$junos-underlying-interface-unit
```
3. Configure the family.


```
[edit dynamic-profiles multiplay interfaces $junos-interface-set-name unit
$junos-underlying-interface-unit]
user@host#set family inet unnumbered-address lo0.0 preferred-source-address
100.20.32.2
```

Configuring the Interface Set

Step-by-Step Procedure

To configure the interface set:

1. Configure the interface set using the Junos OS predefined variable.


```
[edit dynamic-profiles multiplay]
user@host#edit interfaces interface-set $junos-interface-set-name
```
2. Add the dynamic VLAN interfaces to the interface set.


```
[edit dynamic-profiles multiplay interfaces $junos-interface-set-name]
user@host#set interface $junos-interface-ifd-name unit
$junos-underlying-interface-unit
```

Applying the Traffic-Control Profile to the Interface Set

Step-by-Step Procedure

You apply the traffic-control profile outside of the dynamic profile in the `[edit class-of-service]` hierarchy.

To apply the traffic-control profile:

1. Specify the interface set to which you want to apply the traffic-control profile.


```
[edit class-of-service]
user@host#edit interfaces interface-set dynamic-set
```
2. Attach the output traffic-control profile defined in the dynamic profile to the interface set.


```
[edit class-of-service interfaces]
user@host#set output-traffic-control-profile multiplay
```

Configuring DHCP Access

CLI Quick Configuration

To quickly configure DHCP access, copy the following commands and paste them into the router terminal window:

```
[edit]
edit system services dhcp-local-server authentication
set password multiplay
set username-include user-prefix multiplay
up 1
set dynamic-profile dhcp-vlan-prof aggregate-clients replace
```

```
set group vlans interface ge-1/0/0
top
edit access address-assignment pool v4 family inet
set network 100.20.0.0/16
set range limited low 100.20.0.10
set range limited high 100.20.128.250
set dhcp-attributes maximum-lease-time 84600
```

Configuring the DHCP Local Server

Step-by-Step Procedure

To configure DHCP access:

1. Configure the DHCP local server.

```
[edit system]
user@host# edit services dhcp-local-server authentication
```
2. Set the password.

```
[edit system services dhcp-local-server authentication]
user@host# set password multiplay
```
3. Specify that you want to include optional information in the username.

```
[edit system services dhcp-local-server authentication]
user@host# set username-include user-prefix multiplay
```
4. Attach the dynamic profile with the interface set.

```
[edit system services dhcp-local-server]
user@host# set dynamic-profile dhcp-vlan-prof aggregate-clients replace
```
5. Configure a group for the VLAN interface.

```
[edit system services dhcp-local-server]
user@host# set group vlans interface ge-1/0/0
```

Configuring Address Assignment Pools

Step-by-Step Procedure

To configure address assignment pools:

1. Configure the pool of IPv4 addresses.

```
[edit access]
user@host# edit address-assignment pool v4 family inet
```
2. Configure the family of interfaces in the pool.

```
[edit access address-assignment pool v4]
user@host# set network 100.20.0.0/16
```
3. Configure the upper and lower bounds of the address range.

```
[edit access address-assignment pool v4]
user@host# set range limited low 100.20.0.10
user@host# set range limited high 100.20.128.250
```
4. Configure the maximum length of time in seconds for which a subscriber can request and hold a lease.

```
[edit access address-assignment pool v4]
```



```
user@host#set dhcp-attributes maximum-lease-time 84600
```

Configuring RADIUS Authentication

CLI Quick Configuration To quickly configure RADIUS authentication, copy the following commands and paste them into the router terminal window:

```
[edit]
edit access radius-server 172.28.30.108
set secret $9$1u5ErvW87bwgSr4Zji5T
set timeout 5
set retry 5
up 2
edit profile acc-prof
set authentication-order radius
set radius authentication-server 172.28.30.108
```

Configuring RADIUS Access

Step-by-Step Procedure To configure RADIUS access:

1. Configure the RADIUS server.


```
[edit access]
user@host#edit radius-server 172.28.30.108
```
2. Configure the required secret (password) that the local router or switch passes to the RADIUS client.


```
[edit access radius-server 172.28.30.108]
user@host# set secret $9$1u5ErvW87bwgSr4Zji5T
```
3. Configure the length of time that the local router or switch waits to receive a response from a RADIUS server.


```
[edit access radius-server 172.28.30.108]
user@host# set timeout 5
```
4. Configure the number of times that the router or switch attempts to contact a RADIUS accounting server.


```
[edit access radius-server 172.28.30.108]
user@host# set retry 5
```
5. Configure the access profile.


```
[edit access]
user@host#edit profile acc-prof
```
6. Configure the authentication order.


```
[edit access profile acc-prof ]
user@host# set authentication-order radius
```
7. Configure the authentication server.


```
[edit access profile acc-prof]
user@host#set radius authentication-server 172.28.30.108
```

Results

```
dynamic-profiles {
  vlan-prof {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-interface-unit" {
          vlan-id "$junos-vlan-id";
          demux-source inet;
          family inet {
            unnumbered-address lo0.0 preferred-source-address 100.20.32.2;
          }
        }
      }
    }
  }
}

multiplay {
  class-of-service {
    traffic-control-profiles {
      multiplay {
        scheduler-map all_smap;
        shaping-rate 100m;
        guaranteed-rate 20m;
      }
    }
    interfaces {
      interface-set "$junos-interface-set-name" {
        interface "$junos-interface-ifd-name" {
          unit "$junos-underlying-interface-unit";
        }
      }
      "$junos-interface-ifd-name" {
        unit "$junos-interface-unit" {
          output-traffic-control-profile multiplay;
        }
      }
    }
  }
}

scheduler-maps {
  all_smap {
    forwarding-class be scheduler be_sch;
    forwarding-class ef scheduler ef_sch;
    forwarding-class af scheduler af_sch;
    forwarding-class nc scheduler nc_sch;
    forwarding-class voice scheduler voice_sch;
    forwarding-class video scheduler video_sch;
    forwarding-class game scheduler game_sch;
    forwarding-class data scheduler data_sch;
  }
}

schedulers {
  be_sch {
    transmit-rate percent 12;
    buffer-size percent 12;
    priority low;
  }
}
```

```

ef_sch {
    transmit-rate percent 12;
    buffer-size percent 12;
    priority low;
}
af_sch {
    transmit-rate percent 12;
    buffer-size percent 12;
    priority low;
}
nc_sch {
    transmit-rate percent 12;
    buffer-size percent 12;
    priority low;
}
voice_sch {
    transmit-rate percent 12;
    buffer-size percent 12;
    priority low;
}
video_sch {
    transmit-rate percent 12;
    buffer-size percent 12;
    priority low;
}
game_sch {
    transmit-rate percent 12;
    buffer-size percent 12;
    priority low;
}
data_sch {
    transmit-rate percent 12;
    buffer-size percent 12;
    priority low;
}
}
}
}
access {
    radius-server {
        172.28.30.108 {
            secret "$9$1u5ErvW87bwgSr4Zji5T"; ## SECRET-DATA
            timeout 5;
            retry 5;
        }
    }
    profile acc-prof {
        authentication-order radius;
        radius {
            authentication-server 172.28.30.108;
        }
    }
    address-assignment {
        pool v4 {
            family inet {
                network 100.20.0.0/16;
            }
        }
    }
}

```

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```

}
system {
  services {
    dhcp-local-server {
      authentication {
        password multiplay;
        username-include {
          user-prefix multiplay;
        }
      }
    }
    dynamic-profile multiplay aggregate-clients replace;
    group vlans {
      interface ge-1/0/0.0;
    }
  }
}
}

```

Verification

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

- [Verifying the Interfaces that are Included in the Interface Set on page 217](#)
- [Verifying the Traffic Scheduling and Shaping Parameters for the Interface Set on page 217](#)

Verifying the Interfaces that are Included in the Interface Set

Purpose Verify the interfaces included in the interface set.

Action user@host> `show interfaces interface-set dynamic-set terse`

Verifying the Traffic Scheduling and Shaping Parameters for the Interface Set

Purpose Verify that the traffic scheduling and shaping parameters are applied properly to an interface included in the interface set.

Action user@host> `show class-of-service interface`

Related Documentation

- [Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25](#)
- [Configuring an Interface Set of Subscribers in a Dynamic Profile on page 204](#)

Example: Configuring a Dynamic Service VLAN Interface Set of Subscribers in a Dynamic Profile

Interface sets enable you to provide hierarchical scheduling to a group of subscriber interfaces. In this example, by using the `$junos-svlan-interface-set-name` internal dynamic variable when specifying the interface set name, you can locally generate an interface

set name for use by SVLAN interfaces based on the outer tag of the dual-tagged VLAN. The format of the generated variable is *physical_interface_name - outer_VLAN_tag*.

- [Requirements on page 218](#)
- [Overview on page 218](#)
- [Configuration on page 218](#)
- [Verification on page 221](#)

Requirements

Before you begin, configure the subscriber interfaces that you intend to include in the interface set. You can find general configuration instructions for the supported dynamic interface configuration in *DHCP Subscriber Interface Overview* and in the following:

- For dynamic VLAN interfaces, see *Configuring a Static or Dynamic VLAN Subscriber Interface over Aggregated Ethernet*.
- For dynamic IP demux interfaces, see *Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles* and *Configuring a Static or Dynamic IP Demux Subscriber Interface over Aggregated Ethernet*.
- For dynamic VLAN demux interfaces, see *Configuring Dynamic Subscriber Interfaces Using VLAN Demux Interfaces in Dynamic Profiles*.

Overview

Interface sets enable you to provide hierarchical scheduling to a group of subscriber interfaces. By using the `$junos-svlan-interface-set-name` internal dynamic variable when specifying the interface set name, you can locally generate an interface set name for use by SVLAN interfaces based on the outer tag of the dual-tagged VLAN. The format of the generated variable is *physical_interface_name - outer_VLAN_tag*.

This example includes the following statements:

- **interface-set**—Configures the name of the scheduler for dynamic CoS. In this example, you use the `$junos-svlan-interface-set-name` variable to obtain the locally generated interface set name for use by SVLAN interfaces based on the outer tag of the dual-tagged VLAN.
- **output-traffic-control-profile**—Applies an output traffic scheduling and shaping profile to the interface set.
- **output-traffic-control-profile-remaining**—Applies an output traffic scheduling and shaping profile for remaining traffic to the interface set.

Configuration

CLI Quick Configuration

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

```
[edit]
set dynamic-profiles profile-dhcp-ipdemux interfaces interface-set
  $junos-svlan-interface-set-name interface $junos-interface-ifd-name unit
  $junos-underlying-interface-unit
set dynamic-profiles profile-dhcp-ipdemux interfaces $junos-interface-ifd-name unit
  $junos-underlying-interface-unit
set class-of-service traffic-control-profiles tcp1 scheduler-map schedMap
set class-of-service traffic-control-profiles tcp1 shaping-rate 50m
set class-of-service traffic-control-profiles tcp1 guaranteed-rate 200k
set class-of-service traffic-control-profiles tcp3 scheduler-map sslq0q1
set class-of-service traffic-control-profiles tcp3 shaping-rate 20m
set class-of-service traffic-control-profiles tcp3 guaranteed-rate 5m
set class-of-service interfaces interface-set ae0-111 output-traffic-control-profile tcp1
set class-of-service interfaces interface-set ae0-111
  output-traffic-control-profile-remaining tcp3
```

Step-by-Step Procedure

To configure an SVLAN interface set of subscriber interfaces:

1. Access the dynamic profile you want to modify for interface sets.

```
[edit]
user@host# edit dynamic-profiles profile-dhcp-ipdemux
```

2. Access the dynamic profile interface configuration.

```
[edit dynamic-profiles profile-dhcp-ipdemux]
user@host# edit interfaces
```

3. Configure the SVLAN interface set in the dynamic profile.

The interface set is created dynamically when the subscriber logs in.

```
[edit dynamic-profiles profile-dhcp-ipdemux interfaces]
user@host# edit interface-set $junos-svlan-interface-set-name
```

4. Include dynamic IP demux interface creation within the dynamic interface set.

```
[edit dynamic-profiles profile-dhcp-ipdemux interfaces interface-set
  $junos-svlan-interface-set-name]
user@host# set interface $junos-interface-ifd-name unit
  $junos-underlying-interface-unit
```

5. Access the SVLAN interface set name that you expect **\$junos-svlan-interface-set-name** to generate. For example, to specify the expected interface set name for aggregated Ethernet interface ae0 and outer VLAN tag 111, include **ae0-111** for the **interface-set-name** variable.

```
[edit class-of-service interfaces]
user@host# edit interface-set ae0-111
```

6. Apply traffic shaping and queuing parameters to the SVLAN interface set.



TIP: You must configure the interface set in the static [edit class-of-service] hierarchy, not in the [edit dynamic-profiles] hierarchy.

```
[edit class-of-service interfaces interface-set ae0-111]
```

```
user@host# set output-traffic-control-profile tcp1
```

7. Apply traffic shaping and queuing parameters to any remaining traffic on the SVLAN interface set.

```
[edit class-of-service interfaces interface-set ae0-111]  
user@host# set output-traffic-control-profile-remaining tcp3
```

Results

From configuration mode, confirm your configuration by entering the **show dynamic-profiles** command and the **show class-of-service** command. If the output does not display the intended configuration, repeat the instructions in this example to correct the configuration.

```
user@host# show dynamic-profiles  
dynamic-profiles {  
  profile-dhcp-ipdemux {  
    interfaces {  
      interface-set "$junos-svlan-interface-set-name" {  
        interface "$junos-interface-ifd-name" {  
          unit "$junos-underlying-interface-unit";  
        }  
      }  
      "$junos-interface-ifd-name" {  
        unit "$junos-underlying-interface-unit";  
      }  
    }  
  }  
}
```

```
user@host# show class-of-service  
class-of-service {  
  traffic-control-profiles {  
    tcp1 {  
      scheduler-map schedMap;  
      shaping-rate 50m;  
      guaranteed-rate 200k;  
    }  
    tcp3 {  
      inactive: scheduler-map sslq0q1;  
      shaping-rate 20m;  
      guaranteed-rate 5m;  
    }  
  }  
  interfaces {  
    interface-set ae0-111 {  
      output-traffic-control-profile tcp1;  
      output-traffic-control-profile-remaining tcp3;  
    }  
  }  
}
```


Verification

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

Verifying the Interfaces that are Included in the Interface Set

Purpose Verify the interfaces that are included in the interface set.

Action user@host> [show class-of-service interface-set](#)

Displaying Information for Active Subscribers

Purpose Display information for active subscribers.

Action user@host> [show subscribers detail](#)

- Related Documentation**
- [Dynamic Profiles Overview](#)
 - [Configuring a Basic Dynamic Profile](#)
 - [Configuring Hierarchical Schedulers for CoS](#)
 - [Configuring Remaining Common Queues on MIC and MPC Interfaces on page 98](#)

Applying CoS to Subscriber Interfaces

- Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile on page 223
- Applying Minimal Shaping and Scheduling to Remaining Subscriber Traffic on page 224
- Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile on page 225
- Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 226
- Applying CoS Attributes to VLANs Using Agent-Circuit-Identifiers on page 227

Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile

After you configure the traffic shaping and scheduling CoS parameters in a dynamic profile, you apply them to an interface. The output traffic-control profile enables you to provide traffic scheduling to the interface.

To apply CoS attributes to an interface in a dynamic profile:

1. Specify that you want to apply CoS attributes to an interface in the dynamic profile.

```
user@host# edit dynamic-profiles profile-name class-of-service
```

2. Configure the interface name and logical interface using a variable, and apply the output traffic-control profile to the interface.

```
[edit dynamic-profiles profile-name class-of-service interfaces]
user@host# set interfaces $junos-interface-ifd-name unit
$junos-underlying-interface-unit output-traffic-control-profile profile-name
```

You can use one of the following methods to specify the output traffic-control profile you want to use:

- Reference the **\$junos-cos-traffic-control-profile** predefined variable. At subscriber login, subscriber management takes one of the following actions, in the order listed:
 - a. If RADIUS is being used and it returns a value for the traffic-control profile, subscriber management uses the RADIUS value.
 - b. If RADIUS is not being used, subscriber management uses the default traffic-control profile (which is specified by the **predefined-variables-default** statement at the **[edit dynamic-profiles]** hierarchy).

For example:

```
user@host# set interfaces $junos-interface-ifd-name unit
$junos-underlying-interface-unit output-traffic-control-profile
$junos-cos-traffic-control-profile
```

- Explicitly reference the name of the traffic-control profile.

For example:

```
user@host# set interfaces $junos-interface-ifd-name unit
$junos-underlying-interface-unit output-traffic-control-profile tcp-sales-2
```

**Related
Documentation**

- For hardware requirements and configuration guidelines, see [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 33](#)
- [Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 34](#)
- [Example: Maintaining a Constant Traffic Flow by Configuring a Static VLAN Interface with a Dynamic Profile for Subscriber Access on page 38](#)
- [Example: Configuring Dynamic Hierarchical Scheduling and Queuing for Subscriber Access on page 49](#)
- [Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 23](#)
- [CoS for Subscriber Access Overview on page 3](#)

Applying Minimal Shaping and Scheduling to Remaining Subscriber Traffic

It is beneficial to apply a remaining traffic-control profile to a logical interface to provide minimal CoS scheduling when you have not configured or over-provisioned Layer 3 schedulers. In the event that schedulers are not available, the remaining subscriber traffic receives the essential level of service.

To configure scheduling for remaining subscriber traffic:

1. Enable hierarchical scheduling for the interface.

```
[edit interfaces interface-name]
user@host# set hierarchical-scheduler
```

2. Apply the remaining traffic-control profile to the port on which you enabled hierarchical scheduling.

```
[edit class-of-service interfaces interface-name]
user@host# set output-traffic-control-profile-remaining profile-name
```

**Related
Documentation**

- [Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile on page 223](#)

Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile

Rewrite rules define the marking for various CoS values, including DSCP, DSCP IPv6, IP precedence, and IEEE 802.1 CoS values. Rewrite rules have an associated forwarding class and code-point alias or bit set.



NOTE: By default, subscriber lawful intercept does not intercept DHCP control packets that are generated by the routing engine. To ensure that a DHCP control packet generated by the routing engine is intercepted, you need to configure the `ieee-802.1` rewrite-rule for VLAN demux.

For dynamic CoS, you define the rewrite rules mapping for the CoS values statically, then reference the rewrite rule configuration in the dynamic profile for the subscriber interface.

To configure a rewrite rule in a dynamic profile:

1. Define the rewrite-rules mapping for the traffic that passes through all queues on the interface. The available rewrite-rules types for dynamic CoS are **dscp**, **dscpv6**, **ieee-802.1** and **inet-precedence**.

See *Configuring Rewrite Rules*.

2. Apply the rewrite-rules definition to the subscriber interface in the dynamic profile.

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name unit
  logical-unit-number]
user@host# edit rewrite-rules
```

3. Configure the applicable rewrite rule markers in the dynamic profile.

- For DSCP:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name unit
  logical-unit-number rewrite-rules]
user@host# set dscp (rewrite-name | default)
```

- For DSCPv6:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name unit
  logical-unit-number rewrite-rules]
user@host# set dscp-ipv6 (rewrite-name | default)
```

- For IEEE 802.1:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name unit
  logical-unit-number rewrite-rules]
user@host# set ieee-802.1 (rewrite-name | default) vlan-tag (outer | outer-and-inner)
```

- For inet-precedence:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name unit
  logical-unit-number rewrite-rules]
user@host# set inet-precedence (rewrite-name | default)
```

- Related Documentation**
- For hardware requirements and configuration guidelines, see [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
 - [Example: Configuring Dynamic Hierarchical Scheduling and Queuing for Subscriber Access on page 49](#)
 - [Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 23](#)
 - [Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 226](#)
 - [Applying IEEE 802.1p Rewrite Rules to Dual VLAN Tags](#)
 - [Rewriting Packet Header Information Overview](#)

Applying a Classifier to a Subscriber Interface in a Dynamic Profile

You can apply the classification map to a subscriber interface in a dynamic profile.

For dynamic CoS, you define the classification map for the CoS values statically, then reference the classifier configuration in the dynamic profile for the subscriber interface.

To apply a classifier to an interface in a dynamic profile:

1. Define the classifier.

The available classifier types for dynamic CoS are **dscp**, **dscp-ipv6**, **ieee-802.1**, and **inet-precedence**.

See *Defining Classifiers*.

2. Apply the classifier definition to the subscriber interface in the dynamic profile.

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name unit  
  logical-unit-number]  
user@host# edit classifiers
```

3. Configure the applicable classifiers in the dynamic profile.

- For DSCP:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name unit  
  logical-unit-number classifiers]  
user@host# set dscp (classifier-name | default)
```

- For DSCPv6:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name unit  
  logical-unit-number classifiers]  
user@host# set dscp-ipv6 (classifier-name | default)
```

- For IEEE 802.1:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name unit  
  logical-unit-number classifiers]  
user@host# set ieee-802.1 (classifier-name | default) vlan-tag (inner | outer)
```

- For inet-precedence:

```
[edit dynamic-profiles profile-name class-of-service interfaces interface-name unit  
  logical-unit-number classifiers]
```

```
user@host# set inet-precedence (classifier-name | default)
```

Related Documentation

- For hardware requirements and configuration guidelines, see [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [Example: Configuring Dynamic Hierarchical Scheduling and Queuing for Subscriber Access on page 49](#)
- [Verifying the Scheduling and Shaping Configuration for Subscriber Access on page 23](#)
- [Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile on page 225](#)
- [Overview of BA Classifier Types](#)
- [Default Behavior Aggregate Classification Overview](#)

Applying CoS Attributes to VLANs Using Agent-Circuit-Identifiers

To apply CoS attributes, such as shaping, at the household level, you must set and define the CoS policy for the agent-circuit-identifier VLAN interface set using the dynamic profile for the agent-circuit-identifier interface set (not the subscriber profile). You can also configure a traffic-control profile and a remaining traffic-control profile for a dynamic interface set.

The following example is a CoS profile for an ACI set using a unique-ID based dynamic scheduler map:

Before you apply CoS attributes to VLANs:

- Create a basic dynamic profile.

See [Configuring a Basic Dynamic Profile](#).

Configure a CoS dynamic profile with a simple traffic-control profile that is applied to the dynamic interface set that represents the ACI VLAN.

1. Configure CoS to support a dynamic interface set in the CoS profile:

```
[edit dynamic-profiles profile-name]
user@host# edit interface "$junos-interface-name"
```

2. Configure the interfaces.

```
[edit dynamic-profiles profile-name interfaces]
user@host# edit interface-set "$junos-interface-set-name"
user@host# edit interface "$junos-interface-ifd-name"
```

3. Configure the CoS traffic-control profile.

```
[edit class-of-service]
user@host# edit traffic-control-profiles traffic-control-profile-name
user@host# set shaping-rate rate
user@host# set guaranteed-rate rate
```

4. Specify the interfaces.

[edit [class-of-service interfaces](#)]

user@host# edit interface-set "\$junos-interface-set-name"

user@host# edit output-traffic-control-profile *profile-name*

The following example is a CoS profile for an ACI set using a unique ID-based dynamic scheduler map:

```
aci-set-profile {
  variables {
    ds1q0q2DP uid;
    ds1q1q2DP uid;
    be1_dp uid;
    ef1_dp uid;
    af1_dp uid;
    nc1_dp uid;
  }
  interfaces {
    interface-set "$junos-interface-set-name" {
      interface "$junos-interface-ifd-name";
    }
  }
  class-of-service {
    traffic-control-profiles {
      tcp2 {
        inactive: scheduler-map ss1q0q1DP;
        shaping-rate 50m;
        guaranteed-rate 30m;
        overhead-accounting bytes -20;
      }
      tcp3 {
        scheduler-map "$ds1q1q2DP";
        shaping-rate 30m;
        guaranteed-rate 10m;
        overhead-accounting bytes -20;
      }
    }
    interfaces {
      interface-set "$junos-interface-set-name" {
        output-traffic-control-profile tcp2;
        output-traffic-control-profile-remaining tcp3;
      }
    }
    scheduler-maps {
      "$ds1q0q2DP" {
        forwarding-class be scheduler "$be1_dp";
        forwarding-class af scheduler "$af1_dp";
        forwarding-class nc scheduler "$nc1_dp";
      }
      "$ds1q1q2DP" {
        forwarding-class ef scheduler "$ef1_dp";
        forwarding-class af scheduler "$af1_dp";
        forwarding-class nc scheduler "$nc1_dp";
      }
    }
    schedulers {
      "$be1_dp" {
```



```

transmit-rate percent 25;
priority low;
drop-profile-map loss-priority low protocol any drop-profile d3;
drop-profile-map loss-priority medium-low protocol any drop-profile d2;
drop-profile-map loss-priority medium-high protocol any drop-profile d1;
drop-profile-map loss-priority high protocol any drop-profile d0;
}
"$efl_dp" {
transmit-rate percent 25;
priority low;
drop-profile-map loss-priority low protocol any drop-profile d3;
drop-profile-map loss-priority medium-low protocol any drop-profile d2;
drop-profile-map loss-priority medium-high protocol any drop-profile d1;
drop-profile-map loss-priority high protocol any drop-profile d0;
}
"$af1_dp" {
transmit-rate percent 25;
priority low;
drop-profile-map loss-priority low protocol any drop-profile d3;
drop-profile-map loss-priority medium-low protocol any drop-profile d2;
drop-profile-map loss-priority medium-high protocol any drop-profile d1;
drop-profile-map loss-priority high protocol any drop-profile d0;
}
"$nc1_dp" {
transmit-rate percent 25;
priority low;
drop-profile-map loss-priority low protocol any drop-profile d3;
drop-profile-map loss-priority medium-low protocol any drop-profile d2;
drop-profile-map loss-priority medium-high protocol any drop-profile d1;
drop-profile-map loss-priority high protocol any drop-profile d0;
}
}
}
}
}

```

**Related
Documentation**

- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [Changing CoS Services Overview on page 167](#)

Configuring Rate-Limiting Premium and Non-Premium Traffic on an Interface Using Hierarchical Policers

- [Methods for Regulating Traffic by Applying Hierarchical Policers on page 231](#)
- [Hierarchical Policer Applied as Filter Action on page 234](#)
- [Example: Configuring Hierarchical Policers to Limit Rates of Services in a Static Environment on page 235](#)

Methods for Regulating Traffic by Applying Hierarchical Policers

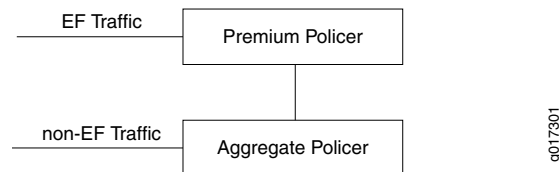
You can deploy policers to enforce service level agreements limiting the input rate at the edge, and at the boundary between domains, to guarantee an equitable deployment of the service among the different domains. Policers determine whether each packet conforms (falls within the traffic contract), exceeds (using up the excess burst capacity), or violates (totally out of the traffic contract rate) the configured traffic policies, and then sets the prescribed action.

Hierarchical policers rate-limit premium traffic separately from the aggregate traffic on an interface as determined by different configured rates. You can use a hierarchical policer to rate-limit ingress Layer 2 traffic at a physical or logical interface and apply different policing actions based on whether the traffic or packets are classified for expedited forwarding (EF) or for a lower priority, such as non-expedited forwarding (non-EF).

Hierarchical policers provide cross-functionality between the configured physical interface and the Packet Forwarding Engine. You can apply a hierarchical policer for premium and aggregate (premium plus normal) traffic levels to a logical interface.

Hierarchical policing uses two token buckets, one for premium (EF) traffic and one for aggregate (non-EF) traffic, as shown in [Figure 23 on page 232](#).

Figure 23: Hierarchical Policer



The class-of-service (CoS) configuration determines which traffic is EF and which is non-EF. Logically, hierarchical policing is achieved by chaining two policers.

- **Premium policer**—You configure the premium policer with traffic limits for high-priority EF traffic only: a guaranteed bandwidth and a corresponding burst-size limit. EF traffic is categorized as nonconforming when its average arrival rate exceeds the guaranteed bandwidth and its average packet size exceeds the premium burst-size limit. For a premium policer, the only configurable action for nonconforming traffic is to discard the packets.
- **Aggregate policer**—You configure the aggregate policer (also known as a logical interface policer) with an aggregate bandwidth (to accommodate both high-priority EF traffic up to the guaranteed bandwidth and normal-priority non-EF traffic) and a burst-size limit for non-EF traffic only. Non-EF traffic is categorized as nonconforming when its average arrival rate exceeds the amount of aggregate bandwidth not currently consumed by EF traffic and its average packet size exceeds the burst-size limit defined in the aggregate policer. For an aggregate policer, the configurable actions for nonconforming traffic are to discard the packets, assign a forwarding class, or assign a packet loss priority (PLP) level.



NOTE: You must configure the bandwidth limit of the premium policer at or below the bandwidth limit of the aggregate policer. If the two bandwidth limits are equal, then only non-EF traffic passes through the interface unrestricted; no EF traffic arrives at the interface.

Ingress traffic is first classified into EF and non-EF traffic prior to applying a policer. EF traffic is guaranteed the bandwidth specified as the premium bandwidth limit, while non-EF traffic is rate-limited to the amount of aggregate bandwidth not currently consumed by the EF traffic. Non-EF traffic is rate-limited to the entire aggregate bandwidth only while no EF traffic is present.

Hierarchical policing uses two token buckets, one for aggregate (non-EF) traffic and one for premium (EF) traffic. In [Figure 23 on page 232](#), the premium policer polices EF traffic and the aggregate policer polices non-EF traffic. In the sample configuration that follows, the hierarchical policer is configured with the following components:

- Premium policer has a bandwidth limit set to 2 Mbps, burst-size limit set to 50 KB, and nonconforming action set to discard packets.

- Aggregate policer has a bandwidth limit set to 10 Mbps, burst-size limit set to 100 KB, and nonconforming action set to mark high PLP.

```
[edit]
user@host# show dynamic-profiles firewall
hierarchical-policer policer-agg-prem {
  aggregate {
    if-exceeding {
      bandwidth-limit 10m;
      burst-size-limit 100k;
    }
    then {
      loss-priority high;
    }
  }
  premium {
    if-exceeding {
      bandwidth-limit 2m;
      burst-size-limit 50k;
    }
    then {
      discard;
    }
  }
}
```

EF traffic is guaranteed a bandwidth of 2 Mbps. Bursts of EF traffic—EF traffic that arrives at the interface at rates above 2 Mbps—can also pass through the interface, provided that sufficient tokens are available in the 50 KB burst bucket. When no tokens are available, EF traffic is rate-limited using the discarded action associated with the premium policer.

Non-EF traffic is metered to a bandwidth limit that ranges between 8 Mbps and 10 Mbps, depending on the average arrival rate of the EF traffic. Bursts of non-EF traffic—non-EF traffic that arrives at the interface at rates above the current limit for non-EF traffic—also pass through the interface, provided that sufficient tokens are available in the 100 KB bandwidth bucket. Aggregate traffic in excess of the currently configured bandwidth or burst size are rate-limited using the action specified for the aggregate policer, which in this example is set to a high PLP.

The premium traffic is policed by both the premium policer and aggregate policer. Although the premium policer rate-limits the premium traffic, the aggregate policer decrements the credits but does not drop the packets. The aggregate policer rate-limits the non-premium traffic. Therefore, the premium traffic is assured to have the bandwidth configured for premium, and the non-premium traffic is policed to the remaining bandwidth.

Related Documentation

- [Example: Configuring Hierarchical Policers to Limit Rates of Services in a Static Environment on page 235](#)
- [Hierarchical Policers Applied as Filter Action on page 234](#)

Hierarchical Policer Applied as Filter Action

After you define firewall filters and policers, you must apply them to take effect.

- You can apply the same firewall filter to multiple interfaces at the same time. By default on MX Series routers, these filters aggregate their counters and policing actions when those interfaces share a Packet Forwarding Engine. To override this behavior and make each counter or policer function specific to each interface application, include the **interface-specific** statement in the firewall filter.

```
[edit dynamic-profiles profile-name firewall family family filter filter-name
user@host# set interface-specific
```

Interface-specific filters are particularly useful for IPTV services where television services are delivered using the IP suite over a packet-switched network instead of being delivered through traditional satellite signal and cable television formats.



NOTE: When you define an interface-specific filter, you must limit the filter name to no more than 52 bytes. Firewall filter names are restricted to 64 bytes in length and interface-specific filters have the specific-name appended to them to differentiate their counters and policing actions. If the automatically generated filter instance name exceeds this maximum length, the system may reject the filter's instance name.

- Alternatively, you can apply a policer to a logical interface either directly or indirectly through a filter that references the policer function. By default, policers are *term-specific*. Junos OS creates a separate policer instance when the same policer is referenced in multiple terms of a firewall filter.

Hierarchical policers provide cross-functionality between the configured physical interface and the Packet Forwarding Engine for provider edge applications. You can apply a hierarchical policer as a filter action for premium and aggregate (premium plus normal) traffic levels to a logical interface. Additionally, an interface-specific filter can have a hierarchical policer as a filter action whether or not the hierarchical policer is a logical interface policer.

A logical interface policer (also known as an aggregate policer) can police the traffic from multiple protocol families without requiring a separate instantiation of a policer for each such family on the logical interface. You define a logical interface policer by including the **logical-interface-policer** statement when defining the policer.

```
[edit dynamic-profiles profile-name firewall policer policer-name
user@host# set logical-interface-policer
```

To apply a logical interface policer on an MX Series router as an action in a firewall filter term, you must specify both the **interface-specific** statement in the firewall filter and the **logical-interface-policer** statement in the related policer. Using a filter to evoke a logical interface filter has the added benefits of increased match flexibility as well as support for two-color policer styles (a policer that classifies traffic into two groups using only the

bandwidth-limit and **burst-size-limit** parameters), which can only be attached at the family level through a filter action.



NOTE: A non-interface-specific filter can only have a hierarchical policer if no logical interface-specific filter action is specified.

**Related
Documentation**

- [Methods for Regulating Traffic by Applying Hierarchical Policers on page 231](#)
- [Example: Configuring Hierarchical Policers to Limit Rates of Services in a Static Environment on page 235](#)

Example: Configuring Hierarchical Policers to Limit Rates of Services in a Static Environment

This example shows how to configure a hierarchical policer and apply the policer to ingress Layer 2 traffic at a logical interface on an MX Series router.

- [Requirements on page 235](#)
- [Overview on page 235](#)
- [Configuration on page 236](#)
- [Verification on page 244](#)

Requirements

Before you begin, be sure that your environment meets the following requirements:

- The interface on which you apply the hierarchical policer is an interface hosted on an MX Series router.
- No other policer is applied to the input of the interface on which you apply the hierarchical policer.
- You are aware that, if you apply the hierarchical policer to logical interface on which an input filter is also applied, the policer is executed first.

Overview

In this example, you configure a hierarchical policer and apply the policer to ingress Layer 2 traffic at a logical interface. [Table 35 on page 236](#) describes the hierarchy levels at which you can configure and apply hierarchical policers on logical and physical interfaces.

Table 35: Hierarchical Policer Configuration and Application Summary

Policer Configuration	Layer 2 Application	Key Points
Hierarchical Policer Hierarchically rate-limits Layer 2 ingress traffic for all protocol families. Cannot be applied to egress traffic, Layer 3 traffic, or at a specific protocol level of the interface hierarchy. Supported on interfaces on Dense Port Concentrators (DPCs) in MX Series routers.		
Aggregate and premium policing components of a hierarchical policer: <pre>[edit dynamic-profiles <i>profile-name</i> firewall] hierarchical-policer <i>policer-name</i> { aggregate { if-exceeding { bandwidth-limit <i>bps</i>; burst-size-limit <i>bytes</i>; } then { discard; forwarding-class <i>class-name</i>; loss-priority <i>supported-value</i>; } } } premium { if-exceeding { bandwidth-limit <i>bps</i>; burst-size-limit <i>bytes</i>; } then { discard; } }</pre>	Option A (physical interface) —Apply directly to Layer 2 input traffic on a physical interface: <pre>[edit dynamic-profiles <i>profile-name</i> interfaces] interface-name { layer2-policer { input-hierarchical-policer <i>policer-name</i>; } }</pre>	Hierarchically rate-limit Layer 2 ingress traffic for all protocol families and logical interfaces configured on a physical interface. Include the layer2-policer configuration statement at the [edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i>] hierarchy level. NOTE: If you apply a hierarchical policer at a physical interface, you cannot also apply a hierarchical policer to any of the member logical interfaces.
	Option B (logical interface) —Apply directly to Layer 2 input traffic on a logical interface: <pre>[edit dynamic-profiles <i>profile-name</i> interfaces] interface-name { unit <i>unit-number</i> { layer2-policer { input-hierarchical-policer <i>policer-name</i>; } } }</pre>	Hierarchically rate-limit Layer 2 ingress traffic for all protocol families configured on a specific logical interface. Include the layer2-policer configuration statement at the [edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>unit-number</i>] hierarchy level. NOTE: You must configure at least one protocol family for the logical interface.

You apply the policer to the Gigabit Ethernet logical interface ge-1/2/0.0, which you configure for IPv4 traffic. When you apply the hierarchical policer to the logical interface, IPv4 traffic is hierarchically rate-limited. If you choose to apply the hierarchical policer to physical interface ge-1/2/0, hierarchical policing applies to IPv4 traffic across the logical interface as well.

Configuration

The following example requires you to navigate various levels in the configuration hierarchy. For information about navigating the CLI, see *Using the CLI Editor in Configuration Mode*.

To configure this example, perform the following tasks:

- [Configuring a Basic Dynamic Profile for Subscriber Management on page 238](#)
- [Configuring the Interfaces on page 239](#)
- [Configuring the Firewall Filter on page 239](#)
- [Configuring the Forwarding Classes on page 241](#)
- [Configuring the Hierarchical Policier on page 242](#)
- [Applying the Hierarchical Policier to Layer 2 Ingress Traffic at a Physical or Logical Interface on page 243](#)

CLI Quick Configuration

To quickly configure this example, copy the following configuration commands into a text file, remove any line breaks, and then paste the commands into the CLI at the [edit] hierarchy level.

```

set dynamic-profiles basic-profile
set dynamic-profiles basic-profile interfaces "$junos-interface-ifd-name"
set dynamic-profiles basic-profile interfaces "$junos-interface-ifd-name" unit
  "$junos-underlying-interface-unit"
set dynamic-profiles basic-profile interfaces "$junos-interface-ifd-name" unit
  $junos-underlying-interface-unit family inet
set dynamic-profiles interfaces ge-1/2/0 unit 0 family inet address 10.8.0.0/31
set dynamic-profiles basic-profile firewall family inet filter hierarch-filter
set dynamic-profiles basic-profile firewall family inet filter hierarch-filter interface-specific
set dynamic-profiles basic-profile firewall family inet filter hierarch-filter term match-ip1
set dynamic-profiles basic-profile firewall family inet filter hierarch-filter term match-ip2
set dynamic-profiles basic-profile firewall family inet filter hierarch-filter term match-ip1
  from precedence critical-ecp protocol
set dynamic-profiles basic-profile firewall family inet filter hierarch-filter term match-ip1
  from protocol tcp
set dynamic-profiles basic-profile firewall family inet filter hierarch-filter term match-ip1
  then hierarchical-policer hp1-share filter-specific
set dynamic-profiles basic-profile firewall family inet filter hierarch-filter term match-ip2
  from precedence internet-control
set dynamic-profiles basic-profile firewall family inet filter hierarch-filter term match-ip2
  from protocol tcp
set dynamic-profiles basic-profile firewall family inet filter hierarch-filter term match-ip2
  then hierarchical-policer hp2-share
set class-of-service forwarding-classes class fc0 queue-num 0 priority high
  policing-priority premium
set class-of-service forwarding-classes class fc1 queue-num 1 priority low policing-priority
  normal
set class-of-service forwarding-classes class fc2 queue-num 2 priority low policing-priority
  normal
set class-of-service forwarding-classes class fc3 queue-num 3 priority low policing-priority
  normal
set dynamic-profiles basic-profile firewall hierarchical-policer policer-agg-prem aggregate
  if-exceeding bandwidth-limit 10m burst-size-limit 100k
set dynamic-profiles basic-profile firewall hierarchical-policer policer-agg-prem aggregate
  then forwarding-class fc1
set dynamic-profiles basic-profile firewall hierarchical-policer policer-agg-prem premium
  if-exceeding bandwidth-limit 2m burst-size-limit 50k
set dynamic-profiles basic-profile firewall hierarchical-policer policer-agg-prem premium
  then discard

```

```
set dynamic-profiles basic-profile interfaces ge-1/2/0 unit 0 layer2-policer
input-hierarchical-policer policer-agg-prem
```

Configuring a Basic Dynamic Profile for Subscriber Management

Step-by-Step Procedure

A dynamic profile is a set of characteristics, defined in a type of template, that you can use to provide dynamic subscriber access and services for broadband applications. These services are assigned dynamically to interfaces. A basic profile must contain a profile name and have both an interface variable name (such as **\$junos-interface-ifd-name**) included at the **[edit dynamic-profiles *profile-name* interfaces** hierarchy level and logical interface variable name (such as **\$junos-underlying-interface-unit** or **\$junos-interface-unit**) at the **[edit dynamic-profiles *profile-name* interfaces *variable-interface-name* unit]** hierarchy level.

1. Create the new dynamic profile.

```
[edit]
user@host# set dynamic-profiles basic-profile
```

2. Define the **interface-name** variable statement with the internal **\$junos-interface-ifd-name** variable used by the router to match the interface name of the receiving interface.

```
[edit dynamic-profiles basic-profile]
user@host# set interfaces "$junos-interface-ifd-name"
```

3. Define the **variable-interface-name** unit statement with the internal variable.

- When referencing an existing interface, specify the **\$junos-underlying-interface-unit** variable used by the router to match the unit value of the receiving interface.
- When creating dynamic interfaces, specify the **\$junos-interface-unit** variable used by the router to generate a unit value for the interface.

```
[edit dynamic-profiles basic-profile interfaces "$junos-interface-ifd-name"]
user@host# set unit $junos-underlying-interface-unit
```

or

```
[edit dynamic-profiles basic-profile interfaces "$junos-interface-ifd-name"]
user@host# set unit $junos-interface-unit
```

4. Define the family address type (inet for IPv4) for the **\$junos-interface-unit** variable.

```
[edit dynamic-profiles basic-profile interfaces "$junos-interface-ifd-name" unit
$junos-underlying-interface-unit]
user@host# set family inet
```

Results Confirm the configuration of the dynamic profile by entering the **show dynamic-profiles** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```
[edit]
user@host# show dynamic-profiles
dynamic-profiles {
  basic-profile {
```

```

interfaces {
    "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
            family inet;
        }
    }
}

```

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

Configuring the Interfaces

Step-by-Step Procedure

Define the physical and logical interfaces for this hierarchical policer example.

1. Configure the physical interface.

```

[edit dynamic-profiles basic-profile]
user@host# set interfaces ge-1/2/0

```
2. Configure the logical interface as unit 0 with its IPv4 (inet) protocol family interface.

```

[edit dynamic-profiles basic-profile interfaces ge-1/2/0]
user@host# set unit 0 family inet address 10.8.0.0/31

```



NOTE: If you apply a Layer 2 policer to this logical interface, you must configure at least one protocol family.

Results Confirm the configuration by entering the **show dynamic-profiles basic-profile interfaces** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```

[edit]
user@host# show dynamic-profiles basic-profile interfaces
ge-1/2/0 {
    unit 0 {
        family inet {
            address 10.8.0.0/31;
        }
    }
}

```

Configuring the Firewall Filter

Step-by-Step Procedure

To configure a hierarchical policer as a filter action, you must first configure a firewall filter.

1. Configure the family address type (inet for IPv4) for the firewall filter and specify the filter name.

We recommend that you name the filter something that indicates the filter's purpose.

```
[edit dynamic-profiles basic-profile]
user@host# set firewall family inet filter hierarch-filter
```

2. To override the aggregation of the counters and policing actions and make each counter or policy function specific to each interface application, include the **interface-specific** statement in the filter.

```
[edit dynamic-profiles basic-profile firewall family inet filter hierarch-filter]
user@host# set interface-specific
```

3. Specify the term names for the filter.

Make each term name unique and represent what its function is.

```
[edit dynamic-profiles basic-profile firewall family inet filter hierarch-filter]
user@host# set term match-ip1
user@host# set term match-ip2
```

4. In each firewall filter term, specify the conditions used to match components of a packet.

Configure the first term to match IPv4 packets received through TCP with the IP precedence field critical-ecp (0xa0) protocol, and apply the hierarchical policer as a filter action.

```
[edit dynamic-profiles basic-profile firewall family inet filter hierarch-filter term
match-ip1]
user@host# set from precedence critical-ecp protocol
user@host# set from protocol tcp
```

5. Specify the actions to take when the packet matches all of the conditions in the first term. Enable all hierarchical policers in one filter to share the same policer instance in the Packet Forward Engine.

```
[edit dynamic-profiles basic-profile firewall family inet filter hierarch-filter term
match-ip1]
user@host# set then hierarchical-policer hp1-share filter-specific
```

6. Configure the second term to match IPv4 packets received through TCP with the IP precedence field internet-control (0xc0), and apply the hierarchical policer as a filter action.

```
[edit dynamic-profiles basic-profile firewall family inet filter hierarch-filter term
match-ip2]
user@host# set from precedence internet-control
user@host# set from protocol tcp
```

7. Specify the actions to take when the packet matches all of the conditions in the second term.

```
[edit dynamic-profiles basic-profile firewall family inet filter hierarch-filter term match-ip2]
user@host# set then hierarchical-policer hp2-share
```

Results Confirm the configuration by entering the **show dynamic-profiles basic-profile firewall** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```
[edit]
user@host# show dynamic-profiles basic-profile firewall
```

```

family inet {
  filter hierarch-filter {
    interface-specific;
    term match-ip1 {
      from {
        precedence critical-ecp protocol;
        protocol tcp;
      }
      then hierarchical-policer hp1-share;
    }
    term match-ip2 {
      from {
        precedence internet-control;
        protocol tcp;
      }
      then hierarchical-policer hp2-share;
    }
  }
}

```

Configuring the Forwarding Classes

Step-by-Step Procedure Define forwarding classes referenced as aggregate policer actions. For hierarchical policers to work, ingress traffic must be correctly classified into premium and non-premium buckets. Some class-of-service (CoS) configuration is required because the hierarchical policer must be able to separate premium/expedited forwarding (EF) traffic from non-premium/non-EF traffic.

1. Enable configuration of the forwarding classes.

```

[edit]
user@host# set class-of-service forwarding-classes

```

2. Define CoS forwarding classes to include the designation of which forwarding class is premium. This defaults to the forwarding class associated with EF traffic.

```

[edit class-of-service forwarding-classes]
user@host# set class fc0 queue-num 0 priority high policing-priority premium
user@host# set class fc1 queue-num 1 priority low policing-priority normal
user@host# set class fc2 queue-num 2 priority low policing-priority normal
user@host# set class fc3 queue-num 3 priority low policing-priority normal

```

Results Confirm the configuration of the forwarding classes referenced as aggregate policer actions by entering the **show class-of-service** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```

[edit]
user@host# show class-of-service
forwarding-classes {
  class fc0 queue-num 0 priority high policing-priority premium;
  class fc1 queue-num 1 priority low policing-priority normal;
  class fc2 queue-num 2 priority low policing-priority normal;
  class fc3 queue-num 3 priority low policing-priority normal;
}

```

Configuring the Hierarchical Policer

Step-by-Step Procedure

Configure the aggregate and premium policing components of a hierarchical policer.

1. Enable configuration of the hierarchical policer.

```
[edit dynamic-profiles basic-profile]
user@host# set firewall hierarchical-policer policer-agg-prem
```

2. Configure the aggregate policer to have a bandwidth limit set to 10 Mbps, burst-size limit set to 100 KB, and nonconforming action set to change the forwarding class to fc1.

```
[edit dynamic-profiles basic-profile firewall hierarchical-policer policer-agg-prem]
user@host# set aggregate if-exceeding bandwidth-limit 10m burst-size-limit 100k
user@host# set aggregate then forwarding-class fc1
```



NOTE: For aggregate policers, the configurable actions for a packet in a nonconforming flow are to discard the packet, change the loss priority, or change the forwarding class.

3. Configure the premium policer to have a bandwidth limit set to 2 Mbps, burst-size limit set to 50 KB, and nonconforming action set to discard packets.

```
[edit dynamic-profiles basic-profile firewall hierarchical-policer policer-agg-prem]
user@host# set premium if-exceeding bandwidth-limit 2m burst-size-limit 50k
user@host# set premium then discard
```



NOTE: The bandwidth limit for the premium policer must not be greater than that of the aggregate policer. For the premium policers, the only configurable action for a packet in a nonconforming traffic flow is to discard the packet.

Results Confirm the configuration of the hierarchical policer by entering the **show dynamic-profiles basic-profile firewall** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```
[edit]
user@host# show dynamic-profiles basic-profile firewall
hierarchical-policer policer-agg-prem {
  aggregate {
    if-exceeding {
      bandwidth-limit 10m;
      burst-size-limit 100k;
    }
    then {
      forwarding-class fc1;
    }
  }
}
```

```

    }
    premium {
      if-exceeding {
        bandwidth-limit 2m;
        burst-size-limit 50k;
      }
      then {
        discard;
      }
    }
  }
}

```

Applying the Hierarchical Policer to Layer 2 Ingress Traffic at a Physical or Logical Interface

Step-by-Step Procedure You can apply policers directly to an interface or applied through a filter to affect only matching traffic. In most cases, you can invoke a policing function at ingress, egress, or in both directions.

- For physical interfaces, a hierarchical policer uses a single policer instance to rate-limit all logical interfaces and protocol families configured on a physical interface, even if the logical interfaces have mutually exclusive families such as inet or bridge.
- For logical interfaces, a hierarchical policer can police the traffic from multiple protocol families without requiring a separate instantiation of a policer for each such family on the logical interface.

To hierarchically rate-limit Layer 2 ingress traffic for IPv4 traffic on logical interface ge-1/2/0.0, reference the policer from the logical interface configuration.

1. Configure the logical interface.

```

[edit dynamic-profiles basic-profile]
user@host# set interfaces ge-1/2/0 unit 0

```

When you apply a policer to Layer 2 traffic at a logical interface, you must define at least one protocol family for the logical interface.

2. Apply the policer to the logical interface.

```

[edit dynamic-profiles basic-profile interfaces ge-1/2/0 unit 0]
user@host# set layer2-policer input-hierarchical-policer policer-agg-prem

```

Alternatively, to hierarchically rate-limit Layer 2 ingress traffic for all protocol families and for *all logical interfaces* configured on physical interface ge-1/2/0, reference the policer from the physical interface configuration.

Results Confirm the configuration of the hierarchical policer by entering the **show dynamic-profiles basic-profile interfaces** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```

[edit]
user@host# show dynamic-profiles basic-profile interfaces
ge-1/2/0 {
  unit 0 {

```

```

layer2-policer {
    input-hierarchical-policer policer-agg-prem;
}
family inet {
    address 10.8.0.0/31;
}
}
}

```

Verification

Confirm that the configuration is working properly.

- [Displaying Traffic Statistics for the Interface on page 244](#)
- [Displaying Number of Packets Policed by the Specified Policer on page 246](#)

Displaying Traffic Statistics for the Interface

Purpose Verify the traffic flow through the physical interface.

Action Use the **show interfaces** operational mode command for physical interface ge-1/2/0, and include the **detail** or **extensive** option.

```
user@host> show interfaces ge-1/2/0 extensive
```

```

Physical interface: ge-1/2/0, Enabled, Physical link is Down
  Interface index: 156, SNMP ifIndex: 630, Generation: 159
  Link-level type: Ethernet, MTU: 1514, MRU: 1522, Speed: 1000mbps, BPDU Error:
  None, MAC-REWRITE Error: None, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
  Remote fault: Online
  Pad to minimum frame size: Disabled
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x4000
  Link flags     : None
  CoS queues     : 8 supported, 8 maximum usable queues
  Schedulers     : 0
  Hold-times     : Up 0 ms, Down 0 ms
  Current address: 4c:96:14:77:77:08, Hardware address: 4c:96:14:77:77:08
  Last flapped   : 2014-11-10 13:36:25 EST (01:26:30 ago)
  Statistics last cleared: Never
Traffic statistics:
  Input bytes   :          0          0 bps
  Output bytes  :         42          0 bps
  Input packets :          0          0 pps
  Output packets:          1          0 pps
IPv6 transit statistics:
  Input bytes   :          0
  Output bytes  :          0
  Input packets :          0
  Output packets:          0
Dropped traffic statistics due to STP State:
  Input bytes   :          0
  Output bytes  :          0
  Input packets :          0
  Output packets:          0
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runt: 0, Policed discards: 0, L3

```



```

incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  FIFO errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 0, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
  FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0,
  Resource errors: 0
Egress queues: 8 supported, 8 in use
Queue counters:      Queued packets  Transmitted packets      Dropped packets

    0                  0              0              0
    1                  0              0              0
    2                  0              0              0
    3                  0              0              0
    4                  0              0              0
    5                  0              0              0
    6                  0              0              0
    7                  0              0              0

Queue number:      Mapped forwarding classes
    0              best-effort
    1              expedited-forwarding
    2              assured-forwarding
    3              network-control
    4              be1
    5              ef1
    6              af1
    7              nc1
Active alarms : LINK
Active defects : LINK
MAC statistics:
Total octets      Receive      Transmit
Total packets      0              0
Unicast packets    0              0
Broadcast packets  0              0
Multicast packets  0              0
CRC/Align errors   0              0
FIFO errors        0              0
MAC control frames 0              0
MAC pause frames   0              0
Oversized frames   0
Jabber frames      0
Fragment frames    0
VLAN tagged frames 0
Code violations     0
Total errors       0              0
Filter statistics:
Input packet count      0
Input packet rejects    0
Input DA rejects        0
Input SA rejects        0
Output packet count     0
Output packet pad count 0
Output packet error count 0
CAM destination filters: 0, CAM source filters: 0

```

```

Autonegotiation information:
  Negotiation status: Incomplete
Packet Forwarding Engine configuration:
  Destination slot: 0 (0x00)
CoS information:
  Direction : Output
  CoS transmit queue      Bandwidth      Buffer Priority
Limit
      0 best-effort      95      950000000      95      0      low
none
      3 network-control  5      50000000      5      0      low
none
Interface transmit statistics: Disabled

```

Meaning The command output section for **Traffic statistics** lists the number of bytes and packets received and transmitted on the interface.

Displaying Number of Packets Policed by the Specified Policer

Purpose Verify the number of packets evaluated by the policer. Premium policer counters are not supported.

Action Use the **show policer** operational mode command and optionally specify the name of the policer **policer-agg-prem**. The command output displays the number of packets evaluated by the specified policer in each direction.

```

user@host> show policer policer-agg-prem
Policers:
Name                                     Bytes      Packets
policer-agg-prem-ge-1/2/0.0-inet-i      10372300    103723

```

The **-inet-i** suffix denotes a policer applied to IPv4 input traffic. In this example, the policer is applied to input traffic only.

Meaning The command output displays the number of packets evaluated by the specified policer in each direction.

Related Documentation

- [Methods for Regulating Traffic by Applying Hierarchical Policers on page 231](#)
- [Hierarchical Policer Applied as Filter Action on page 234](#)

PART 2

Configuring Dynamic Firewall Filters

- [Dynamic Firewall Filters Overview on page 249](#)
- [Configuring Static Firewall Filters That Are Dynamically Applied on page 253](#)
- [Streamlining Processing of Chains of Static Filters on page 261](#)
- [Dynamically Attaching Static or Fast Update Filters to an Interface on page 267](#)
- [Configuring Filters That Are Created Dynamically on page 271](#)
- [Using Ascend Data Filters to Implement Firewalls Based on RADIUS Attributes on page 289](#)
- [Configuring Fast Update Filters to Provide More Efficient Processing Over Classic Static Filters on page 305](#)
- [Defending Against DoS and DDoS Attacks Using Unicast RPF and Fail Filters on page 325](#)
- [Improving Scaling and Performance of Filters on Static Subscriber Interfaces on page 333](#)
- [Configuring Dynamic Service Sets on page 337](#)
- [Monitoring and Managing Firewalls for Subscriber Access on page 339](#)

Dynamic Firewall Filters Overview

- [Understanding Dynamic Firewall Filters on page 249](#)
- [Defining Dynamic Filter Processing Order on page 250](#)

Understanding Dynamic Firewall Filters

Firewall filters provide rules that define whether to accept or reject packets that are transiting an interface on a router. The subscriber management feature supports four categories of firewall filters:

- Classic filters are static filters that are applied to an interface dynamically. They are compiled at commit time and then, when a service is activated, an interface-specific filter is created and attached to a logical interface. This dynamic application is performed by associating input or output filters with a dynamic profile. When triggered, a dynamic profile applies the filter to an interface. Because classic filters are static, they cannot contain subscriber-specific terms (also called rules).
- Parameterized filters allow you to implement customized filters for each subscriber session. In parameterized filters, you use variables to define a filter. When services are activated for a subscriber, actual values such as policing rates, destination addresses, or ports are substituted for the variables and are used to create filters.
- Ascend-Data-Filters allow you to create dynamic filters based on values received from the RADIUS server in the Ascend-Data-Filter attribute (RADIUS attribute 242). The filter is configured on the RADIUS server and contains rules that specifically match conditions for traffic and define an action for the router to perform. When services are activated for a subscriber, a filter is created based on the values in the RADIUS attribute. You can also use Ascend-Data-Filters to create static filters by configuring the Ascend-Data-Filter attribute in a dynamic profile.
- Fast update filters are similar to classic filters. However, fast update filters support subscriber-specific, rather than interface-specific, filter values. Fast update filters also allow individual filter terms to be incrementally added or removed from filters without requiring that the entire filter be recompiled for each modification. Fast update filters are essential for networking environments in which multiple subscribers share the same logical interface.

You configure firewall filters to determine whether to accept or reject traffic before it enters or exits an interface to which the firewall filter is applied. An *input* (or *ingress*)

firewall filter is applied to packets that are entering a network. An *output* (or *egress*) firewall filter is applied to packets that are exiting a network. You can configure firewall filters to subject packets to filtering or class-of-service (CoS) marking (grouping similar types of traffic together and treating each type of traffic as a class with its own level of service priority).

**Related
Documentation**

- [Classic Filters Overview on page 253](#)
- [Ascend-Data-Filter Policies for Subscriber Management Overview on page 289](#)
- [Parameterized Filters Overview on page 271](#)
- [Fast Update Filters Overview on page 306](#)
- [Dynamically Attaching Statically Created Filters for Any Interface Type on page 268](#)
- [Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 267](#)
- [Dynamically Attaching Filters Using RADIUS Variables](#)

Defining Dynamic Filter Processing Order

You can force filter processing to occur in a particular order by using the **precedence** statement. You specify a precedence for input and output filters within a dynamic profile at the **[edit dynamic-profiles *profile-name* interfaces (*interface-name* | demux0) unit *logical-unit-number* family *family*]** hierarchy level.

The precedence range is from 0 through 250. Setting a lower precedence value for a filter gives it a higher precedence within the dynamic profile. A precedence of zero (the default) gives the filter the highest precedence. If no precedence is specified, the filter receives a precedence of zero (highest precedence). Filters with matching precedence (zero or otherwise) are applied in random order.

Before you define a precedence for a filter in a dynamic profile.

1. Create the filters you want to attach to the dynamic profile.

See *Firewall Filters Overview* for information about firewall filters and how to create them.

2. Create a basic dynamic profile.

See *Configuring a Basic Dynamic Profile*.

3. Attach the filters to the dynamic profile.

See “Dynamically Attaching Statically Created Filters for Any Interface Type” on page 268, “Dynamically Attaching Statically Created Filters for a Specific Interface Family Type” on page 267, or *Dynamically Attaching Filters Using RADIUS Variables*.

To define a precedence for an input and output filter:

1. Specify the input filter precedence in the dynamic profile.

```
[edit dynamic-profiles profile-name interfaces interface-name unit logical-unit-number  
  family family]
```

```
user@host# set filter input precedence 50
```

2. Specify the output filter precedence in the dynamic profile.

```
[edit dynamic-profiles profile-name interfaces interface-name unit logical-unit-number  
  family family]
```

```
user@host# set filter output precedence 5
```

- Related Documentation**
- [Classic Filters Overview on page 253](#)
 - [Firewall Filters Overview](#)

Configuring Static Firewall Filters That Are Dynamically Applied

- [Classic Filters Overview on page 253](#)
- [Basic Classic Filter Syntax on page 256](#)
- [Examples: Configuring Static Filters on page 256](#)

Classic Filters Overview

The dynamic firewall feature supports classic filters, which are static filters that are applied to an interface dynamically. They are compiled at commit time and then, when a service is activated, an interface-specific clone of the filter is created and attached to a logical interface. This dynamic application is performed by associating input or output filters with a dynamic profile.

This overview covers:

- [Classic Filter Types on page 253](#)
- [Classic Filter Components on page 254](#)
- [Classic Filter Processing on page 254](#)
- [Guidelines for Creating and Applying Classic Filters for Subscriber Interfaces on page 255](#)

Classic Filter Types

The following classic filter types are supported:

- Port (Layer 2) firewall filter—Port firewall filters apply to Layer 2 switch ports. You can apply port firewall filters only in the ingress direction on a physical port.
- VLAN firewall filter—VLAN firewall filters provide access control for packets that enter a VLAN, are bridged within a VLAN, and leave a VLAN. You can apply VLAN firewall filters in both ingress and egress directions on a VLAN. VLAN firewall filters are applied to all packets that are forwarded to or forwarded from the VLAN.
- Router (Layer 3) firewall filter—You can apply a router firewall filter in both ingress and egress directions on Layer 3 (routed) interfaces.

Classic Filter Components

When creating a classic filter, you first define the family address type (**inet** or **inet6**) and then you define one or more terms that specify the filtering criteria and the action to take when a match occurs.

Each term, or rule, consists of the following components:

- Match conditions—Specifies values or fields that the packet must contain. You can define various match conditions, including:
 - IP source address field
 - IP destination address field
 - Transmission Control Protocol (TCP) or User Datagram Protocol (UDP) source port field
 - IP protocol field
 - Internet Control Message Protocol (ICMP) packet type
 - TCP flags
 - interfaces
- Actions—Specifies what to do when a match condition occurs. Possible actions are to accept or discard a packet. In addition, packets can be counted to collect statistical information. If no action is specified for a term, the default action is to accept the packet.

Classic Filter Processing

The order of the terms within a classic filter is important. Packets are tested against each term in the order in which the terms are listed in the firewall filter configuration. When a firewall filter contains multiple terms, the router takes a top-down approach and compares a packet against the first term in the firewall filter. If the packet matches the first term, the router executes the action defined by that term to either accept or reject the packet, and no other terms are evaluated. If the router does not find a match between the packet and first term, it then compares the packet to the next term in the firewall filter by using the same match process. If no match occurs between the packet and the second term, the router continues to compare the packet to each successive term defined in the firewall filter until a match is found. If a packet does not match any terms in a firewall filter, the default action is to discard the packet.

You can also specify a precedence (from 0 through 255) for input and output filters within a dynamic profile to force filter processing in a particular order. Setting a lower precedence value for a filter gives it a higher precedence within the dynamic profile. Filters with lower precedence values are applied to interfaces before filters with higher precedence values. A precedence of zero (the default) gives the filter the highest precedence. If no precedence is specified, the filter receives a precedence of zero (highest precedence). Filters with matching precedence (zero or otherwise) are applied in random order.



NOTE: Dynamic filters do not process outbound packets that are sourced from the routing engine. To filter outbound packets that are sourced from the routing engine, you can create static outbound filters for each interface.

Guidelines for Creating and Applying Classic Filters for Subscriber Interfaces

Dynamic configuration of firewall filters is supported. However, you can also continue to create static firewall filters for interfaces as you do normally, and then dynamically apply those filters to statically created interfaces using dynamic profiles. You can also use dynamic profiles to attach input and output filters through RADIUS.

When creating and applying filters, keep the following in mind:

- Dynamic application of only input and output filters is supported.
- The filters must be interface-specific.
- You can create family-specific **inet** and **inet6** filters.
- You can create interface-specific filters at the **unit** level that apply to any family type (**inet** or **inet6**) configured on the interface.
- You can add or remove both IPv4 and IPv6 filters with the same service activation or deactivation.
- You can remove one filter type without impacting the other type of filter. For example, you can remove IPv6 filters and leave the current IPv4 filters active.
- You can chain up to five input filters and four output filters together.
- If you do not configure and apply a filter, the interface uses the default group filter configuration.
- You cannot modify or delete a firewall filter while subscribers on the same logical interface are bound.

Related Documentation

- [Understanding Dynamic Firewall Filters on page 249](#)
- [Fast Update Filters Overview on page 306](#)
- [Dynamically Attaching Statically Created Filters for Any Interface Type on page 268](#)
- [Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 267](#)
- [Dynamically Attaching Filters Using RADIUS Variables](#)
- [Verifying and Managing Firewall Filter Configuration on page 339](#)

Basic Classic Filter Syntax

This section provides the basic classic filter CLI statement syntax. The first part of this syntax provides the CLI statements to associate an input and output filter with a dynamic profile. The second part of this syntax represents the configured input and output filters applied to the dynamic profile. When a DHCP event occurs, the dynamic profile applies the specified filters to the DHCP client interface on the router.

```
[edit]
dynamic-profiles [profile-name] {
  interfaces {
    [$junos-interface-ifd-name] {
      unit [$junos-underlying-interface-unit] {
        family family {
          filter {
            input {
              [filter-name];
              precedence [precedence];
            }
            output {
              [filter-name];
              precedence [precedence];
            }
          }
        }
      }
    }
  }
}
[edit]
firewall {
  family [family] {
    filter [filter-name] {
      [desired filter configuration]
    }
    filter [filter-name] {
      [desired filter configuration]
    }
  }
}
```

Related Documentation

- [Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 267](#)
- [Understanding Dynamic Firewall Filters on page 249](#)

Examples: Configuring Static Filters

This topic provides some static filter configuration examples.

```
firewall {
  policer p1 {
    if-exceeding {
      bandwidth-limit 5m;
      burst-size-limit 10m;
    }
  }
}
```

```
    }
    then discard;
  }
family inet {
  filter dfwd {
    interface-specific;
    term 1 {
      from {
        source-address {
          192.1.1.0/24;
        }
      }
      then {
        count c1;
        next term;
      }
    }
    term 2 {
      from {
        source-address {
          192.2.1.0/24;
        }
      }
      then count c2;
    }
    term 3 {
      then accept;
    }
  }
  filter dfwd1 {
    interface-specific;
    term 1 {
      from {
        address {
          192.1.1.0/24;
        }
      }
      then {
        discard;
      }
    }
  }
}
filter tos {
  interface-specific;
  term 1 {
    from {
      precedence priority;
    }
    then forwarding-class assured-forwarding;
  }
  term 2 {
    then {
      log;
      accept;
    }
  }
}
```

```
}
filter dfwd2 {
  interface-specific;
  term 1 {
    from {
      forwarding-class best-effort;
    }
    then {
      sample;
      forwarding-class expedited-forwarding;
    }
  }
  term 2 {
    then accept;
  }
}
filter nodhcp {
  term dhcpdiscover {
    from {
      protocol udp;
      source-port 68;
      destination-port 67;
    }
    then {
      discard;
    }
  }
  term others {
    then accept;
  }
}
filter p1 {
  interface-specific;
  term 1 {
    from {
      precedence priority;
    }
    then {
      policer p1;
      log;
    }
  }
  term 2 {
    then accept;
  }
}
filter dscp {
  interface-specific;
  term 1 {
    from {
      dscp af11;
    }
    then log;
  }
  term 2 {
    then accept;
  }
}
```

```
    }  
  }  
  filter tcm {  
    interface-specific;  
    term 1 {  
      from {  
        dscp af11;  
      }  
      then policer p1;  
    }  
    term 2 {  
      then accept;  
    }  
  }  
}  
traceoptions {  
  flag dynamic;  
}  
}
```

**Related
Documentation**

- [Dynamically Attaching Statically Created Filters for Any Interface Type on page 268](#)
- [Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 267](#)

CHAPTER 20

Streamlining Processing of Chains of Static Filters

- [Configuring Firewall Filter Bypass on page 261](#)
- [Example: Bypassing Firewall Filters on page 262](#)

Configuring Firewall Filter Bypass

You can streamline the filter process, decrease the amount of packet handling for each filter in a chain, and effectively bypass unnecessary filters by using the **service-filter-hit** match/action combination at the `[edit firewall family family-name filter filter-name term term-name]` hierarchy level.

To bypass firewall filters using the **service-filter-hit** match/action combination, you configure the **service-filter-hit** action in at least one filter in the chain and configure **service-filter-hit** match condition in any subsequent filters that you want to bypass. All packets must pass through each filter in a chain. However, after the **service-filter-hit** flag is set in a packet, the packet “bypasses” any subsequent filters that contain the **service-filter-hit** match condition and more efficiently passes (accepts) marked packets and accelerating the filter process.



NOTE: When using the **service-filter-hit** match/action combination, the order in which the filters are applied is important. You can ensure the order in which the filters are processed by specifying a filter precedence value for the interface. See “[Defining Dynamic Filter Processing Order](#)” on page 250 for more information about dynamic filter processing.

To bypass filter processing:

1. Specify the **service-filter-hit** action for any filters in a filter chain.

```
[edit firewall family inet filter video term 1]  
user@host# set then service-filter-hit
```

When the match conditions for the filter are met, the **service-filter-hit** action is set to indicate to subsequent filters that further processing is unnecessary.

2. Specify the **service-filter-hit** match condition in any filters with a lower precedence (that is, a higher [precedence](#) statement value) that you want to detect **service-filter-hit** actions applied from previous filters in the chain.

```
[edit firewall family inet filter data term 1]
user@host# set from service-filter-hit
```

3. Configure the filter to pass (accept) any packet that has a **service-filter-hit** action applied from any previous filters.

```
[edit firewall family inet filter data term 1]
user@host# set then accept
```

Related Documentation

- [Classic Filters Overview on page 253](#)
- [Defining Dynamic Filter Processing Order on page 250](#)
- [Example: Bypassing Firewall Filters on page 262](#)

Example: Bypassing Firewall Filters

This example describes how to configure multiple filters using the **service-filter-hit** match/action combination and contains the following sections:

- [Before You Begin on page 262](#)
- [Filter Bypass Overview on page 262](#)
- [Configuring Filter Bypass on page 263](#)

Before You Begin

When using the **service-filter-hit** match/action combination, keep the following in mind:

- The order in which the filters are applied is important. You can ensure the order in which the filters are processed by specifying a filter precedence value for the interface. See [“Defining Dynamic Filter Processing Order” on page 250](#) for more information about dynamic filter processing and how to use the [precedence](#) statement.
- The following example uses policers to further define the match conditions each filter uses. These filters are not described here. To better understand how to configure policers, see *Statement Hierarchy for Configuring Policers*.

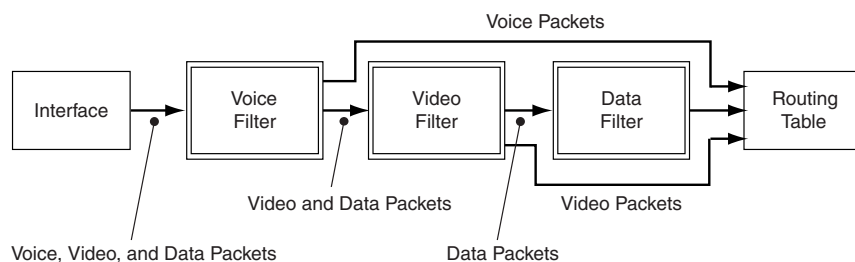
Filter Bypass Overview

Packets must pass through each filter in a chain. However, if you create a chain of filters to process different types of packets (for example, voice, video, and data packets), you can streamline the filter process, decreasing the amount of packet handling for each filter in the chain, effectively bypassing unnecessary filters, by using the **service-filter-hit** match/action combination at the `[edit firewall family family-name filter filter-name term term-name]` hierarchy level.

[Figure 24 on page 263](#) shows the logical processing flow through a chain of three filters (voice, video, and data) where only processing for a specific data type is desired. This

configuration example shows an ingress filter flow. Though subsequent ingress filters in a chain can detect whether the **service-filter-hit** action is set, egress filters do not. To bypass egress filters, you must also configure the **service-filter-hit** match/action combination on those filters.

Figure 24: Logical Flow Example for Filter Bypass Processing



g017470

Configuring Filter Bypass

- [Configuring the Voice Filter on page 263](#)
- [Configuring the Video Filter on page 264](#)
- [Configuring the Data Filter on page 264](#)
- [Results on page 264](#)

CLI Quick Configuration

To quickly configure this example:

```
[edit]
set firewall filter voice term T1 from address 1.1.1.1/32
set firewall filter voice term T1 from source-port 5004-5005
set firewall filter voice term T1 then forwarding-class assured-forwarding service-filter-hit
  accept
set firewall filter voice term default then accept
set firewall filter video term T1 from service-filter-hit
set firewall filter video term T1 then accept
set firewall filter video term T2 from source-address 10.10.10.10/32
set firewall filter video term T2 then policer video-policer service-filter-hit accept
set firewall filter video term default then accept
set firewall filter data term T1 from service-filter-hit
set firewall filter data term T1 then accept
set firewall filter data term T2 then policer data-policer service-filter-hit accept
```

Configuring the Voice Filter

Step-by-Step Procedure

To configure the voice filter for the logical flow in [Figure 24 on page 263](#):

1. Configure the filter to apply the assured forwarding class and set the **service-filter-hit** action for traffic from a specific address and port range (over which voice traffic is expected).

```
[edit]
set firewall filter voice term T1 from address 1.1.1.1/32
set firewall filter voice term T1 from source-port 5004-5005
set firewall filter voice term T1 then forwarding-class assured-forwarding
  service-filter-hit accept
```

2. Configure the filter default action to pass (accept) packet traffic from any other address or port range.

[edit]

set firewall filter voice term default then accept

Configuring the Video Filter

Step-by-Step Procedure

To configure the video filter for the logical flow in [Figure 24 on page 263](#):

1. Configure the filter to pass (accept) incoming packets that are tagged by the **service-filter-hit** action.

[edit]

set firewall filter video term T1 from service-filter-hit

set firewall filter video term T1 then accept

2. Configure the filter to apply a video policer and set the **service-filter-hit** action for traffic from a specific address (over which video traffic is expected).

[edit]

set firewall filter video term T2 from source-address 10.10.10.10/32

set firewall filter video term T2 then policer video-policer service-filter-hit accept

3. Configure the filter default action to pass (accept) packet traffic from any other address or port range.

[edit]

set firewall filter video term default then accept

Configuring the Data Filter

Step-by-Step Procedure

To configure the data filter for the logical flow in [Figure 24 on page 263](#):

1. Configure the filter to pass (accept) incoming packets that are tagged by the **service-filter-hit** action.

[edit]

set firewall filter data term T1 from service-filter-hit

set firewall filter data term T1 then accept

2. Configure the filter to apply a data policer and set the **service-filter-hit** action for traffic from a specific address (over which video traffic is expected).

[edit]

set firewall filter data term T2 then policer data-policer service-filter-hit accept

Results

Display the results of the configuration:

```
[edit firewall]
user@host# show
filter voice {
  term T1 {
    from {
      address {
```

```
        1.1.1.1/32;
    }
    source-port 5004-5005;
}
then {
    forwarding-class assured-forwarding;
    service-filter-hit;
    accept;
}
}
term default {
    then accept;
}
}
filter video {
    term T1 {
        from {
            service-filter-hit;
        }
        then accept;
    }
    term T2 {
        from {
            source-address {
                10.10.10.10/32;
            }
        }
        then {
            policer video_policer;
            service-filter-hit;
            accept;
        }
    }
    term default {
        then accept;
    }
}
filter data {
    term T1 {
        from {
            service-filter-hit;
        }
        then accept;
    }
    term T2 {
        then {
            policer data_policer;
            service-filter-hit;
            accept;
        }
    }
}
```

Related Documentation • [Classic Filters Overview on page 253](#)

- [Defining Dynamic Filter Processing Order on page 250](#)
- *Statement Hierarchy for Configuring Policers*
- [Configuring Firewall Filter Bypass on page 261](#)

Dynamically Attaching Static or Fast Update Filters to an Interface

- [Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 267](#)
- [Dynamically Attaching Statically Created Filters for Any Interface Type on page 268](#)

Dynamically Attaching Statically Created Filters for a Specific Interface Family Type

You can dynamically attach statically created filters for either IPv4 (**inet**) or IPv6 (**inet6**) interface types. These filters apply only to interfaces of the specified type.

Before you can attach a statically created filter using a dynamic profile.

1. Create the filters you want to attach.

See *Firewall Filters Overview* for information about classic firewall filters and how to create them. See [“Configuring Fast Update Filters” on page 310](#) for information about creating fast update filters.

2. Create a basic dynamic profile.

See *Configuring a Basic Dynamic Profile*.

To dynamically attach statically created input and output filters:

1. Specify the unit family type you want to use when dynamically attaching the filters.

- a. For IPv4 interfaces, specify the **inet** unit family.

```
[edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1]  
user@host# set family inet
```

- b. For IPv6 interfaces, specify the **inet6** unit family.

```
[edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1]  
user@host# set family inet6
```

2. Specify the input filter in the dynamic profile.

```
[edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1 family inet]  
user@host# set filter input static-input-filter
```

3. Specify the output filter in the dynamic profile.



NOTE: The following example specifies an optional precedence value for the output filter.

```
[edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1 family inet]
user@host# set filter output static-output-filter precedence 50
```

**Related
Documentation**

- [Classic Filters Overview on page 253](#)
- [Fast Update Filters Overview on page 306](#)
- [Dynamically Attaching Statically Created Filters for Any Interface Type on page 268](#)
- *Dynamically Attaching Filters Using RADIUS Variables*
- *Using Junos OS Defaults Groups*
- *Firewall Filters Overview*

Dynamically Attaching Statically Created Filters for Any Interface Type

You can dynamically attach statically created filters for any interface type. These filters apply to any interfaces that are created using the dynamic profile.



NOTE: For an L2TP LNS on MX Series routers, you can attach firewall for static LNS sessions by configuring these at logical interfaces directly on the inline services device (si-fpc/pic/port). RADIUS-configured firewall attachments are not supported.

Before you can attach a statically created filter using a dynamic profile.

1. Create the filters you want to attach.

See *Firewall Filters Overview* for information about classic firewall filters and how to create them. See “[Configuring Fast Update Filters](#)” on [page 310](#) for information about creating fast update filters.

2. Create a basic dynamic profile.

See *Configuring a Basic Dynamic Profile*.

To dynamically attach statically created input and output filters for all interfaces created dynamically using the dynamic profile:

1. Access the dynamic profile, interface, and unit that you want to use when applying the static filters.

```
[edit]
user@host# edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1
```

2. Specify the input filter for the interface unit.

```
[edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1]
```



```
user@host# set filter input static-input-filter
```

3. Specify the output filter for the interface unit.

```
[edit dynamic-profiles access-profile interfaces ge-1/1/1 unit 1]
```

```
user@host# set filter output static-output-filter
```

**Related
Documentation**

- [Classic Filters Overview on page 253](#)
- [Fast Update Filters Overview on page 306](#)
- [Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 267](#)
- *Dynamically Attaching Filters Using RADIUS Variables*
- *Using Junos OS Defaults Groups*
- *Firewall Filters Overview*

CHAPTER 22

Configuring Filters That Are Created Dynamically

- [Parameterized Filters Overview on page 271](#)
- [Unique Identifiers for Firewall Variables on page 272](#)
- [Configuring Unique Identifiers for Parameterized Filters on page 274](#)
- [Sample Dynamic-Profile Configuration for Parameterized Filters on page 275](#)
- [Dynamic Profile After UID Substitutions for Parameterized Filters on page 277](#)
- [Multiple Parameterized Filters on page 278](#)
- [Parameterized Filter Processing Overview on page 278](#)
- [Parameterized Filters Configuration Considerations on page 280](#)
- [Guidelines for Creating and Applying Parameterized Filters for Subscriber Interfaces on page 281](#)
- [IPv4 Parameterized Filter Match Conditions on page 282](#)
- [IPv6 Parameterized Filter Match Conditions on page 282](#)
- [Parameterized Filter Actions and Modifiers on page 283](#)
- [Parameterized Filter Policer Actions on page 284](#)
- [Interface-Shared Filters Overview on page 284](#)
- [Example: Implementing a Filter for Households That Use ACI-Based VLANs on page 285](#)
- [Example: Dynamic-Profile Parsing on page 286](#)
- [Example: Firewall Dynamic Profile on page 287](#)

Parameterized Filters Overview

Parameterized filters allow you to implement customized filters for each subscriber session. In parameterized filters, you use variables called unique identifiers (UIDs) to define your filter. When services are activated for a subscriber, actual values are substituted for the variables and are used to create filters.

Parameterized filters are configured under a dynamic profile. You can configure a general baseline filter under a dynamic profile and then provide specific variables of that filter when a dynamic session is activated. These variables can include policing rates, destination addresses, ports, and other items.

To provide better scaling, the system analyzes a dynamic profile, and then determines whether the set of variables for one session is the same as for a previous session. If a matching filter already exists, the session creates an interface-specific filter copy of that filter template. If the filter does not already exist, the session reads the configuration and compiles a new filter. This filter is installed as a template with an interface-specific filter copy for the current session pointing to it.

**Related
Documentation**

- [Understanding Dynamic Firewall Filters on page 249](#)
- [Unique Identifiers for Firewall Variables on page 272](#)
- [Sample Dynamic-Profile Configuration for Parameterized Filters on page 275](#)
- [Dynamic Profile After UID Substitutions for Parameterized Filters on page 277](#)
- [Example: Dynamic-Profile Parsing on page 286](#)
- [Parameterized Filters Configuration Considerations on page 280](#)
- [Parameterized Filter Processing Overview on page 278](#)

Unique Identifiers for Firewall Variables

The system uses unique identifiers (UIDs) to aid with scaling. The UID enables the system to determine when configuration objects from multiple subscribers are identical and can be shared. In many situations, such as a filter definition, sharing a single filter among multiple subscribers instead of creating a new filter for every subscriber helps to conserve system resources.

Within a dynamic profile a UID is used to name a configuration object. The system assigns the value of the UID (the object's name) based upon all the variables contained within that configuration stanza along with the dynamic profile's name. The assigned UID value consists of the UID name combined with the string `_UID` and a unique number. For instance, the UID `$my-filter` might be given the value `my-filter_UID1022`.

You must first define a UID under the **variable** stanza using the option **uid**. The UID must be defined at the end, after all the variables that are assigned values externally.

```
dynamic-profile test-profile {  
  [variables] {  
    ... [other variables] ...  
    [my-filter] {  
      uid;  
    }  
  }  
}
```

After a UID has been defined, it can then be used to name an object:

```
dynamic-profile test-profile {  
  firewall {  
    family inet {  
      filter [$my-filter] {  
        ... [filter definition that makes use of other variables] ...  
      }  
    }  
  }  
}
```

```

    }
  }
}

```

As previously described, the system assigns the value of **\$my-filter** depending on the values of the variables used within that filter's definition.

The UID is also used in any other place that the object's name is used. For example, here is an interface stanza to use **\$my-filter** as an input filter:

```

dynamic-profile [test-profile] {
  interfaces {
    [$junos-interface-ifd-name] {
      unit [$junos-interface-unit] {
        family inet {
          filter {
            input [$my-filter];
          }
        }
      }
    }
  }
}

```

You can define multiple configuration objects of the same type (that is, multiple filters) as long as each one uses its own, individual, UID. To ensure that the system selects the correct object when assigning a name, use the **uid-reference** variable.

When the uid-reference is used, it is effectively evaluated twice. First, the value of the uid-reference variable is retrieved. Second, that value is used as the name of a UID and that UID value is retrieved. A uid-reference with a value that is not the name of a UID is considered an error.

A uid-reference is defined similarly to any other variable:

```

dynamic-profile [test-profile] {
  variables {
    [my-filter-selector] {
      uid-reference;
    }
  }
}

```

A uid-reference is used wherever the name of the object is needed. One example is the name of the input filter in the following interface stanza:

```

dynamic-profile [test-profile] {
  interfaces {
    [$junos-interface-ifd-name] {
      unit [$junos-interface-unit] {
        family inet {
          filter {
            input [$my-filter-selector];
          }
        }
      }
    }
  }
}

```

```
    }  
  }  
}
```

Consider the case where two parameterized filters are defined: **\$my-filter-1** and **\$my-filter-2**. The **\$my-filter-selector** variable might be assigned the value **my-filter-1** or **my-filter-2**, depending upon which filter is appropriate.

**Related
Documentation**

- [Configuring Unique Identifiers for Parameterized Filters on page 274](#)
- [Parameterized Filter Processing Overview on page 278](#)
- [Parameterized Filters Configuration Considerations on page 280](#)

Configuring Unique Identifiers for Parameterized Filters

This topic discusses how to configure unique identifiers (UIDs) that can then be used in parameterized filters. The dynamic profile obtains and replaces data for these variables from an incoming client data packet.

To configure unique identifiers for parameterized filters in a dynamic profile:

1. Access the desired dynamic profile.

```
[edit]  
user@host# edit dynamic-profiles Profile1  
[edit dynamic-profiles Profile1]
```

2. Configure the UIDs.

If the value for the variable UID comes from RADIUS, configure the variable as a UID reference.

```
[edit dynamic-profiles Profile1]  
user@host# set variable policer1 uid  
user@host# set variable policer2 uid  
user@host# set variable filter1 uid  
user@host# set variable filter2 uid  
user@host# set variables in-filter uid-reference
```

Example of UIDs that can be used in parameterized filters:

```
dynamic profile {  
  Profile1 {  
    variables {  
      policer1 uid;  
      filter1 uid;  
      policer2 uid;  
      filter2 uid;  
      in-filter {  
        uid-reference;  
      }  
    }  
  }  
}
```

- Related Documentation**
- [Unique Identifiers for Firewall Variables on page 272](#)
 - [Parameterized Filters Overview on page 271](#)
 - *Dynamic Variables Overview*
 - *Junos OS Predefined Variables*

Sample Dynamic-Profile Configuration for Parameterized Filters

In the following sample configuration, the **my-svc-prof** profile provides two different filters: **my-filt-1gw** and **my-filt-2gw**. These filters match on either one or two gateway addresses and apply a policer for that traffic. The name of the filter to apply, the gateway addresses, and the bandwidth for the policer are passed into the service profile from the RADIUS service activation. The `uid-reference` type supports selection of a particular UID generated object out of multiple objects in the profile. The `UID` type indicates that a variable is used for UID generation.

```
dynamic-profile {
  [my-svc-prof] {
    variable {
      [my-in-filter] {
        mandatory;
        uid-reference;
      }
      gw1 {
        mandatory;
      }
      gw2 {
        mandatory;
      }
      bw {
        mandatory;
      }
      my-filt-1gw {
        uid;
      }
      my-filt-2gw {
        uid;
      }
      [my-policer] {
        uid;
      }
    }
  }
  interfaces {
    [$junos-interface-ifd-name] {
      unit [$junos-underlying-interface-unit] {
        family inet {
          filter {
            input [$my-in-filter];
          }
        }
      }
    }
  }
}
```

```
}
firewall {
  policer [$my-policer] {
    if-exceeding {
      bandwidth-limit $bw;
      burst-size-limit 15000;
    }
    then discard;
  }
  family inet {
    filter [$my-filt-1gw] {
      interface-specific;
      term t0 {
        from {
          destination-address $gw1;
        }
        then {
          policer [$my-policer];
        }
      }
      term last {
        then {
          count drops;
          discard;
        }
      }
    }
    filter [$my-filt-2gw] {
      interface-specific;
      term t0 {
        from {
          destination-address {
            $gw1;
            $gw2;
          }
        }
        then {
          policer [$my-policer];
        }
      }
      term last {
        then {
          count drops;
          discard;
        }
      }
    }
  }
}
```

**Related
Documentation**

- [Dynamic Profile After UID Substitutions for Parameterized Filters on page 277](#)
- [Example: Dynamic-Profile Parsing on page 286](#)

Dynamic Profile After UID Substitutions for Parameterized Filters

In the following example, the client session is created on the ge-1/0/0.7 interface and this service is activated:

```
my-svc-prof(my-filt-1gw, 207.17.137.239/32, 0, 5m)
```

A dynamic profile is created by the process. The UIDs assigned by the process are based on the parameters being passed in as well as the sessions previously created.

```
dynamic-profile {
  [my-svc-prof] {
    interfaces {
      ge-1/0/0 {
        unit 7 {
          family inet {
            filter {
              input my-filt-1gw_UID1022;
            }
          }
        }
      }
    }
  }
  firewall {
    policer my-policer_UID1005 {
      if-exceeding {
        bandwidth-limit 5m;
        burst-size-limit 15000;
      }
      then discard;
    }
    family inet {
      filter my-filt-1gw_UID1022 {
        interface-specific;
        term t0 {
          from {
            destination-address 207.17.137.239/32;
          }
          then {
            policer my-policer_UID1005;
          }
        }
        term last {
          then {
            count drops;
            discard;
          }
        }
      }
    }
    filter my-filt-2gw_UID11018 {
      interface-specific;
      term t0 {
        from {
          destination-address {
            207.17.137.239/32;
          }
        }
      }
    }
  }
}
```

```
        0;
      }
    }
    then {
      policer my-policer_UID1005;
    }
  }
  term last {
    then {
      count drops;
      discard;
    }
  }
}
}
```

- Related Documentation**
- [Sample Dynamic-Profile Configuration for Parameterized Filters on page 275](#)
 - [Example: Dynamic-Profile Parsing on page 286](#)

Multiple Parameterized Filters

Differing filter match conditions can be achieved by allowing the filter that is being attached to be selected by the unique-identifier--reference capabilities of parameterized filters. If a variable number of terms or varying match conditions are needed, multiple filters are defined. When the service is activated, that activation will select the particular filter that should be applied in the stanza specifying the interface, unit, family and input/output filter:

```
interfaces {
  ge-1/0/0 {
    unit 7 {
      family inet {
        filter {
          input my-filt-1gw-uid1022;
        }
      }
    }
  }
}
```

- Related Documentation**
- [Parameterized Filter Processing Overview on page 278](#)
 - [Parameterized Filters Configuration Considerations on page 280](#)

Parameterized Filter Processing Overview

When creating a parameterized filter, you first define the family address type (**inet** or **inet6**) and then you define one or more terms that specify the filtering criteria and the action to take when a match occurs.

Each term, or rule, consists of the following components:

- Match conditions—Specifies values or fields that the packet must contain. You can define various match conditions, including:
 - IP source address field
 - IP destination address field
 - Transmission Control Protocol (TCP) or User Datagram Protocol (UDP) source port field
 - IP protocol field
 - Internet Control Message Protocol (ICMP) packet type
 - TCP flags
 - interfaces
- Actions—Specifies what to do when a match condition occurs. Possible actions are to accept or discard a packet. In addition, packets can be counted to collect statistical information. If no action is specified for a term, the default action is to accept the packet.

The processing of parameterized filters is the same as classic filters. The order of the terms within a parameterized filter is important. Packets are tested against each term in the order in which the terms are listed in the firewall filter configuration. When a firewall filter contains multiple terms, the router takes a top-down approach and compares a packet against the first term in the firewall filter. If the packet matches the first term, the router executes the action defined by that term to either accept or reject the packet, and no other terms are evaluated. If the router does not find a match between the packet and first term, it then compares the packet to the next term in the firewall filter by using the same match process. If no match occurs between the packet and the second term, the router continues to compare the packet to each successive term defined in the firewall filter until a match is found. If a packet does not match any terms in a firewall filter, the default action is to discard the packet.

You can also specify a precedence (from 0 through 255) for input and output filters within a dynamic profile to force filter processing in a particular order. Setting a lower precedence value for a filter gives it a higher precedence within the dynamic profile. Filters with lower precedence values are applied to interfaces before filters with higher precedence values. A precedence of zero (the default) gives the filter the highest precedence. If no precedence is specified, the filter receives a precedence of zero (highest precedence). Filters with matching precedence (zero or otherwise) are applied in an unspecified order.



NOTE: Parameterized filters do not support outbound packets that are sourced from the routing engine.

**Related
Documentation**

- [Parameterized Filters Configuration Considerations on page 280](#)

Parameterized Filters Configuration Considerations

Keep the following considerations in mind when configuring parameterized filters.

- [Subscriber IP Address on page 280](#)
- [Interaction with Static Configuration on page 280](#)
- [Interface-Specific Dynamic Service Filters on page 280](#)
- [Service Session Support on page 280](#)
- [Filter Naming Conventions on page 281](#)

Subscriber IP Address

In most deployment scenarios, the interface is based on the subscriber's IP address. Because subscribers may not be unique, they cannot be used in determining similar filters and policers. Do not use the **junos-subscriber-ip-address** IP address as a match candidate. Doing so causes unique filters per subscriber, which inhibits scaling.

Interaction with Static Configuration

Searching for a filter to attach takes place in the following order:

1. Static filter. For example, **firewall family inet filter my-filter**.
2. Fast update filter within the current dynamic profile. For example, **dynamic-profile [profile-name] firewall family inet fast-update-filter my-filter**.
3. Parameterized filter within the current dynamic profile. For example, **dynamic-profile [profile-name] firewall family inet filter**.

The following static configuration objects may be referenced by a parameterized filter. The search order is first in the static configuration and then in the current dynamic-profile:

- firewall policer
- firewall hierarchical-policer
- three-color policer
- policy-options prefix-list

If an object in the static configuration is being used by an active parameterized filter, you cannot delete that object from the configuration while the subscriber is logged in.

Interface-Specific Dynamic Service Filters

All dynamic service filters must be defined as interface-specific.

Service Session Support

Parameterized filters and policers are supported for service activations only, not client sessions.

Filter Naming Conventions

The base filter name is based on the interface and direction (ingress and egress) appended to it. With parameterized filters, the filter-naming process comes from the UID.

Related Documentation

- [Understanding Dynamic Firewall Filters on page 249](#)
- [Verifying and Managing Firewall Filter Configuration on page 339](#)
- [Unique Identifiers for Firewall Variables on page 272](#)
- [Sample Dynamic-Profile Configuration for Parameterized Filters on page 275](#)
- [Dynamic Profile After UID Substitutions for Parameterized Filters on page 277](#)
- [Example: Dynamic-Profile Parsing on page 286](#)
- [Parameterized Filter Processing Overview on page 278](#)

Guidelines for Creating and Applying Parameterized Filters for Subscriber Interfaces

Dynamic configuration of firewall filters is supported. However, you can also continue to create static firewall filters for interfaces as you do normally, and then dynamically apply those filters to statically created interfaces using dynamic profiles. You can also use dynamic profiles to attach input and output filters through RADIUS.

When creating and applying filters, keep the following in mind:

- Dynamic application of only input and output filters is supported.
- The filters must be interface-specific.
- You can create family-specific **inet** and **inet6** filters.
- You can create interface-specific filters at the **unit** level that apply to any family type (**inet** or **inet6**) configured on the interface.
- You can add or remove both IPv4 and IPv6 filters with the same service activation or deactivation.
- You can remove one filter type without impacting the other type of filter. For example, you can remove IPv6 filters and leave the current IPv4 filters active.
- You can chain up to five input filters and four output filters together.
- If you do not configure and apply a filter, the interface uses the default group filter configuration.
- You cannot modify a firewall filter while subscribers on the same logical interface are bound.

Related Documentation

- [Parameterized Filter Processing Overview on page 278](#)
- [Parameterized Filters Configuration Considerations on page 280](#)

IPv4 Parameterized Filter Match Conditions

The following IPv4 match conditions are supported for parameterized filters. Their syntax is the same as the static filter syntax.

address
destination-address
destination-port
destination-port-except
destination-prefix-list
dscp
dscp-except
forwarding-class
forwarding-class-except
icmp-code
icmp-code-except
icmp-type
icmp-type-except
loss-priority
loss-priority-except
packet-length
packet-length-except
port
port-except
precedence
precedence-except
prefix-list
protocol
protocol-except
service-filter-hit
source-address
source-class
source-port
source-port-except
source-prefix-list
ttl
ttl-except

Related Documentation • *Firewall Filter Match Conditions for IPv4 Traffic*

IPv6 Parameterized Filter Match Conditions

The following IPv6 match conditions are supported for parameterized filters. Their syntax is the same as the static filter syntax.

address
destination-address
destination-port

destination-port-except
destination-prefix-list
forwarding-class
forwarding-class-except
icmp-code
icmp-code-except
icmp-type
icmp-type-except
loss-priority
loss-priority-except
packet-length
packet-length-except
port
port-except
prefix-list
service-filter-hit
source-address
source-class
source-port
source-port-except
source-prefix-list
traffic-class
traffic-class-except

Related Documentation • *Standard Firewall Filter Match Conditions for IPv6 Traffic*

Parameterized Filter Actions and Modifiers

The following actions and modifiers are supported for parameterized filters. Their syntax is the same as the static filter syntax.

accept
count
discard
forwarding-class
hierarchical-policer
log
loss-priority
next
policer
port-mirror
port-mirror-instance
reject
routing-instance
sample
service-accounting
service-accounting-deferred
service-filter-hit

three-color-policer

- Related Documentation**
- *Firewall Filter Terminating Actions*
 - *Firewall Filter Nonterminating Actions*

Parameterized Filter Policer Actions

The following policer actions are supported for parameterized filters. Their syntax is the same as the existing static policer syntax.

discard
forwarding-class
loss-priority

- Related Documentation**
- *Firewall Filter Terminating Actions*
 - *Firewall Filter Nonterminating Actions*

Interface-Shared Filters Overview

Interface-shared filters can be defined statically or dynamically, but can only be applied using dynamic profiles, and are supported for both client and service sessions. The same interface-shared instance can be attached to multiple interfaces only if these interfaces reference the same interface-shared filter name and have the same shared name.

The shared name can be taken from either the **\$junos-interface-set-name** variable or the **\$junos-svlan-interface-set-name** variable, where the values of the variables are provided by the related client session or service session. For example, if the **\$junos-interface-set-name** variable is defined as the shared name, the same interface-shared filter instance is attached to all logical interfaces that belong to the interface set defined by the variable of that session. Similarly, if **\$junos-svlan-interface-set-name** is defined for the shared name, all logical interfaces that belong to the VLAN interfaces set defined by the session's variable share the same interface-shared instance.

With VLAN subscriber interfaces that use the agent-circuit-identifier information, many subscribers share the same underlying logical interface. Because some of these subscribers are related to each other as part of the same household, you must apply an interface-shared filter to the subscriber logical interfaces that make up the household to be able to filter and police these related subscribers at a household level. All interfaces that share the same interface-shared filter instance share the same set of counters and policer actions.

The base filter name of a parameterized filter is assigned depending upon the profile name and the contents of the filter definition. Therefore, when an interface-shared filter is used with parameterized filters, all service sessions that want to share the same instance of an interface-shared filter must have the exact same parameterized filter and profile. A service session uses a different instance of the interface-shared filter if either the parameterized filter or the profile is different.

Related Documentation • [Example: Implementing a Filter for Households That Use ACI-Based VLANs on page 285](#)

Example: Implementing a Filter for Households That Use ACI-Based VLANs

In the following example using an interface-shared filter, you configure a dynamic profile that is used to implement agent-circuit-identifier VLAN household filtering. If **\$junos-input-filter** is **FILTER1** and **\$junos-interface-set-name** is **ACI1**, then a filter with the name **FILTER1-ACI1-in** is created and attached to the **demux0** unit. When a subsequent login from the same household occurs, it is in the same VLAN. If **\$junos-input-filter** is also **FILTER1**, the next **demux0** interface also has the **FILTER1-ACI1-in** filter attached. A low value precedence was used with the interface-shared filter. If you want to have the interface-shared filter applied first, give a higher precedence to any other filters that are attached to the same interfaces.

Filter with interface-set match cannot be used on dynamic interface—dynamic interface-set match is not supported. The shared-name of an interface-shared filter can now be populated from the **\$junos-svlan-interface-set-name** variable. This means interface-shared filter can also be attached to dynamic SVLAN interface-set, before which the shared-name could only be taken from the **\$junos-interface-set-name** variable.

Before you can attach an interface-shared filter using a dynamic profile.

- Create a basic dynamic profile.

See [Configuring a Basic Dynamic Profile](#).

To configure an interface-shared filter using a dynamic profile that is used to implement agent-circuit-identifier VLAN household filtering:

1. Access the dynamic profile you want to use.

```
[edit]
user@host# edit dynamic-profiles client-profile
```

2. Specify the interfaces and the unit.

```
[edit dynamic-profiles client-profile]
user@host# edit interfaces demux0 unit $junos-interface-unit
```

3. Specify the family.

```
[edit dynamic-profiles client-profile interfaces demux0 unit "$junos-interface-unit"]
user@host# edit family inet
```

4. Specify the input filter and the filter terms for the interface unit.

```
[edit dynamic-profiles client-profile interfaces demux0 unit "$junos-interface-unit"
family inet]
user@host# edit input $junos-input-filter shared-name $junos-interface-set-name
precedence precedence-number
```

5. Specify the output filter and the filter terms for the interface unit.

```
[edit dynamic-profiles client-profile interfaces demux0 unit "$junos-interface-unit"
family inet]
```

```
user@host# edit input $junos-output-filter shared-name $junos-interface-set-name
precedence precedence-number
```

- Specify that you want to configure a firewall, and specify the family.

```
[edit dynamic-profiles client-profile]
user@host# edit firewall family inet
```

- Specify the filter.

```
[edit dynamic-profiles client-profile firewall family inet]
user@host# edit filter uid
```

- Specify that the filter is an interface-shared filter.

```
[edit dynamic-profiles client-profile firewall family inet filter uid]
user@host# set interface-shared
```

```
[edit]
dynamic-profile {
  client-profile {
    interfaces {
      demux0 {
        unit $junos-interface-unit {
          family inet {
            filter {
              input $junos-input-filter shared-name $junos-interface-set-name precedence
              10;
            }
          }
        }
      }
    }
  }
}
firewall {
  family inet {
    filter FILTER1 {
      interface-shared;
      term... # the filter's terms
    }
  }
}
```

Related Documentation

- [Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 267](#)
- [Dynamically Attaching Filters Using RADIUS Variables](#)
- [Firewall Filters Overview](#)

Example: Dynamic-Profile Parsing

The following example shows the basic dynamic-profile parsing steps for parameterized filters.

1. Read **dynamic-profiles my-svc-prof interface ge-1/0/0 unit 7 family inet filter input** and get the value **my-filt-1gw_UID1022**. The **my-in-filter** variable received the name of the UID (**my-filt-1gw**) from the first service parameter. The name **my-filt-1gw_UID1022** comes from the value of the **my-filt-1gw UID**.
2. Determine whether a static filter called **my-filt-1gw_UID1022** exists. If so, this is the existing classic filter case and not a parameterized filter.
3. Try to read **dynamic-profile my-svc-prof firewall family inet fast-update-filter my-filt-1gw_UID1022**. If this exists, this is a fast update filter, not a parameterized filter.
4. Try to read **dynamic-profile my-svc-prof firewall family inet filter my-filt-1gw_UID1022**. If this does not exist, return a “filter not found” error.
5. Search for a template named **my-filt-1gw_UID1022**. If it does not exist:
 - a. Read the parameterized filter configuration. This adds the match destination address **207.17.137.239** and the policer **my-policer_UID1005** as the action.
 - b. Determine whether **my-policer_UID1005** exists. If it does not, read the **dynamic-profile my-svc-prof firewall policer my-policer_UID1005** configuration and create the **my-policer_UID1005** policer.
 - c. Compile the **my-filt-1gw_UID1022** filter.
 - d. Install **my-filt-1gw_UID1022** as a filter template.
6. Create and install an interface-specific filter reference named **my-filt-1gw_UID1022-ge-1/0/0.7-in** with **my-filt-1gw_UID1022** as its template.
7. Attach **my-filt-1gw_UID1022-ge-1/0/0.7-in** to interface **ge-1/0/0.7**.

When subsequent sessions are created with the same parameters, the system returns the same **my-filt-1gw_UID1022** filter name. In this case, Step 5 finds the existing filter template and proceeds directly to Step 6.

Related Documentation

- [Sample Dynamic-Profile Configuration for Parameterized Filters on page 275](#)
- [Dynamic Profile After UID Substitutions for Parameterized Filters on page 277](#)

Example: Firewall Dynamic Profile

In this example, dynamic firewall is configured for subscriber access using Junos IPv4 predefined variables.

The predefined variables equate to RADIUS settings as follows:

Junos OS Predefined Variable	RADIUS VSA Name	RADIUS Attribute Number
\$junos-input-filter	Ingress-Policy-Name	26–10
\$junos-output-filter	Egress-Policy-Name	26–11

```
dynamic-profiles {
  DynamicFilterProfile {
    interfaces {
      "$junos-interface-ifd-name" {
        unit "$junos-underlying-interface-unit" {
          family inet {
            filter {
              input "$junos-input-filter";
              output "$junos-output-filter";
            }
          }
        }
      }
    }
  }
}
```



NOTE: You must also configure any global firewall parameters.

**Related
Documentation**

- [Understanding Dynamic Firewall Filters on page 249](#)
- *Configuring Dynamic Firewall Filter Services for Use in Dynamic Profiles*

CHAPTER 23

Using Ascend Data Filters to Implement Firewalls Based on RADIUS Attributes

- [Ascend-Data-Filter Policies for Subscriber Management Overview on page 289](#)
- [Ascend-Data-Filter Attribute Fields on page 291](#)
- [Dynamically Applying Ascend-Data-Filter Policies to Subscriber Sessions on page 294](#)
- [Example: Configuring Dynamic Ascend-Data-Filter Support for Subscriber Access on page 296](#)
- [Example: Configuring Static Ascend-Data-Filter Support for Subscriber Access on page 299](#)
- [Verifying and Managing Dynamic Ascend-Data-Filter Policy Configuration on page 303](#)

Ascend-Data-Filter Policies for Subscriber Management Overview

Subscriber management enables you to use Ascend-Data-Filters to create policies for subscriber traffic. An Ascend-Data-Filter is a binary value that is configured on the RADIUS server. The filter contains rules that specify match conditions for traffic and an action for the router to perform (such as accept or discard the traffic). The match conditions might include the source and destination IP address or port, the protocol, the filter direction, the traffic class, and policer information.

Subscriber management uses a dynamic profile to obtain the Ascend-Data-Filter attribute (RADIUS attribute 242) from the RADIUS server and apply the policy to a subscriber session. Dynamic profiles support Ascend-Data-Filters for **inet** and **inet6** family types, and both families can be present in a dynamic profile. You include Junos OS predefined variables in the dynamic profiles — **\$junos-adf-rule-v4** for family **inet** and **\$junos-adf-rule-v6** for **inet6**. The Ascend-Data-Filter attribute can include rules for both address families. The predefined variables map the Ascend-Data-Filter rules for the respective family to the Junos OS firewall filter process. A firewall filter is created and attached to the subscriber's logical interface.

You can also configure a static Ascend-Data-Filter by manually entering the required binary data as a hexadecimal string in a dynamic profile. A statically configured Ascend-Data-Filter in a dynamic profile takes precedence over an Ascend-Data-Filter attribute that is received from RADIUS. The static method is time-consuming to configure; it is typically used only for testing purposes.

The Ascend-Data-Filter attribute is supported in RADIUS Access-Accept and Change of Authorization (CoA) messages.

CoA updates existing filters based on the Ascend-Data-Filter Type field, as shown in the following list:

- If the Type field is 1, IPv4 rules are updated and IPv6 rules are unchanged. The opposite is true if the Type field is 3.
- If both Type 1 and 3 are specified, then all rules are updated.
- If the CoA has no Ascend-Data-Filter rules, then the existing rules are unchanged.

Filter Naming Conventions

Each Ascend-Data-Filter has a unique name, which is assigned by the dynamic firewall process, dfwd. The assigned names are displayed in the results of the **show subscriber extensive** and **show firewall** commands. Ascend-Data-Filters use the following naming convention:

__junos_adf_session#-interfacename-family-direction

For example:

__junos_adf_33847-ge/1/0/4.53-init-in

Each Ascend-Data-Filter rule maps to a single term, and the term names are simply **t0**, **t1**, ..., **tn**. If you configure the **counter** option, the router adds a count action to each term that is created. The counter names are a combination of the term names with **-cnt** appended. For example **t0-cnt** and **t1-cnt**.

Use of Multiple Sessions with Ascend-Data-Filters on an Interface

An interface can have multiple subscriber sessions, each session using its own Ascend-Data-Filter rules. When an Ascend-Data-Filter is applied to a subscriber session, the rules are created independently of any other filters and are added to the interface filter list. The Ascend-Data-Filter rules for the other sessions on the same interface are also added to the filter list. All packets that are processed for the interface must go through all filters, and the filters are applied according to the precedence you set.

Because the filter list can be a combination of several rules, you must consider how the multiple filters coexist. You must ensure that the filters are designed and applied correctly in order to provide the desired filtering and resulting action. For example, a session might have a filter that accepts traffic from Subscriber-A and discards all other traffic. However, a second session on the same interface might have a filter that accepts traffic from Subscriber-B only and discards other traffic. When the two filters are combined in the filter list, traffic from Subscriber-B is discarded by the first filter, and traffic from Subscriber-A is discarded by the second filter. As a result, no traffic is accepted on the interface because the two filters essentially cancel out each other and discard all traffic.

Optional ADF Filter Requirement for Some Subscribers

When you include either of the predefined variables—`$junos-adf-rule-v4` or `$junos-adf-rule-v6`—in the dynamic profile, by default the RADIUS reply message must include the Ascend-Data-Filter attribute (RADIUS attribute 242) for each subscriber. If the attribute is not included, the router reports an error.

A service provider might apply the same dynamic profile to a mixed pool of subscribers, such that the attribute is included by RADIUS for some of the subscribers and is not included for others. By default, the router returns an error for each of the subscribers without the attribute, consuming system resources. You can configure the dynamic profile to accommodate such a mixture of subscribers by making the attribute requirement optional. To do so, and to suppress attribute error reporting, specify the **not-mandatory** option with the **adf** statement at the **[edit dynamic-profiles profile-name interfaces interface-name unit logical-unit-number family family filter]** hierarchy level. With this configuration, the Ascend-Data-filter is simply not created when the Ascend-Data-Filter attribute is not present.

Related Documentation

- [Dynamically Applying Ascend-Data-Filter Policies to Subscriber Sessions on page 294](#)
- [Ascend-Data-Filter Attribute Fields on page 291](#)

Ascend-Data-Filter Attribute Fields

Table 36 on page 291 provides information about the fields used in the Ascend-Data-Filter attribute (RADIUS attribute 242) and how the fields map to Junos OS filter functions. The table lists the fields in the order in which they occur in the Ascend-Data-Filter attribute.

Table 36: Ascend-Data-Filter Attribute Fields

Action or Classifier	Format	Value	Junos OS Filter Function
Type	1 byte	<ul style="list-style-type: none"> • 1 = IPv4 • 3 = IPv6 	
Filter or forward	1 byte	<ul style="list-style-type: none"> • 0 = filter • 1 = forward 	<ul style="list-style-type: none"> • 0 = maps to discard action • 1 = maps to accept action
Indirection	1 byte	<ul style="list-style-type: none"> • 0 = egress • 1 = ingress 	<ul style="list-style-type: none"> • 0 = adds egress terms to the output filter • 1 = adds ingress terms to the input filter
Spare	1 byte	—	—

Table 36: Ascend-Data-Filter Attribute Fields (*continued*)

Action or Classifier	Format	Value	Junos OS Filter Function
Source IP address	IPv4 = 4 bytes IPv6 = 16 bytes	IP address of the source interface	<ul style="list-style-type: none"> 0 = no mapping performed From source-address address entry added to term
Destination IP address	IPv4 = 4 bytes IPv6 = 16 bytes	IP address of the destination interface	<ul style="list-style-type: none"> 0 = no mapping performed From destination-address address entry added to term
Source IP prefix	1 byte	<ul style="list-style-type: none"> Type 1 = Number of leading zeros in the wildcard mask Type 3 = Higher order contiguous bits of the address that make up the network portion of the address 	<ul style="list-style-type: none"> 0 = no mapping performed From source-address prefix entry added to term
Destination IP prefix	1 byte	<ul style="list-style-type: none"> Type 1 = Number of leading zeros in the wildcard mask Type 3 = Higher order contiguous bits of the address that make up the network portion of the address 	<ul style="list-style-type: none"> 0 = no mapping performed From destination-address prefix entry added to term
Protocol	1 byte	Protocol type	<ul style="list-style-type: none"> 0 = no mapping performed IPv4 = from protocol number added to term IPv6 = from next-header number added to term
Established	1 byte	Not implemented	Not implemented
Source port	2 bytes	Port number of the source port	From source-port x - y entry added to term
Destination port	2 bytes	Port number of the destination port	From destination-port x - y entry added to term
Source port qualifier	1 byte	<ul style="list-style-type: none"> 0 = no compare 1 = less than 2 = equal to 3 = greater than 4 = not equal to 	<ul style="list-style-type: none"> 0 = no mapping performed 1 – 3 = mapped to corresponding option 4 = mapped to except match option

Table 36: Ascend-Data-Filter Attribute Fields (*continued*)

Action or Classifier	Format	Value	Junos OS Filter Function
Destination port qualifier	1 byte	<ul style="list-style-type: none"> 0 = no compare 1 = less than 2 = equal to 3 = greater than 4 = not equal to 	<ul style="list-style-type: none"> 0 = no mapping performed 1 – 3 = mapped to corresponding match option 4 = mapped to except match option
Reserved	2 bytes	Not used	Not used
Marking value	1 byte	<ul style="list-style-type: none"> For IPv4 = Type of Service (ToS) For IPv6 = Differentiated Services Code Point (DSCP) 	Not implemented
Marking mask	1 byte	0 = no packet marking	Not implemented
Traffic class	1–41 bytes	<ul style="list-style-type: none"> 0 = no traffic class (required if there is no profile) First byte specifies the length of the ASCII name of the traffic class Traffic class must be statically configured Name can optionally be null terminated, which consumes 1 byte If a name is given, it must match one of the default forwarding classes (such as best-effort) or the name of a forwarding class configured under the [edit class-of-service scheduler-maps map-name] stanza. 	Maps to the forwarding class name. The action forwarding-class name is added to term.

Table 36: Ascend-Data-Filter Attribute Fields (*continued*)

Action or Classifier	Format	Value	Junos OS Filter Function
Rate-limit profile	1–41 bytes	<ul style="list-style-type: none"> 0 = no rate limit (required if there is no profile) First byte specifies the length of the ASCII, followed by the ASCII name of the profile Profile must be statically configured Name can optionally be null terminated, which consumes 1 byte If a name is given, it must match the name of one of the firewall policers that is configured under the <code>[edit firewall]</code> stanza. 	Maps to the policer <i>policer-name</i> action modifier of the same name. The action policer <i>name</i> is added to term.

Related Documentation

- [Ascend-Data-Filter Policies for Subscriber Management Overview on page 289](#)

Dynamically Applying Ascend-Data-Filter Policies to Subscriber Sessions

Subscriber management enables you to use dynamic profiles to dynamically apply policies that are defined in Ascend-Data-Filters (RADIUS attribute 242) to subscriber sessions. The dynamic profiles include a Junos OS predefined variable that maps the rules and actions defined in the Ascend-Data-Filter to Junos OS features. The RADIUS administrator configures the Ascend-Data-Filter on the RADIUS server in a separate operation.

Subscriber management dynamic profiles use the following Junos OS predefined variables to map family-specific Ascend-Data-Filter rules to Junos OS filter functionality:

- **\$junos-adf-rule-v4**—Used for IPv4 family **inet**.
- **\$junos-adf-rule-v6**—Used for IPv6 family **inet6**.

To configure a dynamic profile to dynamically apply the policy defined by an Ascend-Data-Filter to a subscriber session:

1. Specify the dynamic profile in which you want to include the Ascend-Data-Filter. Specify the interface, the logical unit number, and the family type.

[edit]

```
user@host# edit dynamic-profiles profile-name interfaces interface-name unit
logical-unit-number family family
```

2. Specify that you want to include an Ascend-Data-Filter in the dynamic profile.

```
[edit dynamic-profiles profile-name interfaces interface-name unit logical-unit-number
family family]
user@host# edit filter adf
```

3. Specify the Junos OS predefined variable that maps the Ascend-Data-Filter actions to Junos OS filter functionality. Use the variable that corresponds to the specified family type.

```
[edit dynamic-profiles profile-name interfaces interface-name unit logical-unit-number
family family filter adf]
user@host# set rule ($junos-adf-rule-v4 | $junos-adf-rule-v6)
```



NOTE: You can also statically configure the Ascend-Data-Filter in this step by entering the filter in hexadecimal format, rather than use a predefined variable. You might use a static filter for testing purposes.

4. (Optional) Suppress error-reporting in the event the RADIUS reply messages do not include the Ascend-Data-Filter attribute.

```
[edit dynamic-profiles profile-name interfaces interface-name unit logical-unit-number
family family filter adf]
user@host# set not-mandatory
```

5. (Optional) Enable the counter feature. The counter increments each time a packet matches the rule.

```
[edit dynamic-profiles profile-name interfaces interface-name unit logical-unit-number
family family filter adf]
user@host# set counter
```

6. (Optional) Specify the input precedence used to establish the order in which filters on the interface are applied. A lower precedence value equals a higher precedence. The precedence relates to other dynamic filters configured on the same interface.

```
[edit dynamic-profiles profile-name interfaces interface-name unit logical-unit-number
family family filter adf]
user@host# set input-precedence precedence
```

7. (Optional) Specify the output precedence used to establish the order in which filters on the interface are applied. A lower precedence value equals a higher precedence. The precedence relates to other dynamic filters configured on the same interface.

```
[edit dynamic-profiles profile-name interfaces interface-name unit logical-unit-number
family family filter adf]
user@host# set output-precedence precedence
```

Related Documentation

- [Ascend-Data-Filter Policies for Subscriber Management Overview on page 289](#)
- [Ascend-Data-Filter Attribute Fields on page 291](#)
- [Verifying and Managing Dynamic Ascend-Data-Filter Policy Configuration on page 303](#)
- [Example: Configuring Dynamic Ascend-Data-Filter Support for Subscriber Access on page 296](#)

- [Example: Configuring Static Ascend-Data-Filter Support for Subscriber Access on page 299](#)

Example: Configuring Dynamic Ascend-Data-Filter Support for Subscriber Access

This example shows how to configure support for dynamic Ascend-Data-Filter policies.

- [Requirements on page 296](#)
- [Overview on page 296](#)
- [Configuration on page 296](#)
- [Verification on page 297](#)

Requirements

- Ensure that the Ascend-Data-Filter has been configured on the RADIUS server.
- Create the dynamic profile. See *Dynamic Profiles Overview*.
- Configure RADIUS support. See *Configuring RADIUS Server Parameters for Subscriber Access*.

Overview

Ascend-Data-Filters are configured on a RADIUS server, and contain rules that create policies. Subscriber management uses a dynamic profile to obtain the Ascend-Data-Filter attribute (RADIUS attribute 242) from the RADIUS server and apply the policy to a subscriber session.

- Specify the dynamic profile to use to apply the Ascend-Data-Filter policy to the subscriber session.
- Specify the Junos OS predefined variable that maps the Ascend-Data-Filter rules to Junos OS filter functionality.
- Configure optional settings, which include counting the rule usage and setting the precedence order for the filter.

Configuration

Step-by-Step Procedure

To configure dynamic Ascend-Data-Filter support:

1. Specify the dynamic profile in which you want to include the Ascend-Data-Filter, and configure the interface, the logical unit number, and the family type.

[edit]
user@host# **edit dynamic-profiles adf-profile-v4 interfaces**
 \$junos-interface-ifd-name unit \$junos-underlying-interface-unit family inet
2. Specify that you want to include an Ascend-Data-Filter in the dynamic profile and provide the Junos OS predefined variable as the rule that maps the Ascend-Data-Filter actions to Junos OS filter functionality.

```
[edit dynamic-profiles adf-profile-v4 interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit" family inet]
user@host# set filter adf rule $junos-adf-rule-v4
```

3. Enable the counter for the rule.

```
[edit dynamic-profiles adf-profile-v4 interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit" family inet]
user@host# set filter adf counter
```

4. Specify the precedence for received packets on the interface.

```
[edit dynamic-profiles adf-profile-v4 interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit" family inet]
user@host# set filter adf input-precedence 75
```

5. Specify the precedence for transmitted packets on the interface.

```
[edit dynamic-profiles adf-profile-v4 interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit" family inet]
user@host# set filter adf output-precedence 80
```

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

```
[edit]
user@host# show dynamic-profiles
...
adf-profile-v4 {
  interfaces {
    "$junos-interface-ifd-name" {
      unit "$junos-underlying-interface-unit" {
        family inet {
          filter {
            adf {
              rule "$junos-adf-rule-v4";
              counter;
              input-precedence 75;
              output-precedence 80;
            }
          }
        }
      }
    }
  }
}
```

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

Verification

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

- [Verifying that Dynamic Ascend-Data-Filter Rules Are Applied to Subscriber Sessions on page 297](#)
- [Verifying Dynamic Ascend-Data-Filter Usage on page 298](#)

Verifying that Dynamic Ascend-Data-Filter Rules Are Applied to Subscriber Sessions

Purpose Verify that the Ascend-Data-Filter rules were attached to the subscriber.

Action From operational mode, enter the **show subscribers extensive** command.

```
user@host>show subscribers extensive
Type: DHCP
User Name: user1-adf
IP Address: 192.168.1.10
IP Netmask: 255.255.255.0
Logical System: default
Routing Instance: default
Interface: ge-1/0/0.0
Interface type: Static
Dynamic Profile Name: adf-profile-v4
MAC Address: 00:10:94:00:00:01
State: Active
Radius Accounting ID: 5
Login Time: 2010-08-12 14:06:27 PDT
ADF IPv4 Input Filter Name: __junos_adf_5-ge-1/0/0.0-inet-in
  Rule 0: 010101000000000000d87f920000180000000000000000000000
    from {
      destination-address 216.127.146.0/24;
    }
    then {
      accept;
    }
  Rule 1: 01000100000000000000000000000000000000000000000000000
    from {
      protocol 6;
      destination-port 25;
    }
    then {
      discard;
    }
  Rule 2: 01010100000000000000000000000000000000000000000000000
    then {
      accept;
    }
```

Meaning The output shows the information for the dynamic profile, including Ascend-Data-Filter rules. Verify the following information:

- The User Name field indicates the correct subscriber.
- The Dynamic Profile Name field is correct for the subscriber.
- The correct Ascend-Data-Filter rules are applied to the subscriber. The display shows the rules that are configured on the RADIUS server.

Verifying Dynamic Ascend-Data-Filter Usage

Purpose Verify usage of the dynamic Ascend-Data-Filter. Counter statistics are displayed when the **counter** option is configured for the **adf** command in the dynamic profile.

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

```
user@host> show firewall
```

```

Filter: __junos_adf_5-ge-1/0/0.0-inet-in
Counters:
Name          Bytes      Packets
t0-cnt        32758      22
t1-cnt        22199      15
t2-cnt        21723      14

```

Meaning The output shows the name of the filter and lists the counter activity. If the **counter** option is not configured, the output displays only the filter name.

Related Documentation

- [Ascend-Data-Filter Policies for Subscriber Management Overview on page 289](#)
- [Dynamically Applying Ascend-Data-Filter Policies to Subscriber Sessions on page 294](#)

Example: Configuring Static Ascend-Data-Filter Support for Subscriber Access

This example shows how to configure support for static Ascend-Data-Filter policies. In a static configuration, you manually configure the Ascend-Data-Filter as part of the dynamic profile configuration. This procedure differs from dynamic configuration, in which the Ascend-Data-Filter is defined on the RADIUS server and then subscriber management uses a predefined variable to map the Ascend-Data-Filter rules to Junos OS filter functionality. Because creating a static Ascend-Data-Filter configuration can be labor-intensive, you might typically use this method for testing purposes.

- [Requirements on page 299](#)
- [Overview on page 299](#)
- [Configuration on page 300](#)
- [Verification on page 301](#)

Requirements

- Create the dynamic profile. See *Dynamic Profiles Overview*.
- Configure RADIUS support. See *Configuring RADIUS Server Parameters for Subscriber Access*.

Overview

Ascend-Data-Filters contain rules that create policies. Subscriber management uses a dynamic profile to apply the policy to a subscriber session. You manually configure the Ascend-Data-Filter as part of the dynamic policy.

- Specify the dynamic profile to use to apply the Ascend-Data-Filter policy to the subscriber session.
- Configure the Ascend-Data-Filter.
- Configure optional settings, which include counting the rule usage and setting the precedence for received and transmitted traffic.

Configuration

Step-by-Step Procedure

To configure static Ascend-Data-Filter support:

1. Specify the dynamic profile in which you want to create the Ascend-Data-Filter, and configure the interface, the logical unit number, and the family type.


```
[edit]
user@host# edit dynamic-profiles adf-profile-v4 interfaces
$junos-interface-ifd-name unit $junos-underlying-interface-unit family inet
```
2. Configure the Ascend-Data-Filter. Enclose the filter values within quotation marks. You can configure multiple Ascend-Data-Filter rules in the same dynamic profile.


```
[edit dynamic-profiles adf-profile-v4 interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit" family inet]
user@host# set filter adf rule "01000100 0A020100 00000000 18000000
00000000 00000000"
```
3. Enable the counter for the rule.


```
[edit dynamic-profiles adf-profile-v4 interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit" family inet]
user@host# set filter adf counter
```
4. Specify the precedence for received packets on the interface.


```
[edit dynamic-profiles adf-profile-v4 interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit" family inet]
user@host# set filter adf input-precedence 80
```
5. Specify the precedence for transmitted packets on the interface.


```
[edit dynamic-profiles adf-profile-v4 interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit" family inet]
user@host# set filter adf output precedence 85
```

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

```
[edit]
user@host# show dynamic-profiles
...
adf-profile-v4 {
  interfaces {
    "$junos-interface-ifd-name" {
      unit "$junos-underlying-interface-unit" {
        family inet {
          filter {
            adf {
              rule "01000100 0A020100 00000000 18000000 00000000 00000000";
              counter;
              input-precedence 80;
              output-precedence 85;
            }
          }
        }
      }
    }
  }
}
```

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

Results

The Ascend-Data-Filter rule defined in Step 2 of the procedure configures an input policy that filters all packets from network 10.2.1.0 with wildcard mask 255.255.255.0 to any destination.

Table 37 on page 301 lists the values specified in the Ascend-Data-Filter rule.

Table 37: Ascend-Data-Filter Rule

Action or Classifier	Hex Value	Junos OS Filter Function
Type	01	IPv4
Forward	00	Forward
Indirection	01	Ingress
Spare	00	None
Source IP address	0a020100	10.2.1.0
Destination IP address	00000000	Any
Source IP mask	18	24 (255.255.255.0)
Destination IP mask	00	0 (0.0.0.0)
Protocol	00	None
Established	00	None
Source port	0000	None
Destination port	0000	None
Source port qualifier	00	None
Destination port qualifier	00	None
Reserved	0000	None

Verification

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

- [Verifying that Static Ascend-Data-Filter Rules are Applied to Subscriber Sessions on page 302](#)
- [Verifying Static Ascend-Data-Filter Usage on page 302](#)

Verifying that Static Ascend-Data-Filter Rules are Applied to Subscriber Sessions

Purpose Verify that the Ascend-Data-Filter rules you manually configured were attached to the subscriber.

Action From operational mode, enter the **show subscribers extensive** command.

```
user@host>show subscriber extensive
Type: DHCP
User Name: user1-adf
IP Address: 192.168.1.10
IP Netmask: 255.255.255.0
Logical System: default
Routing Instance: default
Interface: ge-1/0/0.0
Interface type: Static
Dynamic Profile Name: adf-profile-v4
MAC Address: 00:10:94:00:00:01
State: Active
Radius Accounting ID: 5
Login Time: 2010-08-12 14:06:27 PDT
ADF IPv4 Input Filter Name: __junos_adf_5-ge-1/0/0.0-inet-in
Rule 0: 010001000A0201000000000001800000000000000000000000
      from {
        destination-address 10.2.1.0/24;
      }
      then {
        accept;
      }
```

Meaning The output shows the information for the dynamic profile, including Ascend-Data-Filter rules. Verify the following information:

- The User Name field indicates the correct subscriber.
- The Dynamic Profile Name field is correct for the subscriber.
- The correct static Ascend-Data-Filter rule is applied to the subscriber.

Verifying Static Ascend-Data-Filter Usage

Purpose Verify usage of the static Ascend-Data-Filter. Counter statistics are displayed when the **counter** option is configured for the **adf** command in the dynamic profile.

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

```
user@host> show firewall

Filter: __junos_adf_5-ge-1/0/0.0-inet-in
Counters:
Name                               Bytes          Packets
t0-cnt                             32758           22
```

Meaning The output shows the name of the filter and the lists counter activity. If the **counter** option is not configured, the output displays only the filter name.

Related Documentation

- [Ascend-Data-Filter Policies for Subscriber Management Overview on page 289](#)
- [Dynamically Applying Ascend-Data-Filter Policies to Subscriber Sessions on page 294](#)

Verifying and Managing Dynamic Ascend-Data-Filter Policy Configuration

Purpose View or manage information for Ascend-Data-Filters.

Action

- To display statistics for Ascend-Data-Filters:

user@host> **show firewall**

- To display firewall log information:

user@host> **show subscribers extensive**

- To clear filter counters:

user@host> **clear firewall all**

Related Documentation

- [Ascend-Data-Filter Policies for Subscriber Management Overview on page 289](#)
- [Dynamically Applying Ascend-Data-Filter Policies to Subscriber Sessions on page 294](#)

CHAPTER 24

Configuring Fast Update Filters to Provide More Efficient Processing Over Classic Static Filters

- [Fast Update Filters Overview on page 306](#)
- [Basic Fast Update Filter Syntax on page 309](#)
- [Configuring Fast Update Filters on page 310](#)
- [Example: Configuring Fast Update Filters for Subscriber Access on page 311](#)
- [Match Conditions and Actions in Fast Update Filters on page 312](#)
- [Configuring the Match Order for Fast Update Filters on page 313](#)
- [Fast Update Filter Match Conditions on page 314](#)
- [Fast Update Filter Actions and Action Modifiers on page 315](#)
- [Configuring Terms for Fast Update Filters on page 315](#)
- [Configuring Filters to Permit Expected Traffic on page 316](#)
- [Avoiding Conflicts When Terms Match on page 317](#)
- [Associating Fast Update Filters with Interfaces in a Dynamic Profile on page 322](#)

Fast Update Filters Overview

Fast update filters provide more efficient filter processing over classic static filters when dynamic services are implemented for multiple subscribers that share the same logical interface.

Fast update filters support subscriber-specific filter values, as opposed to classic filters, which are interface-specific. Fast update filters allow individual filter terms, or rules, to be added or removed from filters without requiring the router to recompile the filter after each modification—terms are added and removed when subscriber services are added and removed.

Using the fast update filters feature involves three distinct operations:

1. Creating the filter—You define fast update filters under the **[edit dynamic-profiles profile-name firewall family family]** hierarchy. The **dynamic-profiles** stanza enables you to use dynamic variables to create subscriber-specific configurations for the filter's match terms. See [“Configuring Fast Update Filters” on page 310](#).
2. Associating the filter with a dynamic profile—You use the **[edit dynamic-profiles profile-name interface interface-name unit unit-number family family]** hierarchy to associate the filter with a dynamic profile. This is the same procedure used for classic filters. See [“Associating Fast Update Filters with Interfaces in a Dynamic Profile” on page 322](#).
3. Attaching the filter to an interface—When a subscriber logs in, the dynamic profile instantiates the subscriber session and applies the properties of the profile, including the fast update filter, to the session interface. This is the same procedure used for classic filters. Also, similar to classic filters, the name of fast update filters can be provided in a user's RADIUS file.

When a dynamic profile instantiates a subscriber session and applies a fast update filter, the router verifies that the filter is not already present on the session interface. If the filter is not present, the router adds the filter. If the filter is already present on the interface, the router simply adds any new terms that are not in the existing filter. This procedure is reversed when subscriber sessions are deleted. Any terms that were added by a session are then removed when the session is deleted. The filter is deleted when the last subscriber session is deleted.



NOTE: You can optionally specify that a term can be added only once and cannot be modified. See [“Match Conditions and Actions in Fast Update Filters” on page 312](#).

This overview covers:

- [Fast Update Filter Components on page 307](#)
- [Fast Update Filter Processing on page 307](#)

- [Fast Update Filter Names on page 308](#)
- [Guidelines for Creating and Applying Fast Update Filters on page 308](#)

Fast Update Filter Components

When creating a fast update filter, you define one or more terms that specify the filtering criteria and the action to take when a match occurs.

Each term consists of the following components:

- **Match condition**—Specifies values or fields that the packet must contain. You can match a maximum of five fields in a fast update filter. A match condition can contain a single value or range. This differs from classic filters, in which terms can have multiple values. However, you can use additional terms to specify multiple ranges. “[Fast Update Filter Match Conditions](#)” on page 314 lists the supported match conditions for fast update filters. The order in which the terms appear in a fast update filter is not important, because the router examines the most specific term first. (Classic filters examine the terms in the order in which the terms are listed.)
- **Action**—Specifies what to do when a packet matches the match condition. If no action is specified for a term, the default action is to accept the packet. “[Fast Update Filter Actions and Action Modifiers](#)” on page 315 lists the supported actions for fast update filters.

Terms that are added to the filter during session instantiation must have a unique set of match conditions. Two terms overlap, or conflict, if a packet can match both sets of conditions—as a result, there are two different actions for the packet. You can ensure that terms are unique by using the `$junos-subscriber-ip-address` variable as the **source-address** (for an input filter) or **destination-address** (for an output filter) in the **from** statement. You must then supply the **source-address** or **destination-address** condition, as appropriate, as the first condition in the **match-order** statement.

Related Documentation

- [Fast Update Filter Actions and Action Modifiers on page 315](#)
- [Fast Update Filter Match Conditions on page 314](#)
- [Avoiding Conflicts When Terms Match on page 317](#)

Fast Update Filter Processing

You must use the **match-order** statement to explicitly specify the order in which the router examines filter match conditions. Also, the router examines only those conditions that you include in the **match-order** statement. When a fast update filter contains multiple terms, the router compares a packet against the terms starting with the most specific condition first. When the packet first matches a condition, the router performs the action defined in the term to either accept or reject the packet, and then no other terms are evaluated. If the router does not find a match between the packet and first term, it then compares the packet to the next term in the filter. The router continues to compare the packet to the next specified term until a match is found. If there is no match after all terms have been examined, the router silently drops the packet.

You can specify a precedence (from 0 through 255) for input and output filters within a dynamic profile to force filter processing in a particular order. Setting a lower precedence value for a filter gives it a higher precedence within the dynamic profile. Filters with lower precedence values are applied to interfaces before filters with higher precedence values. A precedence of zero (the default) gives the filter the highest precedence. If no precedence is specified, the filter receives a precedence of zero (highest precedence). Filters with matching precedence (zero or otherwise) are applied in random order.

Fast Update Filter Names

When a filter is attached to an interface, the router first searches for a classic filter with the specified name, and then uses the classic filter. If no classic filter exists with that name, the router then searches in the dynamic profile for a fast update filter with the specified name, and uses that filter.

If two different dynamic profiles include a fast update filter with the same name, the **match-order** specification of the two filters must be identical. If the two filters are activated on the same interface, the terms are added together.

The router includes the filter name in **show firewall** command results. The router also creates unique names for filter terms and counters for the **show firewall** command.

When a fast update filter is created by the activation of a dynamic profile, the router creates an interface-specific name for the filter. The name uses the following format, which is also used for classic filters:

<filter-name>-<interface-name>.<subunit>-<direction>

For example, an input filter named **httpFilter** on interface **ge-1/0/0.5** is named as follows (**in** indicates an input filter and **out** indicates an output filter):

http-filter-ge-1/0/0.5-in

The router creates unique names for the filter terms and counters by appending the session ID to all term and counter names. Terms that use the **only-at-create** statement have a session-id of 0. Terms and counters use the following format:

<term-name>-<session-id>

<counter-name>-<session-id>

Guidelines for Creating and Applying Fast Update Filters

Fast update filters enable you to create subscriber-specific firewall filters and dynamically apply these filters to statically created interfaces using dynamic profiles. Individual terms can be added to, or removed from, a filter without requiring that the entire filter be recompiled.

When creating and applying fast update filters, keep the following in mind:

- Dynamic application of input and output filters is supported.
- You cannot use the same fast update filter as both an input and output filter in the same dynamic profile attached to an interface.

- Fast update filters must always include terms that permit DHCP traffic to pass. See [“Configuring Filters to Permit Expected Traffic” on page 316](#).
- You can create **family inet** and **inet6** filters.
- You can add or remove both IPv4 and IPv6 filters with the same service activation or deactivation.
- You can remove one filter type without impacting the other type of filter. For example, you can remove IPv6 filters and leave the current IPv4 filters active.
- The **interface-specific** statement is required for all fast update filters.
- The **match-order** statement is required—you must explicitly state the order of the match fields in a fast update filter. See [“Configuring the Match Order for Fast Update Filters” on page 313](#).
- The **match-order** statement uses an implied wildcard for conditions that you specify in the statement. If you specify a condition that is not also configured in the **from** specification of a filter term, the router considers that a wildcard for that condition.
- A filter term can have only a single value or range; however, you can configure multiple terms to specify multiple ranges.
- You can match a maximum of five match conditions in a filter.

Related Documentation

- [Understanding Dynamic Firewall Filters on page 249](#)
- [Classic Filters Overview on page 253](#)
- [Dynamically Attaching Statically Created Filters for Any Interface Type on page 268](#)
- [Dynamically Attaching Statically Created Filters for a Specific Interface Family Type on page 267](#)
- [Verifying and Managing Firewall Filter Configuration on page 339](#)

Basic Fast Update Filter Syntax

This section shows the basic fast update filter statement syntax. The first part of this syntax provides the CLI statements to associate an input and output filter with a dynamic profile. The second part of this syntax represents the configured input and output filters associated to the dynamic profile. When a DHCP event occurs, the dynamic profile applies the specified filters to the DHCP client interface on the router.

```
[edit dynamic-profiles profile-name]  
interfaces {  
  $junos-interface-ifd-name {  
    unit $junos-underlying-interface-unit {  
      family family {  
        filter {  
          input filter-name;  
          precedence precedence;  
          output filter-name;  
          precedence precedence;  
        }  
      }  
    }  
  }  
}
```

```

    }
  }
}
[edit dynamic-profiles profile-name]
firewall {
  family family {
    fast-update-filter filter-name {
      [desired filter configuration]
    }
    fast-update-filter filter-name {
      [desired filter configuration]
    }
  }
}
}

```

Related Documentation • [Configuring Fast Update Filters on page 310](#)

Configuring Fast Update Filters

You configure a fast update filter in a dynamic profile—this enables you to use dynamic variables in the filter configuration. After you configure fast update filters, you then use the **dynamic-profiles** syntax to associate the filter with the subscriber interface.

To configure a fast update filter for subscriber access:

1. Access the dynamic profile you want to use.

```

[edit]
user@host# edit dynamic-profiles myProfile

```

2. Specify that you want to configure a firewall, and specify the family.

```

[edit dynamic-profiles myProfile]
user@host# edit firewall family inet

```

3. Specify that you want to configure a fast update filter and assign a name to the filter.

```

[edit dynamic-profiles myProfile firewall family inet]
user@host# edit fast-update-filter httpFilter

```

4. Specify the **interface-specific** statement. This statement is mandatory.

```

[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# set interface-specific

```

5. Configure the match order to use for the filter terms.

```

[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# set match-order [source-address protocol destination-port]

```

See “[Configuring the Match Order for Fast Update Filters](#)” on page 313.

6. Specify that you want to configure a term for the filter and assign the name to the term. Configure the match conditions and actions for the term.

```

[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# edit term term1

```

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter term
term1]
user@host# set from protocol tcp
user@host# set from source-address $junos-subscriber-ip-address
user@host# set from destination-port http
user@host# set then count http-cnt
```

See [“Configuring Terms for Fast Update Filters” on page 315](#).

Related Documentation

- [Configuring the Match Order for Fast Update Filters on page 313](#)
- [Configuring Terms for Fast Update Filters on page 315](#)
- [Associating Fast Update Filters with Interfaces in a Dynamic Profile on page 322](#)
- [Fast Update Filters Overview on page 306](#)
- [Dynamic Profiles Overview](#)
- [Guidelines for Configuring Firewall Filters](#)
- [Guidelines for Applying Firewall Filters](#)

Example: Configuring Fast Update Filters for Subscriber Access

This example shows you how to configure a fast update filter that is an input filter that counts the HTTP and non-HTTP packets from a subscriber. In the example, you use the firewall stanza to create the filter and the interfaces stanza to attach the filter.

```
[edit dynamic-profiles myProfile]
firewall {
  family inet {
    fast-update-filter httpFilter {
      interface-specific;
      match-order [source-address protocol destination-port];
      term term1 {
        from {
          protocol tcp;
          source-address $junos-subscriber-ip-address;
          destination-port http;
        }
        then {
          count http-cnt;
        }
      }
      term term2 {
        from {
          protocol tcp;
          source-address $junos-subscriber-ip-address;
        }
        then {
          count non-http-cnt;
        }
      }
    }
  }
}
```

```
}
interfaces {
  "$junos-interface-ifd-name" {
    unit "$junos-underlying-interface-unit" {
      family inet {
        filter {
          input httpFilter;
        }
      }
    }
  }
}
```

Related Documentation

- [Configuring Fast Update Filters on page 310](#)

Match Conditions and Actions in Fast Update Filters

To create a fast update filter, you use the **term** statement to specify conditions that a packet must have, and to specify the action the router performs when those conditions exist in the packet.

This section covers:

- [Match Conditions on page 312](#)
- [Actions on page 313](#)
- [Adding Terms Only Once on page 313](#)

Match Conditions

Match conditions specify characteristics that a packet must have—if the conditions exist in the packet, the router then performs the specified action. You use the **from** keyword in the **term** statement to specify match conditions for the filter. The packet must match all conditions in the **from** specification for the action to be performed, which also means that their order in the **from** specification is not important.

An individual condition in a **from** specification can contain a single value or range. You can match a maximum of five match conditions in a filter.

[“Fast Update Filter Match Conditions” on page 314](#) lists the match conditions you can use in fast update filters.



NOTE: The router uses an implied wildcard for conditions that you include in the **match-order** statement. If you include a condition that is *not* configured in the **from** specification of a filter term, the router considers that a wildcard for the condition.

For example, if you include the **dscp** condition in the **match-order** statement, but do not configure a **dscp** value in the **from** specification of the filter term, the router performs the action configured in the **then** specification of the filter on all DSCP values.

Actions

Actions and action modifiers specify the operation the router performs when a particular match condition exists in a packet. You use the **then** keyword in the **term** statement to specify the actions to perform on packets whose characteristics match the conditions specified in the preceding **from** specification.

Action modifiers are actions taken in addition to the specified action. You can configure any combination of action modifiers. For the action or action modifier to take effect, all conditions in the **from** specification must match. If you specify **log** as one of the actions in a term, this constitutes a termination action; whether any additional terms in the filter are processed depends on the traffic through the filter. The action modifier operations carry a default **accept** action. For example, if you specify an action modifier and do not specify an action, the specified action modifier is implemented and the packet is accepted.

[“Fast Update Filter Actions and Action Modifiers” on page 315](#) lists the actions and action modifiers you can use in fast update filters.

Adding Terms Only Once

You can optionally specify that a term can be added only when the fast update filter is first created, and cannot be later changed by adding or removing conditions. We recommend that you only use the **only-at-create** option for terms that do not include subscriber-specific data in their match conditions, such as common or default terms (counting the default drop packet, for instance).

Related Documentation

- [Configuring Terms for Fast Update Filters on page 315](#)
- [Fast Update Filter Match Conditions on page 314](#)
- [Fast Update Filter Actions and Action Modifiers on page 315](#)

Configuring the Match Order for Fast Update Filters

You must include the **match-order** statement to explicitly specify the order in which router examines the match conditions. The router examines only those match conditions that you include in the statement. You can match a maximum of five conditions.



NOTE: If the **match-order** statement contains a condition that is not specified in the **from** statement of a term, the router considers that a wildcard for that condition.

If you use the same fast update filter in multiple dynamic profiles, you must configure the same match order for all profiles.

To configure the order in which the router examines the match conditions of a fast update filter:

1. Access the fast update filter:

```
[edit dynamic-profiles myProfile]
user@host# edit firewall family inet fast-update-filter httpFilter
```

- Specify the mandatory **interface-specific** statement.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# set interface-specific
```

- Configure the match order for the match conditions in the filter. Use brackets to enclose multiple match conditions.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]
user@host# set match-order [source-address protocol destination-port]
```

Related Documentation

- [Configuring Fast Update Filters on page 310](#)
- [Configuring Terms for Fast Update Filters on page 315](#)
- [Fast Update Filters Overview on page 306](#)
- [Dynamic Profiles Overview](#)
- [Fast Update Filter Match Conditions on page 314](#)
- [Guidelines for Configuring Firewall Filters](#)

Fast Update Filter Match Conditions

Table 38: Fast Update Filter Match Conditions

Match Condition	Description
destination-address <i>prefix</i>	IP destination address field.
destination-port <i>number</i>	TCP or UDP destination port field. Can be a single number, a single range, or one of the standard port synonyms.
dscp <i>number</i>	Differentiated services code point. Can be a single number, a single range, or the standard synonyms. IPv4 only.
match-terms <i>string-of-conditions</i>	Series of match conditions. Enclose the string within quotation marks and use semicolons to separate entries. For example, match-terms "protocol tcp; destination-port http" ; Dynamic profile variables are not allowed in the string.
protocol <i>number</i>	IP protocol field. Can be a single number, a single range, or one of the standard protocol synonyms. IPv4 only.
source-address <i>prefix</i>	IP source address field.
source-port <i>number</i>	TCP or UDP source port field. Can be a single number, a single range, or one of the standard protocol synonyms.

Related Documentation

- [Configuring Fast Update Filters on page 310](#)

Fast Update Filter Actions and Action Modifiers

Table 39: Fast Update Filter Actions and Action Modifiers

Action or Action Modifier	Description
Actions	
accept	Accept the packet.
action-terms <i>string-of-actions</i>	A series of multiple actions or action modifiers. Enclose the string within quotation marks and use semicolons to separate entries. For example, action-terms "log; count http-cnt";. Dynamic profile variables are not allowed in the string.
discard	Drop the packet silently, without sending an Internet Control Message Protocol (ICMP) message.
ignore-term	Do not add this term to the filter. All match conditions and actions are ignored.
port-mirror	Port mirror packets.
routing-instance <i>routing-instance</i>	Forward packets to specified routing instance.
Action Modifiers	
count <i>counter-name</i>	Increment the specified counter.
forwarding-class <i>class</i>	Classify the packet into one of the following forwarding classes: as , assured-forwarding , best-effort , expedited-forwarding , or network-control .
log	Log the packet header information.
loss-priority (high medium-high medium-low low)	Set the loss priority level for packets.
policer <i>policer-name</i>	Rate-limit packets based on the specified policer.

Related Documentation

- [Configuring Fast Update Filters on page 310](#)

Configuring Terms for Fast Update Filters

A fast update filter consists of one or more terms. A term is made up of one or more match conditions and the action to take when a packet matches the specified conditions.

To configure a term for a fast update filter:

1. Access the fast update filter.
[edit dynamic-profiles myProfile]

```
user@host# edit firewall family inet fast-update-filter httpFilter
```

2. Create the new term and assign a name to the term.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]  
user@host# set term term1
```

3. Configure the match condition for the term. See [“Fast Update Filter Match Conditions” on page 314](#) for the supported match conditions for fast update filters.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]  
user@host# set from protocol tcp  
user@host# set from source-address $junos-subscriber-ip-address  
user@host# set from destination-port http
```

4. Configure the action that the router takes when the match conditions are met. See [“Fast Update Filter Actions and Action Modifiers” on page 315](#) for the supported actions for fast update filters.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]  
user@host# set then accept
```

5. (Optional) Configure the action modifiers that you want the router to take when the match conditions are met. See [“Fast Update Filter Actions and Action Modifiers” on page 315](#) for the supported action-modifiers for fast update filters.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]  
user@host# set then count http-cnt
```

6. (Optional) Configure the term to be added only once, when the fast update filter is first created.

```
[edit dynamic-profiles myProfile firewall family inet fast-update-filter httpFilter]  
user@host# set only-at-create
```

Related Documentation

- [Configuring Fast Update Filters on page 310](#)
- [Configuring the Match Order for Fast Update Filters on page 313](#)
- [Fast Update Filters Overview on page 306](#)
- [Fast Update Filter Match Conditions on page 314](#)
- [Fast Update Filter Actions and Action Modifiers on page 315](#)
- [Stateless Firewall Filter Overview](#)
- [Stateless Firewall Filter Components](#)

Configuring Filters to Permit Expected Traffic

You must explicitly configure your firewall filter to permit expected traffic, such as DHCP traffic, to pass. Otherwise, the expected traffic is denied when the filter is applied to the interface. This requirement applies to both classic and fast update filters.

The following example shows a fast update filter that might be used to accept DHCP traffic. The actual filter you use depends on the expected traffic in your network.

In the example, the term **allow-dhcp** accepts all DHCP traffic from all source addresses. The term also includes the **only-at-create** option to specify that the term is applied only when the filter is first applied. The term **sub-allow-dhcp** includes the Junos OS predefined variable `$junos-subscriber-ip-address`, which permits all subscriber-specific DHCP traffic.

The **match-order** statement configuration lists the conditions from most-specific to least-specific, as recommended in [“Configuring the Match Order for Fast Update Filters” on page 313](#). Because this filter is designed to permit ingress DHCP traffic, the **source-address** condition is listed first.

```
firewall {
  family inet {
    fast-update-filter psf1 {
      interface-specific;
      match-order [ source-address destination-address protocol destination-port ];
      term allow-dhcp {
        only-at-create;
        from {
          source-address 0.0.0.0/32;
          destination-address 255.255.255.255/32;
          destination-port 67;
          protocol udp;
        }
        then accept;
      }
      term sub-allow-dhcp {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 192.168.1.2/32;
          destination-port 67;
          protocol udp;
        }
        then accept;
      }
    }
  }
}
```

- Related Documentation**
- [Configuring the Match Order for Fast Update Filters on page 313](#)
 - [Configuring Terms for Fast Update Filters on page 315](#)

Avoiding Conflicts When Terms Match

A fast update filter can contain multiple terms, each with a variety of match conditions. However, when you configure multiple terms in a filter, you must ensure that the terms do not overlap, or conflict with each other. Two terms are considered to overlap when it is possible for a packet to match all conditions of both terms. Because each term specifies a different action for matches, the router cannot determine which action to take. When terms overlap, a conflict error occurs and the session fails when the dynamic profile attempts to apply the filter. The error log indicates the overlapping terms.

How the Router Evaluates Terms in a Filter

The router creates a table of match conditions when examining terms. The table, which is similar to a routing table, is based on the conditions included in the **match-order** statement. When the router receives a packet, the router examines the packet's contents in the sequence specified in the **match-order** statement.

For example, using the sample configuration in the following Match-Order Example, the router first examines the packet's **source-address**, then the **destination-address**, and finally the **destination-port**. As shown in the following table, the two terms in the filter do not overlap because each term has a different **destination-port** specification. The router then takes the appropriate filter action for the term that matches the **destination-port** value of the packet.

Term	source-address	destination-address	destination-port	Action
t55	subscriber's address	3.1.1.2/32	http	count t55_cntr accept
t999	subscriber's address	3.1.1.2/32	https	count t999_cntr accept

Match-Order Example

```

firewall {
  family inet {
    fast-update-filter psf1 {
      interface-specific;
      match-order [ source-address destination-address destination-port ];
      term t55 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 3.1.1.2/32;
          destination-port http;
        }
        then {
          count t55_cntr;
          accept;
        }
      }
      term t999 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 3.1.1.2/32;
          destination-port https;
        }
        then {
          count t999_cntr;
          accept;
        }
      }
    }
  }
}

```

```
}
```

Using Implied Wildcards

This section shows an example of how you might use an implied wildcard specification in the match configuration. A condition in the **match-order** statement is an implied wildcard when that condition is not configured in the **from** specification of a term in the filter.



NOTE: When you use ranges (for example, a range of values or a wildcard) in terms, the ranges must not overlap—overlapping ranges create a conflict error. However, you can configure a range in one term and an exact match in another term. For example, in the following filter table, the wildcard destination port value in term **t3** does not overlap the destination port specifications in terms **t55** and **t999** because the **http** and **https** values are exact matches.

In the Implied Wildcard Example configuration, the router views the **destination-port** condition in the **match-order** statement as an implied wildcard for term **t3**, because there is no **destination-port** value configured in that term. As a result, the wildcard specifies that for term **t3** any **destination-port** value is accepted. The filter table appears as follows:

Term	source-address	destination-address	destination-port	Action
t3	subscriber's address	3.1.1.2/32	any (wildcard)	count t3_cntr accept
t55	subscriber's address	3.1.1.2/32	http	count t55_cntr accept
t999	subscriber's address	3.1.1.2/32	https	count t999_cntr accept

In the following filter configuration, traffic with a destination port of **http** matches term **t55** and traffic with a destination port of **https** matches term **t999**. Traffic with a destination port other than **http** or **https** matches term **t3**, which is the implied wildcard.

Implied Wildcard Example

```
firewall {
  family inet {
    fast-update-filter psf1 {
      interface-specific;
      match-order [ source-address destination-address dscp protocol destination-port ];
      term t3 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 3.1.1.2/32;
        }
        then {
```

```

        count t3_cntr;
        accept;
    }
}
term t55 {
    from {
        source-address $junos-subscriber-ip-address;
        destination-address 3.1.1.2/32;
        destination-port http;
    }
    then {
        count t55_cntr;
        accept;
    }
}
term t999 {
    from {
        source-address $junos-subscriber-ip-address;
        destination-address 3.1.1.2/32;
        destination-port https;
    }
    then {
        count t999_cntr;
        accept;
    }
}
}
}
}

```

Conflict Caused by Overlapping Ranges

This section shows two examples of overlapping ranges in terms. When you use ranges (such as a wildcard or a range of values) in terms, the ranges must not overlap—overlapping ranges create a conflict error and the session fails.

In the following filter configuration, the **destination-port** ranges in the two terms overlap. Ports in the range from 50 through 80 match both term **src0** and term **src1**, which each specify different actions to take.



NOTE: You can configure a range in one term and an exact match in another term. See the section, *Using Implied Wildcards*, for an example that uses a wildcard for a match condition in one term and an exact match for the condition in a second term.

Term	source-address	destination-address	destination-port	Action
src0	subscriber's address	10.1.1.2/32	0–80	count c1_cntr accept

Term	source-address	destination-address	destination-port	Action
src1	subscriber's address	10.1.1.2/32	50–100	count c2_cntr accept

Overlapping Ranges Example 1

```

firewall {
  family inet {
    fast-update-filter fuf-src {
      interface-specific;
      match-order [ source-address destination-address destination-port ];
      term src0 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 10.1.1.2/32;
          destination-port 0–80;
        }
        then {
          count c1_cntr;
          accept;
        }
      }
      term src1 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 10.1.1.2/32;
          destination-port 50–100;
        }
        then {
          count c2_cntr;
          accept;
        }
      }
    }
  }
}

```

In this filter configuration, the **protocol** specification in terms **src21** and **src22** use the implied wildcard, which configures a range for each term. Because overlapping ranges are not allowed, a conflict error results.

Term	source-address	destination-address	protocol	destination-port	Action
src20	subscriber's address	10.1.1.2/32	udp	any (wildcard)	count c20_cntr accept
src21	subscriber's address	10.1.1.2/32	any (wildcard)	http	count c21_cntr accept
src21	subscriber's address	10.1.1.2/32	any (wildcard)	https	count c22_cntr accept

Overlapping Ranges
Example 2

```
firewall {
  family inet {
    fast-update-filter fuf-src2 {
      interface-specific;
      match-order [ source-address destination-address protocol destination-port ];
      term src20 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 10.1.1.2/32;
          protocol udp;
        }
        then {
          count c20_cntr;
          accept;
        }
      }
      term src21 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 10.1.1.2/32;
          destination-port http;
        }
        then {
          count c21_cntr;
          accept;
        }
      }
      term src22 {
        from {
          source-address $junos-subscriber-ip-address;
          destination-address 10.1.1.2/32;
          destination-port https;
        }
        then {
          count c22_cntr;
          accept;
        }
      }
    }
  }
}
```

Related Documentation

- [Configuring Fast Update Filters on page 310](#)
- [Configuring Terms for Fast Update Filters on page 315](#)
- [Configuring the Match Order for Fast Update Filters on page 313](#)

Associating Fast Update Filters with Interfaces in a Dynamic Profile

After you configure the fast update filter, you reference the filter in the **interfaces** stanza of a dynamic profile. When the dynamic profile instantiates a subscriber session, the router applies the terms of the filter to the interface.

To apply a fast update filter to an interface in a dynamic profile:

1. Access the dynamic profile you want to use.

```
[edit]
user@host# edit dynamic-profiles myProfile
```

2. Specify the interface for the dynamic profile—use the dynamic interface variable.

```
[edit dynamic-profiles myProfile]
user@host# edit interfaces $junos-interface-ifd-name
```

3. Specify the underlying interface—use the unit number variable.

```
[edit dynamic-profiles myProfile interfaces "$junos-interface-ifd-name"]
user@host# edit unit $junos-underlying-interface-unit
```

4. Specify the family. Use **inet** if you are using IPv4 filters or **inet6** for IPv6 filters.

```
[edit dynamic-profiles myProfile interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit"]
user@host# edit family inet
```

5. Specify the filters that you want to apply to the interface.

```
[edit dynamic-profiles myProfile interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit" family inet]
user@host# set filter input httpFilter
user@host# set filter output myOutFilter
```

**Related
Documentation**

- *Dynamic Profiles Overview*
- *Configuring Static Subscriber Interfaces in Dynamic Profiles*
- *Associating Dynamic Profiles with Statically Created Interfaces*
- [Fast Update Filters Overview on page 306](#)
- *Guidelines for Configuring Firewall Filters*
- *Guidelines for Applying Firewall Filters*

CHAPTER 25

Defending Against DoS and DDoS Attacks Using Unicast RPF and Fail Filters

- [Unicast RPF in Dynamic Profiles for Subscriber Interfaces on page 325](#)
- [Configuring Unicast RPF in Dynamic Profiles for Subscriber Interfaces on page 326](#)
- [Configuring Unicast RPF and Fail Filters in Dynamic Profiles for Subscriber Interfaces on page 326](#)
- [Configuring a Fail Filter for Unicast RPF in Dynamic Profiles for Subscriber Interfaces on page 327](#)
- [Example: Configuring Unicast RPF in a Dynamic Profile on MX Series Routers on page 327](#)

Unicast RPF in Dynamic Profiles for Subscriber Interfaces

Unicast reverse-path forwarding (RPF) provides a way to reduce the effect of denial-of-service (DoS) and distributed denial-of-service (DDoS) attacks on IPv4 and IPv6 interfaces. When you configure unicast RPF on an interface, it checks the packet source address. Packets that pass the check are forwarded. Packets that fail the check are dropped, or if a fail filter is configured, are passed to the filter for further evaluation.

Unicast RPF has two behavioral modes, strict and loose. When you configure unicast RPF in a dynamic profile, strict mode is the default. In strict mode, unicast RPF checks whether the source address of the incoming packet matches a prefix in the routing table, and whether the interface expects to receive a packet with this source address prefix. In loose mode, unicast RPF checks only whether the source address has a match in the routing table. It does not check whether the interface expects to receive a packet from a specific source address.

For both modes, when an incoming packet fails the unicast RPF check, the packet is not accepted on the interface. Instead, unicast RPF counts the packet and sends it to an optional fail filter, if present. The fail filter determines what further action is taken on the packet. In the absence of a fail filter, the packet is silently discarded.

Related Documentation

- [Configuring Unicast RPF and Fail Filters in Dynamic Profiles for Subscriber Interfaces on page 326](#)
- For more detailed information about unicast RPF in general, see *Configuring Unicast RPF*

Configuring Unicast RPF in Dynamic Profiles for Subscriber Interfaces

This topic describes how to configure unicast RPF for subscriber interfaces in dynamic profiles on MX Series routers.

To configure a unicast RPF with a fail filter in a dynamic profile:

1. Access the dynamic profile.

```
[edit]
user@host# edit dynamic-profiles profile-name
```

2. Access the interface and specify the address family

```
[edit dynamic-profiles profile-name]
user@host# edit interfaces interface-name unit logical-unit-number family inet
```

3. Enable the RPF check and specify the fail filter.

```
[edit dynamic-profiles profile-name interface interface-name unit logical-unit-number
  family inet]
user@host# set rpf-check fail-filter filter-name
```

Related Documentation

- [Configuring Unicast RPF and Fail Filters in Dynamic Profiles for Subscriber Interfaces on page 326](#)
- [Example: Configuring Unicast RPF in a Dynamic Profile on MX Series Routers on page 327](#)

Configuring Unicast RPF and Fail Filters in Dynamic Profiles for Subscriber Interfaces

This topic provides a summary of unicast RPF configuration for subscriber interfaces in dynamic profiles on MX Series routers. Unicast RPF provides a way to reduce the effect of denial-of-service attacks on IPv4 and IPv6 interfaces by checking the source IP address against the routing table. Packets that do not match are silently discarded, unless an optional fail filter is configured. The fail filter performs an additional check and directs some action be taken on certain packets. Typical actions include logging the packets or passing them even though they failed the RPF check.



NOTE: Although the fail filter is technically optional, for dynamic profiles in a DHCP environment you must configure a filter to pass DHCP packets. By default, the RPF check prevents DHCP packets from being accepted on interfaces protected by the RPF check. The fail filter identifies the DHCP packets and passes them on.

To configure unicast RPF in dynamic profiles:

1. Enable unicast RPF on one or more interfaces in a dynamic profile.

See “[Configuring Unicast RPF in Dynamic Profiles for Subscriber Interfaces](#)” on page 326.

2. (Optional) Create a fail filter to evaluate failed packets and perform further actions.

See “Configuring a Fail Filter for Unicast RPF in Dynamic Profiles for Subscriber Interfaces” on page 327.

- Related Documentation**
- [Unicast RPF in Dynamic Profiles for Subscriber Interfaces on page 325](#)
 - [Example: Configuring Unicast RPF in a Dynamic Profile on MX Series Routers on page 327](#)

Configuring a Fail Filter for Unicast RPF in Dynamic Profiles for Subscriber Interfaces

This topic describes how to configure a fail filter at the **[edit firewall]** hierarchy level that can be optionally applied by unicast RPF for subscriber interfaces in dynamic profiles on MX Series routers.



NOTE: In contrast to statically configured fail filters, RPF-check fail filters used in a dynamic profile cannot be specific to a particular interface.

To configure a firewall fail filter:

1. Create the filter.

```
[edit]
user@host# edit firewall family inet filter filter-name
```

2. Specify a term for the filter.

```
[edit firewall family inet filter filter-name]
user@host# edit term term-name
```

3. Configure the match conditions for the filter.

```
[edit firewall family inet filter filter-name term term-name]
user@host# set from match-conditions
```

4. Configure the actions to be taken for the matching packets.

```
[edit firewall family inet filter filter-name term term-name]
user@host# set then actions
```

5. (Optional) Repeat Steps 3 and 4 for additional filter terms.

- Related Documentation**
- [Configuring Unicast RPF and Fail Filters in Dynamic Profiles for Subscriber Interfaces on page 326](#)
 - [Example: Configuring Unicast RPF in a Dynamic Profile on MX Series Routers on page 327](#)

Example: Configuring Unicast RPF in a Dynamic Profile on MX Series Routers

This example shows how to help defend the router ingress interfaces against denial-of-service (DoS) and distributed denial-of-service (DDoS) attacks by configuring unicast reverse-path forwarding (RPF) on a customer-edge interface to filter incoming traffic. Unicast RPF verifies the unicast source address of each packet that arrives on an

ingress interface where unicast RPF is enabled. Packets that fail verification are silently discarded unless a fail filter performs some other action on them.

- [Requirements on page 328](#)
- [Overview on page 328](#)
- [Configuration on page 329](#)
- [Verification on page 332](#)

Requirements

This example uses the following software and hardware components:

- An MX Series 3D Universal Edge router

Before you begin:

- Configure the dynamic profile that you intend to use to apply the RPF check.

See [Configuring a Basic Dynamic Profile](#).

Overview

Large amounts of unauthorized traffic—such as attempts to flood a network with fake service requests in a denial-of-service (DoS) attack—can consume network resources and deny service to legitimate users. One way to help prevent DoS and distributed denial-of-service (DDoS) attacks is to verify that incoming traffic originates from legitimate network sources.

Unicast RPF helps ensure that a traffic source is legitimate (authorized) by comparing the source address of each packet that arrives on an interface to the forwarding-table entry for its source address. If the router uses the same interface that the packet arrived on to reply to the packet's source, this verifies that the packet originated from an authorized source, and the router forwards the packet. If the router does not use the same interface that the packet arrived on to reply to the packet's source, the packet might have originated from an unauthorized source, and the router discards the packet, or passes it to a fail filter.

The fail filter enables you to set criteria for packets you want to be passed in spite of failing the RPF check, such as DHCP packets, which are dropped by default.

On MX Series routers, you can configure unicast RPF in a dynamic profile to apply the configuration to one or more subscriber interfaces. See *[Configuring Unicast RPF](#)* for more information about the behavior and limitations of unicast RPF on MX Series routers.

In this example, you configure the router to protect against potential DoS and DDoS attacks from the Internet perpetrated through IPv4 packets arriving on dynamically created VLAN demux interfaces. The dynamic profile, `vlan-demux-prof`, establishes that VLAN demux interfaces are automatically created for subscribers. Unicast RPF is enabled on the dynamic interfaces by the `rpf-check` term.

By default, unicast RPF prevents Dynamic Host Configuration Protocol (DHCP) packets from being accepted on interfaces to which it applies. When DHCP packets are discarded,

no new subscribers can be created by the dynamic profile. To enable interfaces to accept DHCP packets, you must apply a fail filter that properly sorts through the packets that fail the check and identifies the DHCP packets. In this example, you configure the **allow-dhcp** term in the filter **rpf-pass-dhcp**. This term matches, counts, and accepts IPv4 packets that are destined for the DHCP port and any address. The **default term** drops all other packets that fail the RPF check.

This example does not show all possible configuration choices.

Configuration

To enable unicast RPF with a fail filter in a dynamic profile, perform these tasks:

- [Configuring the Dynamic Profile to Apply RPF Checking to Dynamic VLAN Demux Interfaces on page 329](#)
- [Configuring the RPF-Check Fail Filter on page 330](#)

Configuring the Dynamic Profile to Apply RPF Checking to Dynamic VLAN Demux Interfaces

CLI Quick Configuration

To quickly configure the dynamic profile to apply unicast RPF to dynamically created VLAN demux interfaces, copy the following commands, paste them in a text file, remove any line breaks, and then copy and paste the commands into the CLI.

```
edit dynamic-profiles vlan-demux-prof interfaces demux0
edit unit $junos-interface-unit
set demux-options underlying-interface $junos-interface-ifd-name
set vlan-id $junos-vlan-id
edit family inet
set unnumbered-address lo0.0
set rpf-check fail-filter rpf-pass-dhcp
```

Step-by-Step Procedure

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

To configure unicast RPF on the router:

1. Create a dynamic profile.

```
[edit]
user@host# edit dynamic-profiles vlan-demux-prof
```
2. Specify that the dynamic VLAN profile use the demux interface.

```
[edit dynamic-profiles vlan-demux-prof]
user@host# edit interfaces demux0
```
3. Specify that the dynamic profile applies the demux interface unit value to the dynamic VLANs.

```
[edit dynamic-profiles vlan-demux-prof interfaces demux0]
user@host# edit unit $junos-interface-unit
```
4. Specify the logical underlying interface for the dynamic VLANs.

```
[edit dynamic-profiles vlan-demux-prof interfaces demux0 unit $junos-interface-unit]
```

- ```
user@host# set demux-options underlying-interface $junos-interface-ifd-name
```
5. Configure the variable that results in dynamically created VLAN IDs.  

```
[edit dynamic-profiles vlan-demux-prof interfaces demux0 unit $junos-interface-unit]
user@host# set vlan-id $junos-vlan-id
```
  6. Configure the IPv4 address family for the demux interfaces.  

```
[edit dynamic-profiles vlan-demux-prof interfaces demux0 unit $junos-interface-unit]
user@host# edit family inet
```
  7. Configure the unnumbered address for the family.  

```
[edit dynamic-profiles vlan-demux-prof interfaces demux0 unit $junos-interface-unit
family inet]
user@host# set unnumbered-address lo0.0
```
  8. Configure unicast RPF and specify the fail filter that is applied to incoming packets that fail the check.  

```
[edit dynamic-profiles vlan-demux-prof interfaces demux0 unit $junos-interface-unit
family inet]
user@host# set fail-filter fail-filter rpf-pass-dhcp
```

---

### Configuring the RPF-Check Fail Filter

**CLI Quick Configuration** To quickly configure the unicast RPF-check fail filter, copy the following commands, paste them in a text file, remove any line breaks, and then copy and paste the commands into the CLI.

```
edit firewall family inet filter rpf-pass-dhcp
edit term allow-dhcp
set from destination-port dhcp
set from destination-address 255.255.255.255/32
set then count rpf-dhcp-traffic
set then accept
up
edit term default
set then discard
```

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

To configure the RPF-check fail filter:

1. Create the fail filter.  

```
[edit firewall]
user@host# edit family inet filter rpf-pass-dhcp
```
2. Define the filter term that identifies DHCP packets based on the DHCP destination port, then counts and passes the packets.  

```
[edit firewall family inet filter rpf-pass-dhcp]
user@host# edit term allow-dhcp
user@host# set from destination-port dhcp
user@host# set from destination-address 255.255.255.255/32
```

```

user@host# set then count rpf-dhcp-traffic
user@host# set then accept

```

3. Define the filter term that drops all other failed packets.

```

[edit firewall filter rpf-pass-dhcp]
user@host# edit term default
user@host# set then discard

```

**Results** From configuration mode, confirm the unicast RPF configuration by entering the **show dynamic-profiles** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

```

[edit]
user@host# show dynamic-profiles
vlan-demux-prof {
 interfaces {
 demux0 {
 unit "$junos-interface-unit" {
 vlan-id "$junos-vlan-id";
 demux-options {
 underlying-interface "$junos-interface-ifd-name";
 }
 family inet {
 unnumbered-address lo0.0;
 rpf-check {
 fail-filter rpf-pass-dhcp;
 }
 }
 }
 }
 }
}

```

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

```

[edit]
user@host# show firewall
family inet {
 filter rpf-pass-dhcp {
 term allow-dhcp {
 from {
 destination-address {
 255.255.255.255/32;
 }
 destination-port dhcp;
 }
 then {
 count rpf-dhcp-traffic;
 accept;
 }
 }
 }
 term default {
 then {

```

```
 discard;
 }
}
}
```

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

## Verification

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

- [Verifying That Unicast RPF Is Enabled on the Router on page 332](#)

---

### Verifying That Unicast RPF Is Enabled on the Router

**Purpose** Verify that unicast RPF is enabled.

**Action** Verify that unicast RPF is enabled by using the **show subscribers extensive** command.

```
user@host> show subscribers extensive
Type: VLAN
Logical System: default
Routing Instance: default
Interface: ae0.1073741824
Interface type: Dynamic
Dynamic Profile Name: vlan-demux-prof
State: Active
Session ID: 9
VLAN Id: 100
Login Time: 2011-08-26 08:17:00 PDT
IPv4 rpf-check Fail Filter Name: rpf-pass-dhcp
```

**Meaning** The IPv4 rpf-check Fail Filter Name field displays **rpf-pass-dhcp**, the name of the fail filter applied by the dynamic profile for IPv4 packets failing the RPF check.

**Related Documentation**

- [Unicast RPF in Dynamic Profiles for Subscriber Interfaces on page 325](#)
- [Configuring Unicast RPF and Fail Filters in Dynamic Profiles for Subscriber Interfaces on page 326](#)
- [Configuring a Basic Dynamic Profile](#)



# Improving Scaling and Performance of Filters on Static Subscriber Interfaces

- [Firewall Filters and Enhanced Network Services Mode Overview on page 333](#)
- [Configuring a Filter for Use with Enhanced Network Services Mode on page 335](#)

## Firewall Filters and Enhanced Network Services Mode Overview

---

Under normal conditions, every firewall filter is generated in two different formats -- compiled and term-based. The compiled format is used by the routing engine (RE) kernel, FPCs, and MS-DPs. The term-based format is used by MPCs. Compiled firewall filters are duplicated for each interface or logical interface to which they are applied. Term-based filters, instead of being duplicated, are referenced by each interface or logical interface.

When a combination of MPCs and any other cards populate a chassis, the creation of both firewall filter file formats is necessary. In most networks, the creation of both filter formats and any amount of duplication for compiled firewall filters has no effect on the router. However, in subscriber management networks that include thousands of statically configured subscriber interfaces, creating filters in multiple formats and duplicating those filters for each interface can utilize a large portion of router memory resources. You can use either Enhanced IP Network Services mode or Enhanced Ethernet Network Services mode to improve the scaling and performance specific to routing filters in a subscriber access network that uses statically configured subscriber interfaces.

In configurations where interfaces are created either statically or dynamically and firewall filters are applied dynamically, you must configure the chassis network services to run in enhanced mode. In configurations where interfaces are created statically and firewall filters are applied statically, you must configure chassis network services to run in enhanced mode and also configure each firewall filter for enhanced mode.



**NOTE:** Do not use enhanced mode for firewall filters that are intended for control plane traffic. Control plane filtering is handled by the Routing Engine kernel, which cannot use the term-based format of the enhanced mode filters.

[Table 40 on page 334](#) shows the configuration options when determining enhanced network services mode usage.

Table 40: Enhanced Network Services Mode and Firewall Filter Use Case Determination

| Interface and Filter Configuration                             | Chassis Enhanced Mode Required | Firewall Filter Enhanced Mode Required |
|----------------------------------------------------------------|--------------------------------|----------------------------------------|
| Dynamically-created interfaces and dynamically-applied filters | Yes                            | No                                     |
| Statically-created interfaces and dynamically-applied filters  | Yes                            | No                                     |
| Statically-created interfaces and statically-applied filters   | Yes                            | Yes                                    |

To achieve significant resource savings for the router, combine chassis and filter enhanced mode configuration as follows:

- Install only MPCs in the chassis.



**NOTE:** Configuring chassis network services to run one of the enhanced network services modes results in the router enabling only MPCs and MS-DPCs. Because MS-DPCs use compiled firewall filter format, a router chassis that is configured for one of the enhanced network services modes, configuring standard (non-enhanced) firewall filters for use with any MS-DPCs can decrease optimal resource efficiency.

- When configuring static interfaces on the router, configure chassis network services to run either Enhanced IP Network Services mode or Enhanced Ethernet Network Services mode.
- When statically applying firewall filters to statically-created interfaces, configure any firewall filters for enhanced mode to limit the filter creation to only term-based format.



**NOTE:** Any firewall filters that are not configured for enhanced mode are created in both compiled and term-based format, even if the chassis is running one of the enhanced network services modes. Only term-based (enhanced) firewall filters will be generated, regardless of the setting of the enhanced-mode statement at the [edit chassis network-services] hierarchy level, if any of the following are true:

- Flexible filter match conditions are configured at the [edit firewall family *family-name* filter *filter-name* term *term-name* from] or [edit firewall filter *filter-name* term *term-name* from] hierarchy levels.
- A tunnel header push or pop action, such as GRE encapsulate or decapsulate is configured at the [edit firewall family *family-name* filter *filter-name* term *term-name* then] hierarchy level.
- Payload-protocol match conditions are configured at the [edit firewall family *family-name* filter *filter-name* term *term-name* from] or [edit firewall filter *filter-name* term *term-name* from] hierarchy levels.
- An extension-header match is configured at the [edit firewall family *family-name* filter *filter-name* term *term-name* from] or [edit firewall filter *filter-name* term *term-name* from] hierarchy levels.
- A match condition is configured that only works with MPC cards, such as firewall bridge filters for IPv6 traffic.



**WARNING:** Any firewall filter meeting the previous criteria will not be applied to the loopback, lo0, interface of DPC based FPCs. This means that term-based (enhanced) filters configured for use on the loopback interface of a DPC based FPC will not be applied. This will leave the RE unprotected by that filter.

**Related  
Documentation**

- [Network Services Mode Overview](#)
- [Configuring Junos OS to Run a Specific Network Services Mode in MX Series Routers](#)
- [Configuring a Filter for Use with Enhanced Network Services Mode on page 335](#)

## Configuring a Filter for Use with Enhanced Network Services Mode

For a statically-applied enhanced mode filter to function on statically created interfaces, you must include the **enhanced mode** statement in each filter. However, you do not need to configure the **enhanced mode** statement in filters that are dynamically applied to either static or dynamically-created interfaces.



**NOTE:** For either static or dynamic interfaces to use enhanced network services mode, you must configure the router chassis network services to use either Enhanced IP Network Services mode or Enhanced Ethernet Network Services mode. By configuring chassis network services to run in one of the enhanced modes, the router enables only MPCs and MS-DPCs in the chassis. See [“Firewall Filters and Enhanced Network Services Mode Overview” on page 333](#) for details.

To configure a stateless firewall filter to use enhanced mode:

1. Create or edit the stateless firewall filter.



**NOTE:** You can configure enhanced mode firewall filters for only `inet` and `inet6` filter families.

For IPv4:

```
[edit]
user@host# edit firewall family inet filter filter-name
```

For IPv6:

```
[edit]
user@host# edit firewall family inet6 filter filter-name
```

2. Specify the filter as an enhanced mode filter.

```
[edit firewall family inet filter filter-name]
user@host# set enhanced-mode
```

3. Configure or modify any filter terms.

See *Example: Configuring and Applying a Simple Filter* for a filter configuration example.

#### Related Documentation

- [Understanding How to Use Firewall Filters](#)
- [Network Services Mode Overview](#)
- [Firewall Filters and Enhanced Network Services Mode Overview on page 333](#)
- [Configuring Junos OS to Run a Specific Network Services Mode in MX Series Routers](#)
- [Understanding Dynamic Firewall Filters on page 249](#)

# Configuring Dynamic Service Sets

- [Dynamic Service Sets Overview on page 337](#)
- [Associating Service Sets with Interfaces in a Dynamic Profile on page 337](#)
- [Verifying and Managing Service Sets Information on page 338](#)

## Dynamic Service Sets Overview

---

A service set is a collection of services to be performed by an Adaptive Services (AS) or Multiservices PIC. You configure a service-set definition at the **[edit services]** hierarchy level. You can then apply the service set to one or more interfaces on the router. The service set can be applied either dynamically or statically.

To dynamically associate a service set to interfaces you include the **service-set** statement with the **input** or **output** statement at the **[edit dynamic-profiles *profile-name* interfaces *interface-name* unit *logical-unit-number* family *family* service]** hierarchy level.

To statically associate a defined service set with an interface, you include the **service-set** statement with the **input** or **output** statement at the **[edit interfaces *interface-name* unit *logical-unit-number* family *family* service]** hierarchy level.

### Related Documentation

- [Associating Service Sets with Interfaces in a Dynamic Profile on page 337](#)
- [Verifying and Managing Service Sets Information on page 338](#)
- *Understanding Service Sets*
- *Applying Filters and Services to Interfaces*

## Associating Service Sets with Interfaces in a Dynamic Profile

---

After you configure a service set, you use a dynamic profile to dynamically associate the service set with interfaces. You reference the filter in the **interfaces** stanza of a dynamic profile. When the dynamic profile instantiates a subscriber session, the router applies the terms of the filter to the interface.

To apply a service set to an interface in a dynamic profile:

1. Access the dynamic profile you want to use.

**[edit]**

```
user@host# edit dynamic-profiles myProfile
```

2. Specify the interface for the dynamic profile—use the dynamic interface variable.

```
[edit dynamic-profiles myProfile]
user@host# edit interfaces $junos-interface-ifd-name
```

3. Specify the underlying interface—use the unit number variable.

```
[edit dynamic-profiles myProfile interfaces "$junos-interface-ifd-name"]
user@host# edit unit $junos-underlying-interface-unit
```

4. Specify the family. Dynamic service sets are supported only on **family inet** (IPv4).

```
[edit dynamic-profiles myProfile interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit"]
user@host# edit family inet
```

5. Specify the input and output service sets that you want to apply to the interface.

```
[edit dynamic-profiles myProfile interfaces "$junos-interface-ifd-name" unit
"$junos-underlying-interface-unit" family inet]
user@host# set service input service-set inputService_200
user@host# set service input post-service-filter postService_15
user@host# set service output service-set outputService_320
```

- Related Documentation**
- [Dynamic Service Sets Overview on page 337](#)
  - [Verifying and Managing Service Sets Information on page 338](#)
  - *Configuring Service Sets to be Applied to Services Interfaces*
  - *Applying Filters and Services to Interfaces*

---

## Verifying and Managing Service Sets Information

---

**Purpose** View information for service sets:

- Action**
- To display summary information for service sets:

```
user@host> show services service-sets summary
```

- To display interface-specific information for service sets:

```
user@host> show services service-sets summary interface interface-name
```

- Related Documentation**
- [Dynamic Service Sets Overview on page 337](#)
  - [Associating Service Sets with Interfaces in a Dynamic Profile on page 337](#)
  - [CLI Explorer](#)

# Monitoring and Managing Firewalls for Subscriber Access

- [Verifying and Managing Firewall Filter Configuration on page 339](#)
- [Enhanced Policer Statistics Overview on page 339](#)

## Verifying and Managing Firewall Filter Configuration

---

**Purpose** View or manage information for firewall filters:



**NOTE:** The router creates unique names for fast update filters and for filter terms and counters. See *Naming Fast Update Filters* in “[Fast Update Filters Overview](#)” on [page 306](#) for information.

**Action** • To display statistics for firewall filters:

user@host> [show firewall](#)

• To display firewall log information:

user@host> [show firewall log](#)

• To clear filter counters:

user@host> [clear firewall all](#)

**Related Documentation**

- [Classic Filters Overview on page 253](#)
- [Fast Update Filters Overview on page 306](#)
- [CLI Explorer](#)

## Enhanced Policer Statistics Overview

---

You can use the enhanced policer statistics to analyze traffic for debugging purposes on MPC/MIC interfaces on MX Series routers and Multi-Rate Ethernet Enhanced Queuing IP Services DPC with SFP and XFP.

Enhanced policer statistics provide the following:

- Offered packet statistics for traffic subjected to policing.
- OOS packet statistics for packets that are marked out-of-specification by the policer. Changes to all packets that have out-of-specification actions, such as discard, color marking, or forwarding-class, are included in this counter.
- Transmitted packet statistics for traffic that is not discarded by the policer. When the policer action is discard, the statistics are the same as the within-specification statistics; when the policer action is non-discard (loss-priority or forwarding-class), the statistics are included in this counter.

**Related  
Documentation**

- *show policer*
- [show firewall on page 748](#)
- [enhanced-policer on page 541](#)



## PART 3

# Configuring Dynamic Multicast

- [Configuring Dynamic IGMP to Support IP Multicasting for Subscribers on page 343](#)
- [Configuring Dynamic MLD to Enable Subscribers to Access Multicast Networks on page 349](#)



## CHAPTER 29

# Configuring Dynamic IGMP to Support IP Multicasting for Subscribers

- [Dynamic IGMP Configuration Overview on page 343](#)
- [Subscriber Management IGMP Model Overview on page 343](#)
- [Configuring Dynamic DHCP Client Access to a Multicast Network on page 344](#)
- [Example: IGMP Dynamic Profile on page 346](#)

## Dynamic IGMP Configuration Overview

---

The Internet Group Management Protocol (IGMP) is a host to router signaling protocol for IPv4 used to support IP multicasting. This protocol manages the membership of hosts and routers in multicast groups. IP hosts use IGMP to report their multicast group memberships to any immediately neighboring multicast routers. Multicast routers use IGMP to learn, for each of their attached physical networks, which groups have members.

Subscriber access supports the configuration of IGMP within the **dynamic profiles** hierarchy. By specifying IGMP statements within a dynamic profile, you can dynamically apply IGMP configuration when a subscriber connects to an interface using a particular access technology (DHCP), enabling the subscriber to access a carrier (multicast) network.

### Related Documentation

- [Dynamic Profiles Overview](#)
- [Subscriber Management IGMP Model Overview on page 343](#)
- [Configuring Dynamic DHCP Client Access to a Multicast Network on page 344](#)
- [Configuring IGMP](#)

## Subscriber Management IGMP Model Overview

---

In an IPTV network, channel changes occur when a set-top box (STB) sends IGMP commands that inform an upstream device (for example, a multiservice access node [MSAN] or services router) whether to start or stop sending multicast groups to the subscriber. In addition, IGMP hosts periodically request notification from the STB about which channels (multicast groups) are being received.

You can implement IGMP in the subscriber management network in the following ways:

- **Static IGMP**—All multicast channels are sent to the MSAN. When the MSAN receives an IGMP request to start or stop sending a channel, it adds the subscriber to the multicast group and then discards the IGMP packet.
- **IGMP Proxy**—Only multicast channels currently being viewed are sent to the MSAN. If the MSAN receives a request to view a channel that is not currently being forwarded to the MSAN, it forwards the request upstream. However, the upstream device does not see all channel change requests from each subscriber, limiting bandwidth control options.
- **IGMP Snooping**—Only multicast channels currently being viewed are sent to the MSAN. The MSAN forwards all IGMP requests upstream, unaltered, even if it is already receiving the channel. The upstream device sees all channel change requests from each subscriber. Using IGMP snooping enables the broadband services router to determine the mix of services and the bandwidth requirements of each subscriber and adjust the bandwidth made available to each service.
- **IGMP Passthrough**—The MSAN transparently passes IGMP packets upstream to the broadband services router.

IGMP hosts (sources) also periodically verify that they are sending the correct traffic by requesting that each client send information about what multicast groups it wants to receive. The responses to this *IGMP query* can result in a substantial upstream traffic burst.

IGMPv2 is the minimum level required to support IPTV, and is the most widely deployed. Emerging standards specify IGMPv3.

**Related  
Documentation**

- [Dynamic IGMP Configuration Overview on page 343](#)

---

## Configuring Dynamic DHCP Client Access to a Multicast Network

---

This topic describes how to create a basic dynamic profile that enables DHCP clients to dynamically access the multicast network.

Before you configure dynamic profiles for initial client access:

1. Create a basic dynamic profile.

See *Configuring a Basic Dynamic Profile*.

2. Configure the necessary router interfaces that you want accessing DHCP clients to use.

See *DHCP Subscriber Interface Overview* for information about the types of interfaces you can use with dynamic profiles and how to configure them.

3. Ensure that the router is configured to enable communication between the client and the RADIUS server.

See *Specifying the Authentication and Accounting Methods for Subscriber Access*.

4. Configure all RADIUS values that you want the profiles to use when validating DHCP clients for access to the multicast network.

See *Configuring RADIUS Server Parameters for Subscriber Access*

To configure an initial client access dynamic profile:

1. Access an IGMP access profile.

```
user@host# edit dynamic-profiles access-profile
[edit dynamic-profiles access-profile]
user@host#
```

2. Define the IGMP interface with the interface variable.



**NOTE:** The variable value is replaced by the name of the interface over which the router received the DHCP message.

```
[edit dynamic-profiles access-profile]
user@host# set protocols igmp interface $junos-interface-name
```

3. (Optional) Enable or disable accounting on the IGMP interface.

```
[edit dynamic-profiles access-profile protocols igmp interface "$junos-interface-name"]
user@host# set accounting
```

or

```
[edit dynamic-profiles access-profile protocols igmp interface "$junos-interface-name"]
user@host# set no-accounting
```



**NOTE:** This statement enables you to override the accounting setting at the IGMP protocol level. For example, if IGMP accounting is enabled at the [edit protocols igmp interface *interface-name*] hierarchy level, you can use the no-accounting statement to disable accounting for any IGMP interfaces that are dynamically created by the dynamic profile. If IGMP accounting is not enabled at the [edit protocols igmp interface *interface-name*] hierarchy level, you can use the accounting statement to enable accounting for any IGMP interfaces that are dynamically created by the dynamic profile.

4. Set the IGMP interface to remain enabled.

```
[edit dynamic-profiles access-profile protocols igmp interface "$junos-interface-name"]
user@host# set disable:$junos-igmp-enable
```



**NOTE:** RADIUS is capable of disabling IGMP. By assigning the enable variable to the disable statement, you can ensure that IGMP remains enabled.

5. (Optional) Specify a group policy for the IGMP interface.

```
[edit dynamic-profiles access-profile protocols igmp interface "$junos-interface-name"]
user@host# set group-policy report-reject-policy
```

6. (Optional) Enable immediate leave on the IGMP interface.

```
[edit dynamic-profiles access-profile protocols igmp interface "$junos-interface-name"]
user@host# set immediate-leave $junos-igmp-immediate-leave
```

7. (Optional) Set the IGMP interface to obtain the IGMP version from RADIUS.

```
[edit dynamic-profiles access-profile protocols igmp interface "$junos-interface-name"]
user@host# set version $junos-igmp-version
```

- Related Documentation**
- *Configuring a Basic Dynamic Profile*
  - *Dynamic Profiles Overview*

## Example: IGMP Dynamic Profile

In this example, IGMP is configured for subscriber access using Junos OS predefined variables.

The predefined variables equate to RADIUS settings as follows:

| Junos OS Predefined Variable | RADIUS VSA Name      | RADIUS Attribute Number |
|------------------------------|----------------------|-------------------------|
| \$var-igmp-version           | IGMP-Version         | 26–78                   |
| \$var-igmp-access-grp        | IGMP-Access-Name     | 26–71                   |
| \$var-igmp-access-src-grp    | IGMP-Access-Src-Name | 26–72                   |

```
[edit dynamic-profiles profile-name]
interfaces {
 demux0 {
 unit "$junos-interface-unit" {
 demux-options {
 underlying-interface "$junos-underlying-interface";
 }
 family inet {
 demux-source {
 "$junos-subscriber-ip-address";
 }
 unnumbered-address lo0.0 preferred-source-address 20.21.0.1;
 }
 }
 }
}
protocols {
 igmp {
 interface "$junos-interface-name" {
 version "$var-igmp-version";
 }
 }
}
```

```
 group-policy ["$var-igmp-access-grp" "$var-igmp-access-src-grp"];
 }
}
```



NOTE: You must also configure any global IGMP parameters.

**Related  
Documentation**

- [Configuring Dynamic DHCP Client Access to a Multicast Network on page 344](#)





## CHAPTER 30

# Configuring Dynamic MLD to Enable Subscribers to Access Multicast Networks

- [Dynamic MLD Configuration Overview on page 349](#)

## Dynamic MLD Configuration Overview

---

The Multicast Listener Discovery (MLD) Protocol manages the membership of hosts and routers in multicast groups. IP version 6 (IPv6) multicast routers use MLD to learn, for each of their attached physical networks, which groups have interested listeners. Each router maintains a list of host multicast addresses that have listeners for each subnet, as well as a timer for each address. However, the router does not need to know the address of the listeners—just the address of the hosts. The router provides addresses to the multicast routing protocol it uses; this ensures that multicast packets are delivered to all subnets where there are interested listeners. In this way, MLD is used as the transport for the Protocol Independent Multicast (PIM) protocol.

Subscriber access supports the configuration of MLD within the **dynamic profiles** hierarchy for dynamically created interfaces. By specifying MLD statements within a dynamic profile, you can dynamically apply MLD configuration when a subscriber connects to an interface using a particular access technology (DHCP), enabling the subscriber to access a carrier (multicast) network.

### Related Documentation

- [Dynamic Profiles Overview](#)
- [Configuring Dynamic DHCP Client Access to a Multicast Network on page 344](#)
- [Examples: Configuring MLD](#)



## PART 4

# Configuring HTTP Redirect

- [Configuring HTTP Redirect Services to Provide Authentication and Authorization Services for Redirected Subscribers on page 353](#)
- [Monitoring and Managing HTTP Redirect Services on page 381](#)



## CHAPTER 31

# Configuring HTTP Redirect Services to Provide Authentication and Authorization Services for Redirected Subscribers

- [Redirecting HTTP Requests Overview on page 353](#)
- [Remote HTTP Redirect Server Operation Flow on page 354](#)
- [Local HTTP Redirect Server Operation Flow on page 356](#)
- [Configuring HTTP Redirect Services on page 357](#)
- [Example: Walled Garden as a Service Filter on page 361](#)
- [Example: Walled Garden as an HTTP Service Rule on page 362](#)
- [Example: Configuring an HTTP Service and Attaching It to a Static Interface on page 362](#)
- [Example: Configuring HTTP Redirect Services and Attaching to a Dynamic Interface on page 370](#)
- [Example: Configuring Destination Address Rewrite for HTTP Redirect on page 376](#)
- [Example: Configuring Redundant Multiservice on page 377](#)

## Redirecting HTTP Requests Overview

---

HTTP request traffic from subscribers is aggregated from access networks onto a Broadband Remote Access Server (B-RAS) router, where HTTP traffic can be intercepted and redirected to a captive portal. A captive portal provides authentication and authorization services for redirected subscribers before granting access to protected servers outside of a walled garden. A walled garden defines a group of servers where access is provided to subscribers without reauthorization through a captive portal. You can use a captive portal page as the initial page a subscriber sees after logging in to a subscriber session and as a page used to receive and manage HTTP requests to unauthorized Web resources.

The HTTP redirect service implements a data handler and a control handler and registers them with service rules applicable to the HTTP applications. These rules are parsed by the captive-portal-content-delivery process on the routing engine. The data handler applies the rules to HTTP data flows and handles rewriting the IP destination address or sending an HTTP 302 response with a preconfigured redirect URL. In addition, the control handler maintains a connection with the captive-portal-content-delivery process

on the routing engine to learn configuration changes, such as the redirect URL and the rewrite IP destination and port pair. To achieve faster performance, the control handler maintains a cache of relevant configured entities, such as URLs on Multiservices DPC.

Packet flow differs depending on the following configurations:

- Walled garden as a service filter—HTTP traffic destined to servers within the walled garden does not flow to Multiservices DPC. However, any HTTP traffic destined outside of the walled garden flows to the Multiservices DPC.
- Walled garden as an HTTP policy term—All HTTP traffic flows to the Multiservices DPC. The HTTP service handler determines whether traffic is allowed to go to a walled garden.
- HTTP request packet—If the flow is destined to servers within the walled garden, no action is taken.

An HTTP redirect service can be attached to either a static or dynamic interface. For dynamic subscriber management, HTTP services can be attached dynamically at subscriber login or by using a change of authorization (CoA).

Redundant multiservice PIC and DPC support for HTTP redirect distributes captive portal content delivery rules to both PICs to leverage all framework support (for IPv4 only). Data traffic is sent only to the active PIC and rule processing is performed on the active PIC.

**Related  
Documentation**

- *Configuring a Basic Dynamic Profile*
- *Defining Various Levels of Services for DHCP Subscribers*
- *Junos OS Predefined Variables*
- [Associating Service Sets with Interfaces in a Dynamic Profile on page 337](#)

---

## Remote HTTP Redirect Server Operation Flow

---

You can use the remote HTTP redirect feature in configurations where the redirect server resides outside of the router and on a policy server, such as Session and Resource Control (SRC).

An HTTP redirect remote server that resides in a walled garden behind routers processes HTTP requests redirected to it and responds with a redirect URL to a captive portal. When you use a remote HTTP redirect server, you need to configure an HTTP service rule to rewrite the IP-DA of the incoming HTTP requests on the service router so that the requests reach the remote HTTP redirect server before being redirected to a captive portal.

The following general sequence occurs during access configuration for a remote HTTP redirect server deployment:

1. The subscriber logs in.
2. RADIUS authenticates the subscriber and sends a service activate (IP-DA rewrite), which redirects traffic to the redirect policy server in a walled garden.

3. The subscriber attempts to access the content server.
4. The router first redirects the HTTP traffic to SRC, which redirects it to the captive portal.
5. The captive portal sends an authorization page back to the subscriber.
6. The subscriber enters credentials to obtain authorization.
7. The captive portal verifies the subscriber credentials.
8. The captive portal authorizes the subscriber and notifies SRC.
9. SRC checks the subscriber database and formulates a policy to allow the subscriber access to the content server.
10. SRC sends the policy directly to the router or notifies the RADIUS server, which in turn sends a change of authorization (CoA) to the router.
11. The router attaches the new policy, overriding the initial IP-DA write.

The subscriber now has access to the content server.

The following example shows a configuration for IP-DA rewrite:

```
[edit services captive-portal-content-delivery]
rule ipda-rewrite {
 match-direction input-output;
 term 1 {
 from {
 applications http {
 destination-port 80;
 }
 }
 then {
 rewrite destination-address 100.20.1.2;
 }
 }
}
```

**Related  
Documentation**

- [Local HTTP Redirect Server Operation Flow on page 356](#)

## Local HTTP Redirect Server Operation Flow

---

You can use the local HTTP redirect feature in configurations where the redirect server resides locally on the router.

An HTTP redirect local server that resides locally on a router processes HTTP requests redirected to it and responds with a redirect URL to a captive portal. You can implement the local server as a service within a service set, which provides more scalability and better performance. When you use a local HTTP redirect server, you need to configure an HTTP service rule to redirect HTTP requests to a captive portal within a walled garden.

The following general sequence occurs during access configuration for a local HTTP redirect server deployment:

1. The subscriber logs in.
2. RADIUS authenticates the subscriber and sends a service activate (HTTP redirect), which redirects HTTP traffic to the captive portal in a walled garden.
3. The subscriber attempts to access the content server (HTTP traffic).
4. The subscriber's HTTP traffic is redirected to the captive portal by the router.
5. The captive portal sends an authorization page back to the subscriber.
6. The subscriber enters credentials to obtain authorization.
7. The captive portal verifies the subscriber credentials.
8. The captive portal authorizes the subscriber.

The subscriber now has access to the content server.

The following example shows a configuration for HTTP redirect:

```
[edit services captive-portal-content-delivery]
rule redirect {
 match-direction input-output
 term 1 {
 from {
 applications junos-http;
 }
 then {
 redirect http://100.20.2.10/index.html; # this is the captive portal page
 }
 }
}
```

### Related Documentation

- [Remote HTTP Redirect Server Operation Flow on page 354](#)



## Configuring HTTP Redirect Services

---

This example shows how to configure an HTTP redirect service.

- [Requirements on page 357](#)
- [Overview on page 357](#)
- [Configuration on page 357](#)
- [Verification on page 360](#)

### Requirements

Before you begin:

1. Configure the connection between the redirect server and the JUNOS router by configuring policies on the controller.
2. On the controller, configure a policy that includes the following policy actions to define which traffic to send to the redirect server:
  - An exception action to specify that an HTTP application receive traffic.
  - An HTTP redirect policy action to specify the URL to receive packets identified in the exception application action.

### Overview

In this example, you configure a walled garden with services and policies.

### Configuration

#### Step-by-Step Procedure

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

To configure the HTTP redirect service:

1. Configure the packet and installation.

```
[edit chassis]
fpc 1 {
 pic 0 {
 adaptive-services {
 service-package {
 extension-provider {
 control-cores 1;
 data-cores 7;
 object-cache-size 1024;
 policy-db-size 64;
 package jservices-cpcd;
 syslog {
 daemon any;
 external any;
 }
 }
 }
 }
 }
}
```

```
 }
 }
}
}
```

2. Configure the units and assign the VLAN IDs.

```
[edit interfaces]
ge-0/0/1 {
 vlan-tagging;
 unit 1 {
 vlan-id 100;
 family inet {
 address 100.20.1.1/24;
 }
 }
}
```

3. Configure the policy options.

```
policy-options {
 prefix-list google {
 74.125.19.0/24;
 }
}
```

4. Configure the service options.

```
firewall {
 family inet {
 service-filter walled {
 term google {
 from {
 destination-prefix-list {
 google;
 }
 }
 then skip;
 }
 term http {
 from {
 destination-port [80 8080];
 }
 then service;
 }
 term skip {
 then skip;
 }
 }
 }
 service-filter fromSRC {
 term SRC {
 from {
 source-address {
 10.1.2.3/32;
 }
 source-port 8800;
 }
 }
 }
}
```

```
 then service;
 }
 term skip {
 then skip;
 }
 }
 }
}
```

5. Configure the captive portal content delivery services.

```
services {
 captive-portal-content-delivery {
 rule test {
 match-direction input;
 term t1 {
 then {
 rewrite;
 }
 }
 }
 profile ipda-rewrite {
 cpcd-rules test;
 ipda-rewrite-options {
 destination-address 10.1.2.3;
 destination-port 8800;
 }
 }
 traceoptions {
 file cpcdd;
 flag all;
 }
 }
 service-set sset1 {
 captive-portal-content-delivery-profile ipda-rewrite;
 interface-service {
 service-interface ms-1/0/0;
 }
 }
 stateful-firewall {
 rule Rule1 {
 match-direction input-output;
 term 1 {
 from {
 applications [junos-icmp-all junos-dhcp-server junos-tftp junos-http];
 }
 then {
 accept;
 }
 }
 term 2 {
 from {
 applications SRC;
 }
 then {
 accept;
 }
 }
 }
 }
}
```

```
 }
 }
}
```

6. Configure the applications.

```
applications {
 application SRC {
 protocol tcp;
 destination-port 8800;
 }
}
```

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

For brevity, this **show services** command output includes only the configuration that is relevant to this example. Any other configuration on the system has been replaced with ellipses (...).

```
[edit]
user@host# show services captive-content-delivery
```

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

## Verification

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

- [Verifying HTTP Redirect Requests on page 360](#)

---

### Verifying HTTP Redirect Requests

**Purpose** View information and statistics for the HTTP redirect configuration.

- Action**
- To display services statistics:  
user@host# show services captive-portal-content-delivery statistics
  - To display services flows:  
user@host# show services captive-portal-content-delivery flows
  - To clear services statistics:  
user@host# clear services captive-portal-content-delivery statistics

**Related Documentation**

- [Redirecting HTTP Requests Overview on page 353](#)

## Example: Walled Garden as a Service Filter

Service filters are configured under the firewall and are not specific to captive portal content delivery. The following example shows a walled garden with one server, which is the captive portal:

```
[edit firewall family inet]
root@host# show
service-filter walled {
 term 1 {
 from {
 destination-address {
 100.20.2.3/32; ## this is the address of captive portal
 }
 destination-port 80;
 }
 then skip; ## skip service DPC for http traffic
 ## destined to captive portal
 }
}
```

The following example shows a walled garden within a subnet:

```
service-filter walled-net {
 term 2 {
 from {
 destination-prefix-list {
 100.20.2.0/24; ## '100.20.2.0/24' is not defined
 }
 }
 then skip;
 }
}
```

The following example shows the configuration of an IPv6 walled garden:

```
[edit services captive-portal-content-delivery]
rule walled-garden {
 match-direction input-output
 term 1 {
 from {
 destination-address 2001:2002:0:1::/64; ## captival portal resides here
 destination-port 80;
 }
 then {
 accept;
 }
 }
}
```

**Related Documentation**

- [Redirecting HTTP Requests Overview on page 353](#)

## Example: Walled Garden as an HTTP Service Rule

---

HTTP service rule configuration resides under the services hierarchy and uses the captive portal and content delivery (captive-portal-content-delivery) service. The following example shows a walled garden configured as an HTTP service rule:

```
[edit services captive-portal-content-delivery]
rule walled-garden {
 match-direction input-output
 term 1 {
 from {
 destination-address 100.20.2.3/32; ## captive portal
 destination-port 80;
 }
 then {
 accept;
 }
 }
}
```

When a remote HTTP redirect server is used, you need to configure an HTTP service rule to rewrite the IP-DA of incoming HTTP requests on the service router so that the requests reach the remote HTTP redirect server before being redirected to a captive portal. If the destination port is not specified, the default behavior is determined by the rewrite configuration. If no rewrite configuration is available, the destination port is not rewritten. The following example shows a configuration for IP-DA rewrite:

```
[edit services captive-portal-content-delivery]
rule ipda-rewrite {
 match-direction input-output;
 term 1 {
 from {
 applications junos-http;
 }
 then {
 rewrite destination-address 100.20.2.10; # this is the remote
 # redirect server.
 }
 }
}
```

**Related Documentation**

- [Redirecting HTTP Requests Overview on page 353](#)

## Example: Configuring an HTTP Service and Attaching It to a Static Interface

---

This example shows how to configure an HTTP redirect service and attach it to a static interface.

- [Requirements on page 363](#)
- [Overview on page 363](#)

- [Configuration on page 363](#)
- [Verification on page 370](#)

## Requirements

Before you begin:

- Configure the connection between the redirect server and the JUNOS router.
- Define the source address (10.0.0.0/24 is used in this example).
- Define the interface(s) used for subscriber traffic.

## Overview

You can configure an HTTP redirect service set and attach it to a static interface using either of these examples:

- [Configuring HTTP redirect service using an interface-specific filter](#)
- [Configuring HTTP redirect service using a next-hop method](#)

## Configuration

- [Configuring HTTP Redirect Service Using an Interface-Specific Filter on page 363](#)
- [Configuring HTTP Redirect Service Using a Next-Hop Method on page 366](#)
- [Results on page 369](#)

---

### Configuring HTTP Redirect Service Using an Interface-Specific Filter

#### Step-by-Step Procedure

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

To configure the HTTP redirect service using an interface-specific filter:

1. Configure the package and installation.

```
[edit chassis]
fpc 11 {
 pic 1 {
 adaptive-services {
 service-package {
 extension-provider {
 control-cores 1;
 data-cores 7;
 object-cache-size 1024;
 policy-db-size 64;
 package jservices-cpcd;
 syslog {
 daemon none;
 external none;
 kernel none;
 pfe none;
 }
 }
 }
 }
 }
}
```

```
 }
 }
}
}
```

2. Configure the static interface, unit, and assign the VLAN ID. Also, define the redirect filter and HTTP input and output service sets, and service filters.

```
[edit interfaces]
xe-0/0/1 {
 unit 900 {
 vlan-id 900;
 family inet {
 filter {
 input redirect-in;
 }
 service {
 input {
 service-set http-redirect-sset service-filter http-redirect-sfilter;
 }
 output {
 service-set http-redirect-sset;
 }
 }
 }
 }
}
```

3. Configure the service options by defining the interface-specific filter using multiple walled garden destination addresses to direct traffic, and the service filter to redirect HTTP traffic to servers inside the walled garden.

```
[edit firewall]
family inet {
 filter redirect-in {
 interface-specific;
 term DNS {
 from {
 destination-port 53;
 }
 then {
 accept;
 }
 }
 term Wall-Garden {
 from {
 destination-address {
 192.168.220.1/24;
 192.168.220.2/24;
 192.168.220.3/24;
 192.168.11.1/32;
 192.168.14.1/32;
 192.168.18.1/32;
 }
 }
 then {
```



```

 count Wall-Garden;
 forwarding-class best-effort;
 accept;
 }
}
term HTTP {
 from {
 protocol tcp;
 destination-port http;
 }
 then {
 count HTTP;
 forwarding-class best-effort;
 accept;
 }
}
term DROP_ALL {
 then {
 discard;
 }
}
}
service-filter http-redirect-sfilter {
 term 1 {
 from {
 source-address {
 10.0.0.0/24;
 }
 destination-address {
 A1.B1.C1.D1/32; # replace with your own IP address (server inside the walled
 garden)
 A2.B2.C2.D2/32; # replace with your own IP address (server inside the walled
 garden)
 A3.B3.C3.D3/32; # replace with your own IP address (server inside the walled
 garden)
 }
 }
 then skip;
 }
 term 2 {
 from {
 source-address {
 10.0.0.0/24;
 }
 protocol tcp;
 destination-port [http 8080];
 }
 then {
 count SVC-HTTP;
 service;
 }
 }
 term 3 { # this term will make the remaining traffic to be accept and not serviced
 (not redirected)
 then skip; # if the intention is to drop the remaining traffic, then this term must be
 changed to discard.
 }
}

```

```
}
```

4. Configure the service filter as a walled garden by defining a rule named `redirect`, referencing the rule in a profile named `http-redirect`, configuring a service set named `http-redirect-sset` that references the `http-redirect` captive portal content delivery profile, and attaching the `http-redirect` service set to static interface `ms-11/1/0`.

```
[edit services]
captive-portal-content-delivery {
 rule redirect {
 match-direction input;
 term 1 {
 then {
 redirect http://redirection-portal/redirection/;
 }
 }
 }
 profile http-redirect {
 cpcd-rules redirect;
 }
}
service-set http-redirect-sset {
 captive-portal-content-delivery-profile http-redirect;
 interface-service {
 service-interface ms-11/1/0;
 }
}
```

### Configuring HTTP Redirect Service Using a Next-Hop Method

#### Step-by-Step Procedure

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

To configure the HTTP redirect service using a next-hop method:

1. Configure the service filter by defining a rule named `redirect`, referencing the rule in a profile named `http-redirect`, configuring a service set named `http-redirect-sset` that references the `http-redirect` captive portal content delivery profile, and attaching the next-hop service set to inside-service-interface `ms-11/1/0.1`, and to outside-service-interface `ms-11/1/0.2`.

```
[edit services]
captive-portal-content-delivery {
 rule redirect {
 match-direction input;
 term REDIRECT {
 then {
 redirect http://redirection-portal/redirection/;
 }
 }
 }
 profile http-redirect {
 cpcd-rules redirect;
 }
}
```

```

 }
 }
 service-set http-redirect-sset {
 captive-portal-content-delivery-profile http-redirect;
 next-hop-service {
 inside-service-interface ms-11/1/0.1;
 outside-service-interface ms-11/1/0.2;
 }
 }
}

```

2. Configure the package and installation.

```

[edit chassis]
fpc 11 {
 pic 0 {
 adaptive-services {
 service-package layer-3;
 }
 }
 pic 1 {
 adaptive-services {
 service-package {
 extension-provider {
 control-cores 1;
 data-cores 7;
 object-cache-size 1024;
 policy-db-size 64;
 package jservices-cpcd;
 syslog {
 daemon none;
 external none;
 kernel none;
 pfe none;
 }
 }
 }
 }
 }
}

```

3. Configure the interfaces used for subscriber traffic and define the interface VLAN where any redirected traffic will arrive. Also, define the service options for redirect filter, and inside and outside service domains.



**NOTE:** The values configured for the service options are shown for example only. You must configure and provision appropriate values as per the requirement.

```

[edit interfaces]
xe-0/0/1 {
 unit 900 { <<<<<<<<<< interface.vlan where the traffic that must be redirected
 will arrive
 description "VLAN REDIRECT";
 vlan-id 900;
 }
}

```

```

family inet {
 filter {
 input FF_HTTP_REDIRECT_IN;
 }
 address 10.205.255.10/30;
}
}
ms-11/1/0 {
 services-options {
 open-timeout 4;
 close-timeout 2;
 inactivity-tcp-timeout 5;
 inactivity-asymm-tcp-timeout 5;
 inactivity-non-tcp-timeout 5;
 session-timeout 5;
 tcp-tickles 0;
 }
 unit 1 {
 family inet;
 service-domain inside;
 }
 unit 2 {
 family inet {
 filter {
 output FF_CPCD_REDIRECT_OUTPUT;
 }
 }
 service-domain outside;
 }
}
}

```

4. Configure interface-specific filters to direct output traffic to the outside service domain, and input traffic to the inside service domain.

```

[edit firewall]
family inet {
 filter FF_CPCD_REDIRECT_OUTPUT {
 interface-specific;
 term One {
 then {
 count back-to-default;
 }
 }
 }
}
filter FF_HTTP_REDIRECT_IN {
 interface-specific;
 term ACCEPTED_PREFIXES {
 from {
 prefix-list {
 User-PRIVATE-Blocks-01;
 }
 }
 then next term;
 }
 term HTTP {
 from {

```

```

 protocol tcp;
 destination-port http;
 }
 then {
 count http;
 forwarding-class best-effort;
 }
}
}
}

```

5. Configure the policy option and statement to use a private blocks prefix list for the source address, for example, 10.0.0.0/24.

```

[edit policy-options]
policy-statement User-PRIVATE-Blocks-01 {
 10.0.0.0/24;
}

```

## Results

From configuration mode, confirm your configuration and display the current operational state of all captive portal interfaces by entering the **show services captive-content-delivery** command using various options. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

### show services captive-portal-content-delivery

```

user@host> show services captive-portal-content-delivery pic xe-0/0/1
Name Index
xe-0/0/1 20

```

```

user@host> show services captive-portal-content-delivery profile
Profile Rules or Rule Sets
http-redirect 1
cpd-rules 1

```

```

user@host> show services captive-portal-content-delivery http-redirect
Profile Rules or Rule Sets
http-redirect 1

```

```

user@host> show services captive-portal-content-delivery rule
Rule Name Term Name
redirect REDIRECT
rewrite term 1

```

```

user@host> show services captive-portal-content-delivery rule redirect term t1
Rule name: redirect
Rule match direction: input
Term name: term 1
Term action: redirect
Term action option: http://redirection-portal/redirection/

```

```

user@host> show services captive-portal-content-delivery service-set http-redirect-sset detail
Service Set Id Profile Compiled Rules
http-redirect-sset 1 http-redirect 1

```

```
user@host> show services captive-portal-content-delivery statistics interface ms-11/1/0
service-set interface: ms-11/1/0
```

```
Packets received Packets altered
5 3
```

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

## Verification

To confirm that HTTP redirect services have been configured correctly, perform these tasks:

- [Verifying HTTP Redirect Requests on page 370](#)

---

### Verifying HTTP Redirect Requests

**Purpose** View information and statistics for the HTTP redirect configuration.

- Action**
- To display services statistics:  
user@host# **show services captive-portal-content-delivery statistics**
  - To display services flows:  
user@host# **show services captive-portal-content-delivery flows**
  - To clear services statistics:  
user@host# **clear services captive-portal-content-delivery statistics**

**Related Documentation**

- [Redirecting HTTP Requests Overview on page 353](#)

---

## Example: Configuring HTTP Redirect Services and Attaching to a Dynamic Interface

This example shows how to configure HTTP redirect services and attach it to a dynamic interface.

- [Requirements on page 370](#)
- [Overview on page 371](#)
- [Configuration on page 371](#)
- [Verification on page 375](#)

## Requirements

This example uses the following hardware and software components:

- MX240, MX480, or MX960 3D Universal Edge Router with any of the following installed:  
a Dense Port Concentrator (DPC) on a single board or a Multiservices Modular PIC Concentrator (MS-MPC) and Multiservices Modular Interfaces Card (MS-MIC).
- Junos OS Release 10.4 or later

## Overview

A dynamic service attachment uses a dynamic profile. To handle scalability more efficiently, this dynamic profile example shows that the name of the service set can be populated dynamically for each subscriber at instantiation time. This dynamic profile encapsulates a service attachment point associated with a statically preprovisioned service set.

## Configuration

To configure HTTP redirect services and attach it to a dynamic interface, perform these tasks:

- [Configuring the Package and Installation for Captive Portal Content Delivery on page 372](#)
- [Configuring an HTTP Redirect Service and Attaching It to a Dynamic Interface on page 374](#)

### CLI Quick Configuration

To quickly configure this example, copy the following commands, paste them into a text file, remove any line breaks, and then copy and paste the commands into the CLI.

```
[edit]
set chassis fpc 3 pic 0 adaptive-services service-package
set chassis fpc 3 pic 0 adaptive-services service-package extension-provider
edit chassis fpc 3 pic 0 adaptive-services service-package extension-provider
set control-cores 1
set data-cores 7
set object-cache-size 1024
set policy-db-size 64
set package jservices-cpcd
set package jservices-llpdf
set chassis fpc 3 pic 1 adaptive-services service-package
set chassis fpc 3 pic 1 adaptive-services service-package extension-provider
edit chassis fpc 3 pic 1 adaptive-services service-package extension-provider
set control-cores 1
set data-cores 7
set object-cache-size 1024
set policy-db-size 64
set package jservices-cpcd

[edit]
edit dynamic-profiles profile prof-2
set interfaces $junos-interface-ifd-name
set interfaces $junos-interface-ifd-name unit $junos-interface-unit
set interfaces $junos-interface-ifd-name unit $junos-interface-unit family inet
edit dynamic-profiles profile prof-2 interfaces $junos-interface-ifd-name unit
 $junos-interface-unit family inet service
set input service-set ssetname1 service-filter sfiltername1
set input post-service-filter pfiltername1
set output service-set ssetname2
```

### Configuring the Package and Installation for Captive Portal Content Delivery

#### Step-by-Step Procedure

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

1. Configure Junos OS to support a service package on an adaptive services interface on a MX Series 3D Universal Edge Router with MS-DPCs or MS-MPCs/MS-MICs..

**[edit chassis]**

```
user@host# set fpc 3 pic 0 adaptive-services service-package
```

2. Configure an application on the first of two PICs. When the **extension-provider** statement is first configured, the PIC reboots.

**[edit chassis fpc 3 pic 0 adaptive-services service-package]**

```
user@host# set extension-provider
```

3. Set the control core to run control functionality and the data core to process data for the application.

**[edit chassis fpc 3 pic 0 adaptive-services service-package extension-provider]**

```
user@host# set control-cores 1
```

```
user@host# set data-cores 7
```

4. Set the size of the object cache in MB. Must be in increments of 128 MB.

**[edit chassis fpc 3 pic 0 adaptive-services service-package extension-provider]**

```
user@host# set object-cache-size 1024
```

5. Set the size of the policy database in MB. The size of the policy database together must be smaller than the size of the object cache.

**[edit chassis fpc 3 pic 0 adaptive-services service-package extension-provider]**

```
user@host# set policy-db-size 64
```

6. Install and configure the captive portal content delivery package and the Junos Services LL-PDF container package on the PIC.

**[edit chassis fpc 3 pic 0 adaptive-services service-package extension-provider]**

```
user@host# set package jservices-cpcd
```

```
user@host# set package jservices-llpdf
```



**NOTE:** Up to eight packages can be installed on a PIC; however, only one data package can be on a PIC.

7. Configure an application on the second of two PICs. When the **extension-provider** statement is first configured, the PIC reboots.

**[edit chassis fpc 3 pic 1 adaptive-services service-package]**

```
user@host# set extension-provider
```

8. Set the control core to run control functionality and the data core to process data for the application.



```
[edit chassis fpc 3 pic 1 adaptive-services service-package extension-provider]
```

```
user@host# set control-cores 1
```

```
user@host# set data-cores 7
```

9. Set the size of the object cache in MB. Must be in increments of 128 MB.

```
[edit chassis fpc 3 pic 1 adaptive-services service-package extension-provider]
```

```
user@host# set object-cache-size 1024
```

10. Set the size of the policy database in MB. The size of the policy database together must be smaller than the size of the object cache.

```
[edit chassis fpc 3 pic 1 adaptive-services service-package extension-provider]
```

```
user@host# set policy-db-size 64
```

11. Install and configure the captive portal content delivery package on the PIC.

```
[edit chassis fpc 3 pic 1 adaptive-services service-package extension-provider]
```

```
user@host# set package jservices-cpcd
```

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

```
[edit]
root@host# show configuration chassis
fpc 3 {
 pic 0 {
 adaptive-services {
 service-package {
 extension-provider {
 control-cores 1;
 data-cores 7;
 object-cache-size 1024;
 policy-db-size 64;
 package jservices-cpcd;
 package jservices-llpdf;
 }
 }
 }
 }
 pic 1 {
 adaptive-services {
 service-package {
 extension-provider {
 control-cores 1;
 data-cores 7;
 object-cache-size 1024;
 policy-db-size 64;
 package jservices-cpcd;
 }
 }
 }
 }
}
```

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

### Configuring an HTTP Redirect Service and Attaching It to a Dynamic Interface

---

#### Step-by-Step Procedure

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

1. Configure a dynamic profile to use as the parameterized service attachment.  
**[edit dynamic-profiles]**  
user@host# **set profile prof-2**
2. Configure the dynamic interface name using the interface variable.  
**[edit dynamic-profiles profile prof-2]**  
user@host# **set interfaces \$junos-interface-ifd-name**
3. Configure the logical unit number using the unit number variable on a dynamic underlying VLAN interface.  
**[edit dynamic-profiles profile prof-2 interfaces \$junos-interface-ifd-name]**  
user@host# **set unit \$junos-interface-unit**
4. Configure protocol family information for the logical interface.  
**[edit dynamic-profiles profile prof-2 interfaces \$junos-interface-ifd-name unit \$junos-interface-unit]**  
user@host# **set family inet**
5. Configure the input service sets and filters to apply to traffic by a dynamic profile.  
**[edit dynamic-profiles profile prof-2 interfaces \$junos-interface-ifd-name unit \$junos-interface-unit family inet service]**  
user@host# **set input service-set ssetname1 service-filter sfiltername1**  
user@host# **set input post-service-filter pfiltername1**
6. Configure the output service sets and filters to apply to traffic by a dynamic profile.  
**[edit dynamic-profiles profile prof-2 interfaces \$junos-interface-ifd-name unit \$junos-interface-unit family inet service]**  
user@host# **set output service-set ssetname2**

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

```
[edit]
root@host# show dynamic-profiles
dynamic-profiles {
 profile prof-2
 interfaces {
 $junos-interface-ifd-name {
 unit $junos-interface-unit {
 family inet {
 service {
```

```
 input {
 service-set ssetname1 service-filter sfiltername1;
 input post-service-filter pfiltername1;
 }
 output {
 output service-set ssetname2;
 }
}

}

}

}

}
```

## Verification

To confirm that a service set has been configured correctly for a service interface, perform these tasks:

- [Verifying Service Set Summary Information for a Services Interface on page 375](#)
- [Verifying Statistics for the Configured Service Set Interface on page 375](#)

## Verifying Service Set Summary Information for a Services Interface

**Purpose** Display the summary information about the service sets for service interfaces.

**Action** From operational mode, enter the **show services service-sets summary** command.

```

user@host> show services service-sets summary
Service sets
CPU
Interface configured Bytes used Policy bytes used utilization
ms-1/0/0 1 385021900 (81.96%) 299796 (0.44%) 92.89 % OVLD

```

|                |                                                                                                               |
|----------------|---------------------------------------------------------------------------------------------------------------|
| <b>Meaning</b> | The output lists summarized information for the configured service interface and its configured service sets. |
|----------------|---------------------------------------------------------------------------------------------------------------|

## Verifying Statistics for the Configured Service Set Interface

**Purpose** Display statistics for the configured service set interface.

|               |                                                                                                                              |
|---------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>Action</b> | From operational mode, enter the <b>show services captive-portal-content-delivery statistics interface ms-1/0/0</b> command. |
|---------------|------------------------------------------------------------------------------------------------------------------------------|

```
user@host> show services captive-portal-content-delivery statistics interface ms-1/0/0
service-set interface: ms-1/0/0
```

|                  |                 |
|------------------|-----------------|
| Packets received | Packets altered |
| 5                | 3               |

**Meaning** The output lists the packet flow statistics for the configured service set interface.

- Related Documentation**
- [Redirecting HTTP Requests Overview on page 353](#)

---

## Example: Configuring Destination Address Rewrite for HTTP Redirect

---

- [Requirements on page 376](#)
- [Overview on page 376](#)
- [Configuration on page 376](#)
- [Verification on page 377](#)

### Requirements

- Multiservices DPC PIC

### Overview

This procedure shows how to configure an DA rewrite rule. The destination port is not specified and the default behavior is determined by the rewrite configuration. If no rewrite configuration is available, the destination port is not rewritten.

### Configuration

---

#### Example: Configuring a Rewrite Rule

---

##### Step-by-Step Procedure

1. Configure the service rule:  

```
[edit services captive-portal-content-delivery]
user@host# set rule da-rewrite
```
2. Specify the term name:  

```
[edit services captive-portal-content-delivery da-rewrite]
user@host# set term t1
```
3. Specify the match conditions for the term:  

```
[edit services captive-portal-content-delivery da-rewrite inet-filter term t1]
user@host# set from applications junos-http
```
4. Specify the actions to take if the packet matches all the conditions in that term:  

```
[edit services captive-portal-content-delivery da-rewrite inet-filter term t1]
user@host# set then rewrite destination-address 2001:2002::1;
```

##### Results

Confirm the configuration by entering the **show services** configuration command. If the command output does not display the intended configuration, repeat the instructions in this procedure to correct the configuration.

```
[edit services captive-portal-content-delivery]
rule da-rewrite {
 match-direction input-output
 term 1 {
 from {
 applications junos-http;
```

```
 }
 then {
 rewrite destination-address 2001:2002::1; # this is the remote redirect server.
 }
}
}
```

The following example shows the configuration for an IPv6-DA rewrite service rule. Because the destination port is not specified, the default behavior is determined by the rewrite configuration. If no rewrite configuration is available, the destination port is not rewritten.

```
[edit services captive-portao-content-delivery]
rule ipv6da-rewrite {
 match-direction input-output
 term 1 {
 from {
 applications junos-http;
 }
 then {
 rewrite destination-address 2001:2002::1; # this is the remote
 # redirect server.
 }
 }
}
```

## Verification

### [Displaying HTTP Redirect configuration](#)

---

**Purpose** Verify the HTTP requests are redirected to the server.

**Action** user@host> **show services detail**

**Related Documentation**

- [Redirecting HTTP Requests Overview on page 353](#)

## Example: Configuring Redundant Multiservice

---

- [Requirements on page 377](#)
- [Overview on page 377](#)
- [Configuration on page 378](#)
- [Verification on page 379](#)

## Requirements

- Multiservices DPC PIC

## Overview

This procedure shows how to configure redundant multiservice support.

## Configuration

### Example: Configuring Redundant Multiservice for IPv4

---

#### Step-by-Step Procedure

1. Configure the interface:  

```
[edit interfaces]
user@host# set interface rms0
```
2. Configure the redundant multiservice service set:  

```
[edit services]
user@host# set service-interface rms0
```
3. Configure the redundant multiservice service set attachment:  

```
[edit interfaces]
user@host# set ge-1/0/0 unit 100
```

#### Results

Confirm the configuration by entering the **show redundancy-options** configuration command.

```
show redundancy-options
redundancy-options {
 primary ms-2/1/0;
 secondary ms-3/1/0;
 hot-standby;
}
unit 0 {
 family inet;
}
```

Confirm the service set configuration by entering the **show captive-portal-content-delivery-profile** configuration command.

```
show captive-portal-content-delivery-profile httpRedirect
interface-service {
 service-interface rms0;
}
```

Confirm the service set attachment by entering the **show show vlan-id** configuration command.

```
show vlan-id 100
family inet {
 service {
 input {
 service-set sset10 service-filter walled;
 }
 output {
 service-set sset10;
 }
 }
 address 192.1.4.1/24;
}
```

## Verification

### Displaying Redundant Multiservice Configuration

---

**Purpose** Verify the redundant multiservice configuration.

**Action** user@host> **show interfaces redundancy detail**

**Related Documentation**

- *Failover of the Control Service PICs*





## CHAPTER 32

# Monitoring and Managing HTTP Redirect Services

- [Verifying HTTP Redirect Requests on page 381](#)

### Verifying HTTP Redirect Requests

---

**Purpose** View information and statistics for the HTTP redirect configuration.

**Action** • To display services statistics:

user@host> **show services captive-portal-content-delivery statistics**

• To display services flows:

user@host> **show services captive-portal-content-delivery flows**

• To clear services statistics:

user@host> **clear services captive-portal-content-delivery statistics**

**Related Documentation** • [Redirecting HTTP Requests Overview on page 353](#)



## PART 5

# Configuring Subscriber Secure Policy

- [Configuring Subscriber Secure Policy Traffic Mirroring on page 385](#)
- [Configuring RADIUS-Initiated Subscriber Secure Policy Traffic Mirroring on page 389](#)
- [Configuring Subscriber Secure Policy Support for IPv4 Multicast Traffic on page 403](#)
- [Configuring DTCP-Initiated Subscriber Secure Policy Traffic Mirroring on page 405](#)
- [Configuring Intercept-Related Information for Subscriber Secure Policy on page 417](#)
- [Configuring the Mediation Device for Subscriber Secure Policy on page 421](#)
- [Monitoring and Managing DTCP Messages on page 431](#)



## CHAPTER 33

# Configuring Subscriber Secure Policy Traffic Mirroring

- [Subscriber Secure Policy Overview on page 385](#)
- [Subscriber Secure Policy Licensing Requirements on page 387](#)
- [Configuring Support for Subscriber Secure Policy Mirroring on page 387](#)

### Subscriber Secure Policy Overview

---

Subscriber secure policy enables you to mirror traffic on a per-subscriber basis. You can mirror the content of subscriber traffic as well as monitor events related to the subscriber session that is being mirrored.

Subscriber secure policy mirroring can be based on information provided by either RADIUS or Dynamic Tasking Control Protocol (DTCP), and can mirror both IPv4 and IPv6 traffic. Configuration of subscriber secure policy mirroring is independent of the actual mirroring session—you can configure the mirroring parameters at any time. Also, you can use a single RADIUS or DTCP server to provision mirroring operations on multiple routers in a service provider's network. To provide security, the ability to configure, access, and view the subscriber secure policy components and configuration is restricted to authorized users.

After subscriber secure policy is triggered, both the subscriber incoming and outgoing traffic are mirrored. The original traffic is sent to its intended destination and the mirrored traffic is sent to a mediation device for analysis. The actual mirroring operation is transparent to subscribers whose traffic is being mirrored. A special UDP/IP header is prepended to each mirrored packet sent to the mediation device. The mediation device uses the header to differentiate multiple mirrored streams that arrive from different sources.

### Subscriber Secure Policy for Subscribers on VLANs

Interface-based subscriber secure policy is supported on dynamic, authenticated VLAN interfaces and VLAN demux interfaces. When you enable subscriber secure policy for these interfaces, traffic for all configured families (inet, inet6) including Layer 2 and Layer 3 control traffic is mirrored. The mirrored packets include Layer 2 encapsulations.

## Traffic Filtering For DTCP-Initiated Subscriber Secure Policy Mirrored Traffic

You can filter mirrored traffic before it is sent to a mediation device. With this feature, service providers can reduce the volume of traffic sent to a mediation device. For some types of traffic, such as IPTV or video on demand, you do not need to mirror the entire content of the traffic because the content may already be known or controlled by the service provider.

## Mirroring-Related Event Reporting

Subscriber secure policy also supports the use of SNMPv3 traps to report events related to the mirroring operation to an external device. Types of information sent in traps include identifying information for subscribers, such as username or IP address, and subscriber session events, such as login or logout events or mirroring session activation or deactivation. The traps map to messages defined in the *Lawfully Authorized Electronic Surveillance (LAES) for IP Network Access, American National Standard for Telecommunications*.

## Support for L2TP Subscribers

Both DTCP-initiated and RADIUS-initiated SSP can be applied to Point-to-Point Protocol (PPP) subscribers whose traffic is tunneled with Layer 2 Tunneling Protocol (L2TP). DTCP SSP supports subscribers only at the L2TP network server (LNS), whereas RADIUS-initiated SSP supports subscribers at the L2TP access concentrator (LAC) or the LNS.

At the LAC, both subscriber ingress traffic (from the subscriber into the tunnel) and subscriber egress traffic (from the tunnel to the subscriber) are mirrored at the subscriber-facing ingress interface. The ingress traffic is mirrored after PPPoE decapsulation and before L2TP encapsulation. The egress traffic is mirrored after L2TP decapsulation. The mirrored packet includes the complete HDLC frame sent to the LNS rather than only the IP datagram.

At the LNS, both subscriber ingress traffic (from the LAC to the LNS) and subscriber egress traffic (from the LNS to the LAC) are mirrored at the inline services (si) interface corresponding to the subscriber. Ingress traffic is mirrored after decapsulation of L2TP, HDLC, and PPP headers. The egress traffic is mirrored before the IP datagram is encapsulated. The mirrored traffic contains only the IP datagram belonging to the subscriber.

There is no specific L2TP SSP configuration.

### Related Documentation

- [RADIUS-Initiated Subscriber Secure Policy Overview on page 389](#)
- [DTCP-Initiated Subscriber Secure Policy Overview on page 405](#)
- [Intercept-Related Events Transmitted to the Mediation Device on page 417](#)

## Subscriber Secure Policy Licensing Requirements

To enable and use subscriber secure policy, you must install and properly configure the Subscriber Secure Policy license.

### Related Documentation

- *Junos OS Feature Licenses*
- *Junos OS Feature License Keys*
- *License Enforcement*

## Configuring Support for Subscriber Secure Policy Mirroring

Subscriber secure policy runs on the radius-flow-tap service. This topic describes the steps to configure radius-flow-tap support for RADIUS-initiated and DTCP-initiated subscriber secure policy mirroring.

To configure the radius-flow-tap service to support subscriber secure policy mirroring:

1. Configure the flow-tap service used for subscriber secure policy mirroring.

```
[edit services]
user@host# edit radius-flow-tap
```

2. Assign the tunnel interfaces that the radius-flow-tap service uses.

```
[edit services radius-flow-tap]
user@host# set interfaces vt-1/1/0.0
```

If a currently used tunnel interface is deleted from the pool of interfaces, the active mirroring sessions are redistributed from the deleted interface to other tunnel interfaces in the pool. Also, when a new tunnel interface is added into the pool, the service adds the new interface to the list of interfaces available for new mirroring sessions or for existing sessions transferred from a failed interface.

3. Specify the source IP address that the radius-flow-tap service uses for mirroring. This address is used in the IP header prepended to mirrored packets that are sent to the content destination device.

```
[edit services radius-flow-tap]
user@host# set source-ipv4-address ipv4-address
```

4. (Optional) Specify the forwarding class that is applied to the mirrored packets sent to the mediation device.

If you do not specify a forwarding class, mirrored packets inherit the forwarding class from the original packet (which is the forwarding class set by default classification that CoS applies to the packet on the ingress interface).

```
[edit services radius-flow-tap]
user@host# set forwarding-class class-name
```

5. (Optional) Specify the lawful intercept policy that determines what traffic, if any, is not sent to the mediation device.

You can add or change a lawful intercept policy any time, but a changed policy does not apply to a currently enabled policy. To change a policy, add a policy with a new name, use DTCP DISABLE to turn off the current policy, and use DTCP ENABLE to point to the new policy name.

```
[edit services radius-flow-tap]
user@host# set policy policy-name
```

**Related  
Documentation**

- [Subscriber Secure Policy Overview on page 385](#)
- [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)
- [Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 406](#)
- [Guidelines for Configuring Subscriber Secure Policy Mirroring on page 391](#)



# Configuring RADIUS-Initiated Subscriber Secure Policy Traffic Mirroring

- [RADIUS-Initiated Subscriber Secure Policy Overview on page 389](#)
- [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)
- [Guidelines for Configuring Subscriber Secure Policy Mirroring on page 391](#)
- [Configuring RADIUS Server Support for Subscriber Secure Policy Mirroring on page 391](#)
- [Subscriber Secure Policy Traffic Mirroring Architecture Using RADIUS on page 392](#)
- [RADIUS-Initiated Traffic Mirroring Interfaces on page 394](#)
- [RADIUS-Initiated Traffic Mirroring Process at Subscriber Login on page 396](#)
- [RADIUS-Initiated Traffic Mirroring Process for Logged-In Subscribers on page 397](#)
- [Configuring Tunnel Interfaces for Subscriber Secure Policy Mirroring on page 398](#)
- [RADIUS Attributes Used for Subscriber Secure Policy on page 400](#)
- [Terminating RADIUS-Initiated Subscriber Traffic Mirroring on page 401](#)

## RADIUS-Initiated Subscriber Secure Policy Overview

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RADIUS-initiated mirroring creates secure policies based on RADIUS VSAs and uses RADIUS attributes to identify the subscriber whose traffic is to be mirrored. Mirroring is initiated without regard to the subscriber location, router, interface, or type of traffic.

The mirroring operation can be initiated by RADIUS messages as follows:

- **Subscriber login**—Mirroring starts when the subscriber logs in and the router receives the trigger in a RADIUS Access-Accept message. Using triggers in RADIUS Access-Accept messages enables you to mirror per-subscriber traffic without regard to how often the subscriber logs in or out, or which router or interface the subscriber uses.
- **In-session**—Mirroring starts when the router receives the trigger in a RADIUS change of authorization request (CoA-Request) message. Using triggers in CoA-Request messages enables you to immediately mirror traffic of a subscriber who is already logged in.

- Related Documentation**
- [Subscriber Secure Policy Traffic Mirroring Architecture Using RADIUS on page 392](#)
  - [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)

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## Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview

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Before you configure subscriber secure policy traffic mirroring, note the following:

- Subscriber secure policy mirroring runs on the radius-flow-tap service infrastructure. To configure the subscriber secure policy service, you must have the same privileges that are required to configure the radius-flow-tap service.
- The subscriber secure policy feature requires some system resources while mirroring, encrypting, and sending traffic to the mediation device. For example, you might elect to use a 10-Gigabit Ethernet interface for the tunnel to the mediation device if you expect the amount of traffic you plan to mirror to approach 1 Gbps of actual user data.

To configure the subscriber secure policy service:

1. Configure tunnel interfaces (vt interfaces) that are used to send mirrored content to the mediation device.  
[See “Configuring Tunnel Interfaces for Subscriber Secure Policy Mirroring” on page 398.](#)
2. Configure radius-flow-tap service support for secure subscriber policy. This support includes optional forwarding-class information that the subscriber secure policy service uses to send mirrored traffic to the content destination device.  
[See “Configuring Support for Subscriber Secure Policy Mirroring” on page 387.](#)
3. Configure an access profile that specifies the RADIUS-related support for subscriber secure policy on the router, including a list of one or more RADIUS authentication servers. The router uses the list of specified servers for both authentication and dynamic request operations. You must also configure the RADIUS dynamic request feature, which provides the CoA message support used in-session traffic mirroring.  
[See “Configuring RADIUS Server Support for Subscriber Secure Policy Mirroring” on page 391.](#)
4. Ensure that the following support is also configured:
  - The RADIUS record of the mirrored subscriber must include the RADIUS attributes and VSAs required for subscriber secure policy mirroring. See [“RADIUS Attributes Used for Subscriber Secure Policy” on page 400](#) for descriptions of the supported attributes used in RADIUS Accept-Accept and CoA messages.
  - The mediation device must be configured to accept the mirrored content.
5. (Optional) Enable the mirroring of IPv4 multicast traffic on the router.  
[See “Enabling Subscriber Secure Policy Mirroring for IPv4 Multicast Traffic” on page 404.](#)
6. (Optional) Configure SNMPv3 trap support to report mirroring-related events to the mediation device.  
[See “Configuring SNMPv3 Traps for Subscriber Secure Policy Mirroring” on page 419.](#)

To terminate an active subscriber mirroring session at any time.

See [“Terminating RADIUS-Initiated Subscriber Traffic Mirroring”](#) on page 401.

**Related  
Documentation**

- [RADIUS Attributes Used for Subscriber Secure Policy](#) on page 400
- [Guidelines for Configuring Subscriber Secure Policy Mirroring](#) on page 391
- [Intercept-Related Events Transmitted to the Mediation Device](#) on page 417
- [Terminating RADIUS-Initiated Subscriber Traffic Mirroring](#) on page 401

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## Guidelines for Configuring Subscriber Secure Policy Mirroring

The subscriber secure policy service uses the radius-flow-tap service infrastructure.

When configuring subscriber secure policy mirroring, consider the following guidelines regarding the relationship between subscriber secure policy service and the radius-flow-tap service:

- The radius-flow-tap service **[edit services radius-flow-tap]** and the flow-tap service **[edit services flow-tap]** cannot run simultaneously on the router. Therefore, flow-tap and subscriber secure policy mirroring cannot run simultaneously on the same router.
- You can configure one instance of the radius-flow-tap service on the router. Subscriber secure policy RADIUS-initiated mirroring and DTCP-initiated mirroring use the radius-flow-tap service.
- If you delete the radius-flow-tap service all subscriber secure policy mirroring stops.

**Related  
Documentation**

- [Subscriber Secure Policy Overview](#) on page 385
- [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview](#) on page 390
- [Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview](#) on page 406
- [Configuring Support for Subscriber Secure Policy Mirroring](#) on page 387

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## Configuring RADIUS Server Support for Subscriber Secure Policy Mirroring

This topic describes how to configure support for the RADIUS server that initiates subscriber-based traffic mirroring. You create an access profile to specify the RADIUS server support.

To configure the router’s interaction with the RADIUS server in support of subscriber secure policy mirroring:

1. Create the access profile and assign a name.

```
[edit access]
user@host# edit profile profile-name
```

2. Specify RADIUS as the authentication method.

```
[edit access profile profile-name]
```

```
user@host# set authentication-order radius
```

- Specify the IP address of the RADIUS server that performs authentication. This server also performs dynamic request (CoA) functions.

```
[edit access profile profile-name]
```

```
user@host# set radius authentication-server ip-address
```

- Specify the secret to use when communicating with the RADIUS server.

```
[edit access profile profile-name]
```

```
user@host# set radius-server server-address secret password
```

- Specify other optional RADIUS configuration settings as needed, such as accounting support.

#### Related Documentation

- [Subscriber Secure Policy Overview on page 385](#)
- [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)
- [RADIUS Attributes Used for Subscriber Secure Policy on page 400](#)

## Subscriber Secure Policy Traffic Mirroring Architecture Using RADIUS

Figure 25 on page 392 shows the architecture of the RADIUS-initiated subscriber secure policy mirroring environment.

Figure 25: RADIUS-Initiated Subscriber Secure Policy Architecture

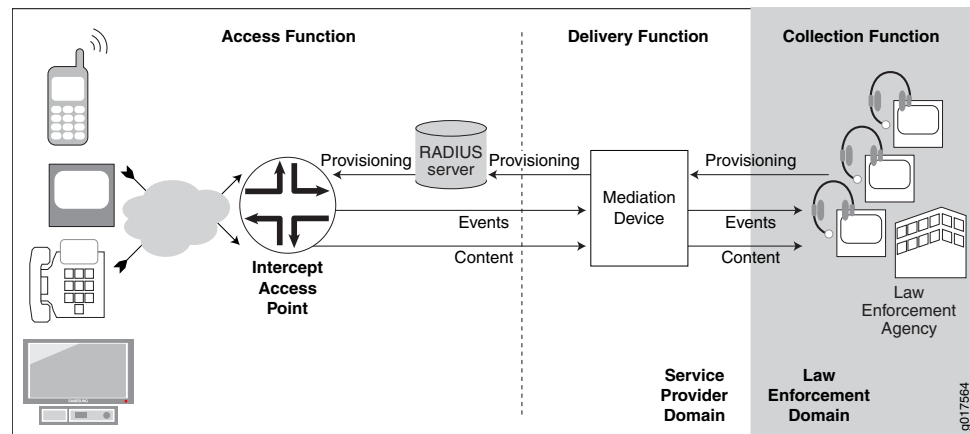


Table 41 on page 393 describes the functions and components of a RADIUS-initiated subscriber secure policy traffic mirroring environment.

**Table 41: RADIUS-Initiated Subscriber Secure Policy Functions and Components**

| Function or Component | Description                                                                                                                                                                                                                                                                                                                            |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Collection function   | <p>The collection function is responsible for collecting intercepted content and identifying information from the delivery function.</p> <p>The collection function is the responsibility of the law enforcement agency (LEA).</p>                                                                                                     |
| Delivery function     | <p>The delivery function delivers information that it receives from the access function to the collection function.</p> <p>The delivery function is performed by the mediation device.</p>                                                                                                                                             |
| Access function       | <p>The access function has access to the intercept target's traffic content and intercept-related events. It is responsible for collecting this information and sending it to the delivery function.</p> <p>The access function is the responsibility of intercept access points (IAPs).</p>                                           |
| Events                | Intercept-related events, such as login or logout events or mirroring session activation or deactivation. The router sends the events to the mediation device in SNMP traps.                                                                                                                                                           |
| LEA                   | Law enforcement agency. The LEA provides intercept targets to the service provider who provisions the mediation device.                                                                                                                                                                                                                |
| Mediation device      | <p>The mediation device receives provisioning information from the LEA, and it uses the information to send provisioning information to the RADIUS server.</p> <p>The mediation device also receives intercept-related events and intercepted content from the router, and delivers the events and intercepted content to the LEA.</p> |
| RADIUS server         | The RADIUS server receives provisioning information from the mediation device. It identifies subscribers whose traffic is to be mirrored, and triggers mirroring sessions on the IAP (the router) by including mirroring-related RADIUS attributes and VSAs in Access-Accept or CoA-Request messages that it sends to the IAP.         |

**Table 41: RADIUS-Initiated Subscriber Secure Policy Functions and Components (*continued*)**

| Function or Component | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IAP                   | <p>Intercept access point. In a subscriber access network the Juniper Networks router is the IAP.</p> <p>Using subscriber secure policies, the IAP intercepts traffic to and from the subscriber whose traffic is being mirrored. It encapsulates the intercepted content in a packet header and delivers it to the mediation device, while also sending the content to the intended destination.</p> <p>The IAP also sends intercept-related events to the mediation device using SNMP traps.</p> |

**Related Documentation**

- [RADIUS-Initiated Subscriber Secure Policy Overview on page 389](#)
- [RADIUS-Initiated Traffic Mirroring Interfaces on page 394](#)
- [RADIUS-Initiated Traffic Mirroring Process at Subscriber Login on page 396](#)
- [RADIUS-Initiated Traffic Mirroring Process for Logged-In Subscribers on page 397](#)

**RADIUS-Initiated Traffic Mirroring Interfaces**

Figure 26 on page 394 shows the interfaces involved in RADIUS-initiated secure subscriber policy traffic mirroring.

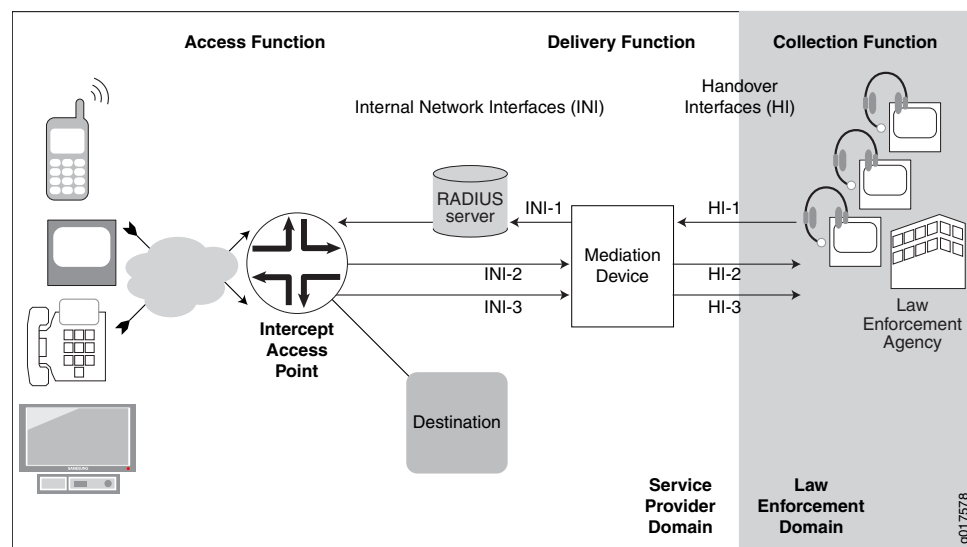
**Figure 26: RADIUS-Initiated Traffic Mirroring Interfaces**

Table 42 on page 395 describes the interfaces involved in RADIUS-initiated secure subscriber policy traffic mirroring.

Table 42: RADIUS-Initiated Traffic Mirroring Interfaces

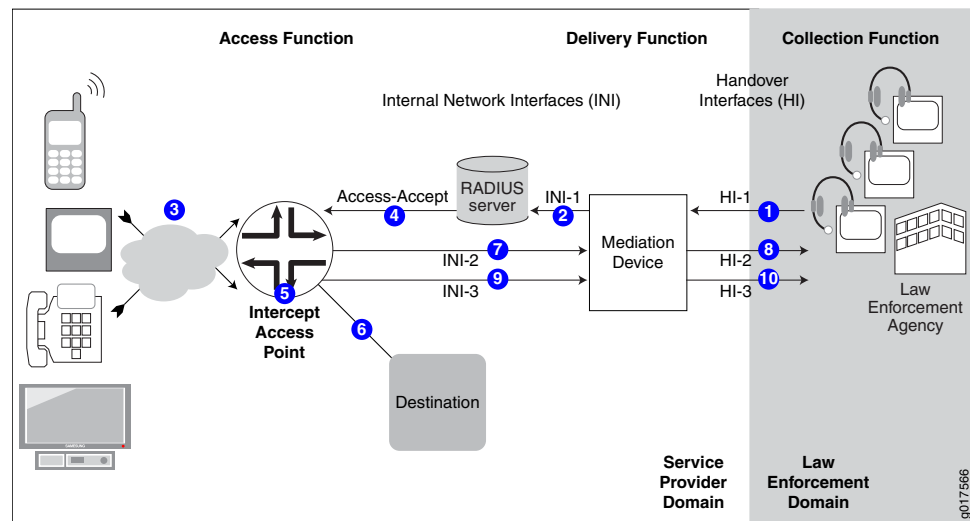
| Interface | Description                                                                                                                                                                                                                                                 |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HI-1      | Handover Interface 1—Administrative interface between the LEA and the service provider mediation device. The LEA sends provisioning information to the mediation device on this interface.                                                                  |
| HI-2      | Handover Interface 2—Intercept-related information interface between the LEA and the mediation device that is used to deliver intercept-related events to the LEA. These events can be subscriber session events such as login, logout, and authentication. |
| HI-3      | Handover Interface 3—Intercepted content Interface between the mediation device and LEA that is used to deliver intercepted content to the LEA.                                                                                                             |
| INI-1     | Internal network Interface 1—Interface used to send intercept provisioning information from the mediation device to the RADIUS server.                                                                                                                      |
| INI-2     | Internal network interface 2—Interface used to send intercept-related events from the router to the mediation device. This information is sent in SNMP traps.                                                                                               |
| INI-3     | Internal network interface 3—Interface used to send intercepted content from the router to the mediation device.                                                                                                                                            |

- Related Documentation**
- [Subscriber Secure Policy Traffic Mirroring Architecture Using RADIUS on page 392](#)
  - [RADIUS-Initiated Traffic Mirroring Process at Subscriber Login on page 396](#)
  - [RADIUS-Initiated Traffic Mirroring Process for Logged-In Subscribers on page 397](#)

## RADIUS-Initiated Traffic Mirroring Process at Subscriber Login

Figure 27 on page 396 shows the process for a RADIUS-initiated subscriber mirroring operation that is initiated when the mirrored subscriber logs in.

Figure 27: RADIUS-Initiated Subscriber Secure Policy Model at Login



|                                                                                                                                                                                       |                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1— The LEA sends provisioning information for a subscriber whose traffic is to be mirrored over the HI-1 interface to the mediation device.                                           | 6— The IAP sends the original subscriber traffic to its intended destination.                                                                                                                                                                                        |
| 2— The mediation device sends the provisioning information over the INI-1 interface to the RADIUS server.                                                                             | 7— As subscriber-related events occur, the IAP sends the events in SNMP traps over the INI-2 interface to the mediation device.                                                                                                                                      |
| 3— The subscriber logs in, requesting authentication by the RADIUS server.                                                                                                            | 8— The mediation device provides the events over the HI-2 interface to the LEA.                                                                                                                                                                                      |
| 4— The RADIUS server authenticates the subscriber and sends an Access-Accept message containing mirroring-related RADIUS attributes in Juniper Networks VSAs to the IAP (the router). | 9— The IAP encapsulates the mirrored content in a packet header and sends it over the INI-3 interface to the mediation device. The IAP uses the destination IP address of the mediation device that it received in the Access-Accept message from the RADIUS server. |
| 5— The IAP creates a subscriber secure policy based on the mirroring VSAs and begins mirroring the subscriber's traffic.                                                              | 10— The mediation device sends mirrored content over the HI-3 interface to the LEA.                                                                                                                                                                                  |

### Related Documentation

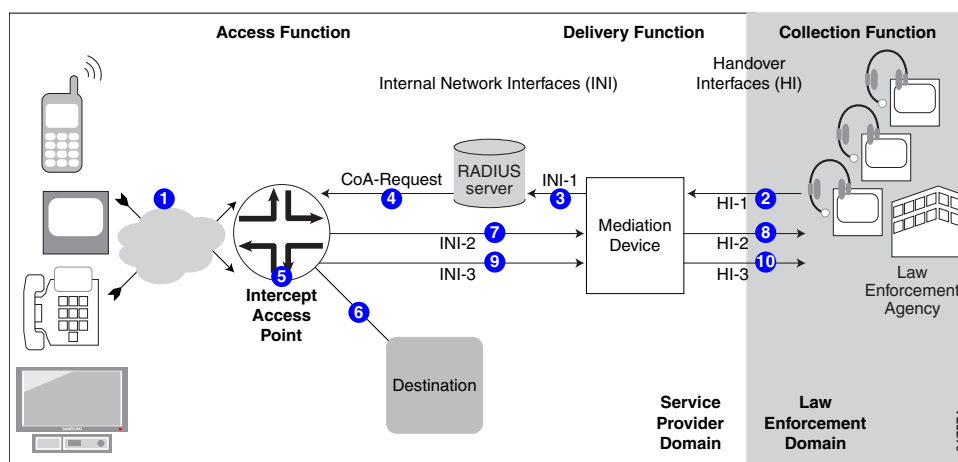
- [Subscriber Secure Policy Traffic Mirroring Architecture Using RADIUS on page 392](#)
- [RADIUS-Initiated Traffic Mirroring Interfaces on page 394](#)
- [RADIUS-Initiated Traffic Mirroring Process for Logged-In Subscribers on page 397](#)
- [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)



## RADIUS-Initiated Traffic Mirroring Process for Logged-In Subscribers

Figure 28 on page 397 shows the process for a RADIUS-initiated subscriber mirroring operation that is initiated after the subscriber has logged in.

Figure 28: RADIUS-Initiated Subscriber Secure Policy Model After Login



|                                                                                                                                                                                            |                                                                                                                                                                                                                                                         |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1— The subscriber logs in, requesting authentication by the RADIUS server. The RADIUS server authenticates the subscriber (no mirroring activity occurs).                                  | 6— The IAP sends the original subscriber traffic to its intended destination.                                                                                                                                                                           |
| 2— The LEA sends provisioning information for a subscriber whose traffic is to be mirrored over the HI-1 interface to the mediation device.                                                | 7— As subscriber-related events occur, the IAP sends the events in SNMP traps over the INI-2 interface to the mediation device.                                                                                                                         |
| 3— The mediation device sends the provisioning information over the INI-1 interface to the RADIUS server.                                                                                  | 8— The mediation device provides events over the HI-2 interface to the LEA.                                                                                                                                                                             |
| 4— The RADIUS server sends a CoA message containing the mirroring-related RADIUS attributes and VSAs to the IAP (the router).                                                              | 9— The IAP encapsulates the mirrored subscriber content in a packet header and sends it to the mediation device over the INI-3 interface. The IAP uses the destination IP address that it received in the Access-Accept message from the RADIUS server. |
| 5— The RADIUS CoA message initiates the mirroring operation. The IAP creates the subscriber secure policy based on the mirroring VSAs and immediately begins mirroring subscriber traffic. | 10— The mediation device sends mirrored content over the HI-3 interface to the LEA.                                                                                                                                                                     |

### Related Documentation

- [Subscriber Secure Policy Traffic Mirroring Architecture Using RADIUS on page 392](#)
- [RADIUS-Initiated Traffic Mirroring Interfaces on page 394](#)
- [RADIUS-Initiated Traffic Mirroring Process at Subscriber Login on page 396](#)
- [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)

## Configuring Tunnel Interfaces for Subscriber Secure Policy Mirroring

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The router, acting as the IAP, uses tunnel interfaces (vt interfaces) to send mirrored traffic to the mediation device. The IAP equally distributes the mirrored traffic across the available tunnel interfaces.

Because the MX Series 3D Universal Edge Routers do not support Tunnel Services PICs, you create a pool tunnel interfaces on MX Series routers at the **[edit chassis]** hierarchy level.

You can configure up to 2048 mirrored subscriber sessions per chassis.

To configure a pool of tunnel interfaces for use by subscriber secure policy mirroring:

1. Access the chassis configuration, and specify the slot number of the DPC, MPC, or MIC.
  - On the MX80 router, the range is 0 through 1.
  - On other MX Series routers, if two System Control Boards (SCBs), are installed, the range is 0 through 11. If three SCBs are installed, the range is 0 through 5 and 7 through 11.

```
[edit chassis]
user@host# edit fpc 1
```

2. Configure the PIC number of the FPC.
  - On MX80 routers, if the FPC is 0, the PIC number can only be 0. If the FPC is 1, the PIC range is 0 through 3.
  - For all other MX Series routers, the range is 0 through 3.

```
[edit chassis fpc 1]
user@host# edit pic 1
```

3. Specify that the FPC and PIC are to be used for tunnel interfaces.

```
[edit chassis fpc 1 pic 1]
user@host# edit tunnel-services
```

4. Specify the amount of bandwidth to reserve for tunnel traffic on each Packet Forwarding Engine.
  - 1g indicates that 1 Gbps of bandwidth is reserved for tunnel traffic.
  - 10g indicates that 10 Gbps of bandwidth is reserved for tunnel traffic.

If you specify a bandwidth that is not compatible, tunnel services are not activated. For example, you cannot specify a bandwidth of 1 Gbps for a Packet Forwarding Engine on a 10-Gigabit Ethernet 4-port DPC.

```
[edit chassis fpc 1 pic 1 tunnel-services]
user@host#
user@host# set bandwidth 1g
```

The bandwidth that you specify determines the port number of the tunnel interfaces that are created. When you specify a bandwidth of **1g**, the port (unit) number is always 10. When you specify any other bandwidth, the port number is always 0.

5. Configure the tunnel interfaces, including the family.

To configure subscriber secure policy mirroring for IPv6 traffic, configure the tunnel interfaces for both the **inet** and **inet6** families.

[edit interfaces]

user@host# **set vt-1/1/0 unit 10 family inet**

user@host# **set vt-1/1/0 unit 10 family inet6**

**Related  
Documentation**

- [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)
- [Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 406](#)

## RADIUS Attributes Used for Subscriber Secure Policy

Table 43 on page 400 lists the RADIUS VSAs that are associated with subscriber secure policy. If these VSAs are present in the RADIUS Access-Accept message for a subscriber, the action specified in the LI-Action attribute takes effect.

Mirroring VSAs that the RADIUS server sends to the router are salt-encrypted. Salt encryption is a random string of data used to modify a password hash.

**Table 43: RADIUS-Based Mirroring Attributes**

| Attribute Number | Attribute Name  | Description                                                                                                                                                                                                           | Value                                                                                                                                                 |
|------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| [26-58]          | LI-Action       | Traffic mirroring action                                                                                                                                                                                              | Salt-encrypted integer <ul style="list-style-type: none"> <li>• 0 = stop mirroring</li> <li>• 1 = start mirroring</li> <li>• 2 = no action</li> </ul> |
| [26-59]          | Med-Dev-Handle  | Identifier that associates mirrored traffic with a specific subscriber<br><br>Med-Dev-Handle includes: <ul style="list-style-type: none"> <li>• Intercept-Identifier</li> <li>• Acct-Session-ID (optional)</li> </ul> | Salt-encrypted string                                                                                                                                 |
| [26-60]          | Med-Ip-Address  | IP address of mediation device to which mirrored traffic is forwarded                                                                                                                                                 | Salt-encrypted IP address                                                                                                                             |
| [26-61]          | Med-Port-Number | UDP port in the mediation device to which mirrored traffic is forwarded                                                                                                                                               | Salt-encrypted integer                                                                                                                                |



**NOTE:** CoA-Request messages that include any of the RADIUS-based mirroring attributes (VSAs 26–58, 26–59, 26–60, or 26–61) must always include all four VSAs. If the CoA action is to stop mirroring (VSA 26–58 value is 0), then the values of the other three attributes in the CoA message must match the existing attribute values, or the action fails.

If a subscriber is already logged in, Table 44 on page 401 lists the RADIUS attributes that can be present in RADIUS CoA messages to identify the subscriber whose traffic is to have a mirroring action applied (activation or deactivation).

Table 44: RADIUS Attributes Used in CoA Messages to Identify Subscribers for Traffic Mirroring

| Attribute Number | Attribute Name  |
|------------------|-----------------|
| [1]              | User-Name       |
| [44]             | Acct-Session-ID |

## Triggering Subscriber Secure Policy for Subscribers on Dynamic Authenticated VLANs



**BEST PRACTICE:** When you have DHCPv4/DHCPv6 subscribers over VLANs, two sessions are created for each subscriber—one for the Layer 2 VLAN, and one for DHCP. In this case, we recommend that you use one trigger that matches both the DHCP and the VLAN session.

If authentication is performed on both the VLAN session and the DHCP session, we recommend that you use a separate, unique username for the VLAN and DHCP sessions to allow RADIUS to distinguish on which of the sessions to trigger subscriber secure policy traffic mirroring. Otherwise, when the DHCP session is authenticated and activated, traffic mirroring fails.

### Related Documentation

- [RADIUS-Initiated Subscriber Secure Policy Overview on page 389](#)
- [Subscriber Secure Policy Traffic Mirroring Architecture Using RADIUS on page 392](#)

## Terminating RADIUS-Initiated Subscriber Traffic Mirroring

You can terminate RADIUS-initiated traffic mirroring sessions by the following action:

- RADIUS CoA message receipt—Terminated upon receipt of a CoA message with the VSA 26-58 (LI-Action) value of 0. The RADIUS administrator configures the LI-Action of 0 in the mirrored subscriber's RADIUS record.

### Related Documentation

- [RADIUS-Initiated Subscriber Secure Policy Overview on page 389](#)
- [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)



# Configuring Subscriber Secure Policy Support for IPv4 Multicast Traffic

- [Subscriber Secure Policy Support for IPv4 Multicast Traffic on page 403](#)
- [Enabling Subscriber Secure Policy Mirroring for IPv4 Multicast Traffic on page 404](#)

## Subscriber Secure Policy Support for IPv4 Multicast Traffic

---

IP multicast traffic is used for applications such as audio or video streaming, IPTV, video conferencing, or online gaming. Multicast traffic is sent to multiple subscribers who have joined a multicast group.

Secure subscriber policy allows for the mirroring of IPv4 multicast traffic sent to a specific subscriber. If multiple subscribers whose traffic requires mirroring join the same multicast session, the subscriber secure policy feature mirrors each subscriber's traffic and forwards it separately to the mediation device with the proper prepended header.

Mirroring of multicast traffic is supported only for subscribers in the default logical system.

You can enable and disable the mirroring of multicast traffic on a per-chassis basis. You cannot enable or disable it on a per-subscriber basis.

## Triggering the Mirroring of IPv4 Multicast Traffic

Multicast traffic being sent towards a subscriber does not contain much of the identifying information used to trigger mirroring of a subscriber's unicast traffic. For example, the multicast packet contains the multicast group address in the destination address of the packet instead of the subscriber's IP address. It also does not contain the user name or MAC address of the subscriber, and does not include information obtained by RADIUS or DHCP. Therefore, methods of identifying multicast traffic that is received by a subscriber are not the same as methods of identifying a subscriber's unicast traffic or multicast traffic that is sent by a subscriber.

To join a multicast group, a subscriber sends an IGMP join request, and it receives a reply. The reply contains the multicast groups to which the subscriber is registered. Triggering the mirroring of multicast traffic is based on the sending of the IGMP join request and the information in the IGMP reply. If the subscriber's unicast traffic is already being mirrored either through DTCP-initiated or RADIUS-initiated traffic mirroring, and the subscriber

sends an IGMP join request, mirroring of multicast traffic sent to the subscriber is initiated. The traffic being mirrored is based on the groups contained in the IGMP reply.

- Related Documentation**
- [Enabling Subscriber Secure Policy Mirroring for IPv4 Multicast Traffic on page 404](#)

---

## Enabling Subscriber Secure Policy Mirroring for IPv4 Multicast Traffic

---

This topic describes the steps to enable subscriber secure policy mirroring of IPv4 multicast traffic. You can enable and disable IPv4 multicast intercept on a per chassis basis.

To configure the radius-flow-tap service to support subscriber secure policy mirroring:

1. Configure the flow-tap service used for subscriber secure policy mirroring.

```
[edit services]
user@host# edit radius-flow-tap
```

2. Enable the interception of multicast traffic.

```
[edit services radius-flow-tap]
user@host# set multicast-interception
```

- Related Documentation**
- [Subscriber Secure Policy Support for IPv4 Multicast Traffic on page 403](#)
  - [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)
  - [Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 406](#)



## CHAPTER 36

# Configuring DTCP-Initiated Subscriber Secure Policy Traffic Mirroring

- [DTCP-Initiated Subscriber Secure Policy Overview on page 405](#)
- [Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 406](#)
- [Example: Configuring Traffic That Is Mirrored Using DTCP-Initiated Subscriber Secure Policy on page 407](#)
- [Subscriber Secure Policy Traffic Mirroring Architecture Using DTCP on page 408](#)
- [DTCP-Initiated Traffic Mirroring Interfaces on page 410](#)
- [DTCP-Initiated Traffic Mirroring Process on page 412](#)
- [DTCP Messages Used for Subscriber Secure Policy on page 413](#)
- [DTCP Traffic Mirroring Triggers on page 413](#)
- [Terminating DTCP-Initiated Subscriber Traffic Mirroring Sessions on page 416](#)

## DTCP-Initiated Subscriber Secure Policy Overview

---

Dynamic Tasking Control Protocol (DTCP)-initiated mirroring creates secure policies to mirror traffic for the subscriber based on DTCP messages. The attributes in a DTCP ADD message trigger the router to start mirroring traffic and specify the interface on which the mirroring takes place. The mirroring operations can be initiated by DTCP messages as follows:

- **Subscriber login**—Mirroring starts on the specified interface when the subscriber logs in. The DTCP ADD message must be sent to the router before the subscriber logs in.
- **In-session**—Mirroring starts for all subscribers that match the trigger supplied in the DTCP ADD message when the router receives a DTCP ADD message.

### Related Documentation

- [Subscriber Secure Policy Traffic Mirroring Architecture Using DTCP on page 408](#)
- [Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 406](#)

## Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview

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Before you configure subscriber secure policy traffic mirroring, note the following:

- Subscriber secure policy mirroring runs on the radius-flow-tap service infrastructure. To configure the subscriber secure policy service, you need the same privileges that are required to configure the radius-flow-tap service.
- The subscriber secure policy feature requires some system resources while mirroring, encrypting, and sending traffic to the mediation device. For example, you might elect to use a 10-Gigabit Ethernet interface for the tunnel and mediation device if you expect the amount of traffic you plan to mirror to approach 1 Gbps of actual user data.

To configure DTCP-initiated subscriber secure policy service:

1. Configure tunnel interfaces that are used to send mirrored content to the mediation device.  
[See “Configuring Tunnel Interfaces for Subscriber Secure Policy Mirroring” on page 398.](#)
2. Configure the radius-flow-tap service support for secure subscriber policy. This support includes configuring the tunnels and optional forwarding-class information that the subscriber secure policy service uses to send mirrored traffic to the content destination device.  
[See “Configuring Support for Subscriber Secure Policy Mirroring” on page 387.](#)
3. Configure the mediation device as a user on the router. This user account allows the router to receive DTCP messages from the mediation device.  
[See “Configuring the Mediation Device as a User on the Router” on page 428.](#)
4. Configure the mediation device to provision traffic mirroring on the router.  
[See “Configuring the Mediation Device to Provision Traffic Mirroring” on page 429.](#)
5. Configure a DTCP-over-SSH connection to the mediation device.  
[See “Configuring a DTCP-over-SSH Connection to the Mediation Device” on page 429.](#)
6. (Optional) Enable mirroring of IPv4 multicast traffic on the router.  
[See “Enabling Subscriber Secure Policy Mirroring for IPv4 Multicast Traffic” on page 404](#)
7. Configure SNMPv3 trap support to report mirroring information to an external device.  
[See “Configuring SNMPv3 Traps for Subscriber Secure Policy Mirroring” on page 419.](#)

You can terminate an active subscriber mirroring session at any time.

[See “Terminating DTCP-Initiated Subscriber Traffic Mirroring Sessions” on page 416.](#)

### Related Documentation

- [DTCP-Initiated Subscriber Secure Policy Overview on page 405](#)
- [Intercept-Related Events Transmitted to the Mediation Device on page 417](#)

## Example: Configuring Traffic That Is Mirrored Using DTCP-Initiated Subscriber Secure Policy

This example shows how to configure traffic that is mirrored using DTCP-initiated subscriber secure policy.

- [Requirements on page 407](#)
- [Overview on page 407](#)
- [Configuration on page 407](#)

### Requirements

- Juniper Networks MX Series routers.
- Junos OS Release 12.3R1 or later.

### Overview

This example drops all video on demand TCP traffic from subnet 10.0.0.0/8 to any subscriber on which the policy named vod is enabled.

To configure traffic mirroring using DTCP-initiated subscriber secure policy:

1. Create a policy.
2. Set up the policy to filter IPv4 or IPv6 traffic by source or destination address, or port, protocol, or DSCP value.
3. Apply the policy using the DTCP attribute X-Drop-Policy.
4. Use the X-Drop-Policy with the ADD DTCP command to begin filtering traffic when mirroring is triggered.



**NOTE:** To begin filtering traffic that is currently being mirrored, use the X-Drop-Policy attribute with the new ENABLE DTCP command. To stop filtering traffic that is currently being mirrored, use the X-Drop-Policy attribute with the new DISABLE DTCP command.

### Configuration

#### Step-by-Step Procedure

To configure filtering mirrored traffic before it is sent to a mediation device:

1. Specify that you want to configure radius-flow-tap.  

```
[edit services]
user@host# edit radius-flow-tap
```
2. Specify that you want to configure a video on demand policy.  

```
[edit services radius-flow-tap]
user@host# edit policy vod
```

3. Specify inet as the family that you want to use.  

```
[edit services radius-flow-tap vod]
user@host# edit inet
```
4. Specify t1 as the term name for the IPv4 drop-policy.  

```
[edit services radius-flow-tap vod inet]
user@host# edit drop-policy t1
```
5. Specify the source address for the drop-policy.  

```
[edit services radius-flow-tap vod inet drop-policy t1]
user@host# edit source-address 10.0.0.0/8
```
6. Specify the match criteria that you want to use.  

```
[edit services radius-flow-tap vod inet drop-policy t1]
user@host# set protocol tcp
```

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

```
[edit services radius-flow-tap policy]
vod {
 inet {
 drop-policy t1 {
 from {
 source-address {
 10.0.0.0/8;
 }
 protocol tcp;
 }
 }
 }
}
```

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

- Related Documentation**
- [Subscriber Secure Policy Overview on page 385](#)
  - [Configuring Support for Subscriber Secure Policy Mirroring on page 387](#)
  - [DTCP Traffic Mirroring Triggers on page 413](#)

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## Subscriber Secure Policy Traffic Mirroring Architecture Using DTCP

Figure 29 on page 409 shows the architecture of the DTCP-initiated subscriber secure policy mirroring environment.

Figure 29: DTCP-Initiated Subscriber Secure Policy Architecture

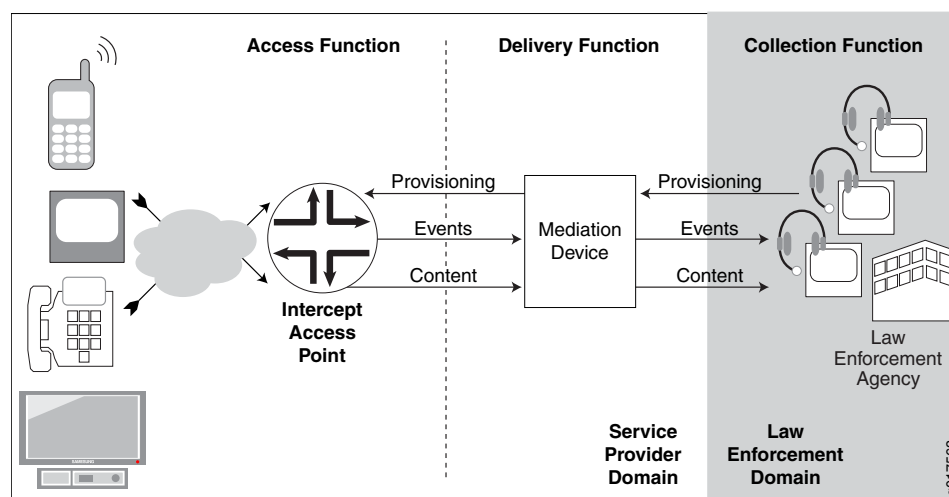


Table 45 on page 409 describes the functions and components of a DTCP-initiated subscriber secure policy traffic mirroring environment.

Table 45: DTCP-Initiated Subscriber Secure Policy Functions and Components

| Function or Component | Description                                                                                                                                                                                                                                                                         |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Collection function   | <p>The collection function is responsible for collecting intercepted content and identifying information from the delivery function.</p> <p>The collection function is the responsibility of the law-enforcement agency (LEA).</p>                                                  |
| Delivery function     | <p>The delivery function delivers information that it receives from the access function to the collection function.</p> <p>The delivery function is performed by the mediation device.</p>                                                                                          |
| Access function       | <p>The access function has access to the intercept target's traffic content and intercept-related events. It is responsible for collecting this information and sending it to the delivery function.</p> <p>The access function is performed by intercept access points (IAPs).</p> |
| Events                | Intercept-related events, such as login or logout events or mirroring session activation or deactivation. The router sends the events to the mediation device in SNMP traps.                                                                                                        |
| LEA                   | Law enforcement agency. The LEA provides intercept targets to the service provider who provisions the mediation device.                                                                                                                                                             |

**Table 45: DTCP-Initiated Subscriber Secure Policy Functions and Components** (*continued*)

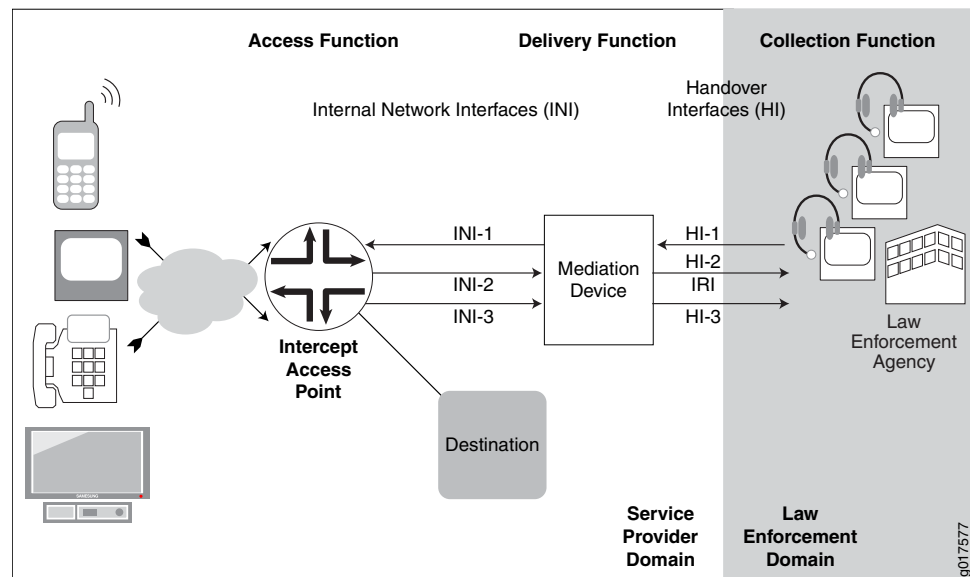
| Function or Component | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mediation device      | <p>The mediation device receives provisioning information from the LEA, and it uses the information to send provisioning information to the IAP (the router).</p> <p>The mediation device also receives intercept-related events and intercepted content from the router, and delivers the events and content to the LEA.</p>                                                                                                                                                                      |
| IAP                   | <p>Intercept access point. In a subscriber access network the Juniper Networks router is the IAP.</p> <p>Using subscriber secure policies, the IAP intercepts traffic to and from the subscriber whose traffic is being mirrored. It encapsulates the intercepted content in a packet header and delivers it to the mediation device, while also sending the traffic to the intended destination.</p> <p>The IAP also sends intercept-related events to the mediation device using SNMP traps.</p> |

**Related Documentation**

- [DTCP-Initiated Subscriber Secure Policy Overview on page 405](#)
- [DTCP-Initiated Traffic Mirroring Interfaces on page 410](#)
- [DTCP-Initiated Traffic Mirroring Process on page 412](#)

**DTCP-Initiated Traffic Mirroring Interfaces**

Figure 30 on page 410 shows the interfaces involved in DTCP-initiated secure subscriber policy traffic mirroring.

**Figure 30: DTCP-Initiated Traffic Mirroring Interfaces**

[Table 46 on page 411](#) describes the interfaces involved in DTCP-initiated secure subscriber policy traffic mirroring.

**Table 46: DTCP-Initiated Traffic Mirroring Interfaces**

| Interface | Description                                                                                                                                                                                                                                                 |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HI-1      | Handover Interface 1—Administrative interface between the LEA and the service provider mediation device. The LEA sends provisioning information to the mediation device on this interface.                                                                  |
| HI-2      | Handover Interface 2—Intercept-related information interface between the LEA and the mediation device that is used to deliver intercept-related events to the LEA. These events can be subscriber session events such as login, logout, and authentication. |
| HI-3      | Handover Interface 3—Intercepted content Interface between the mediation device and LEA that is used to deliver intercepted content to the LEA.                                                                                                             |
| INI-1     | Internal network Interface 1—Interface used to send DTCP messages containing intercept provisioning information from the mediation device to the router.                                                                                                    |
| INI-2     | Internal network interface 2—Interface used to send intercept-related events from the router to the mediation device. This information is sent in SNMP traps.                                                                                               |
| INI-3     | Internal network interface 3—Interface used to send intercepted content from the router to the mediation device.                                                                                                                                            |

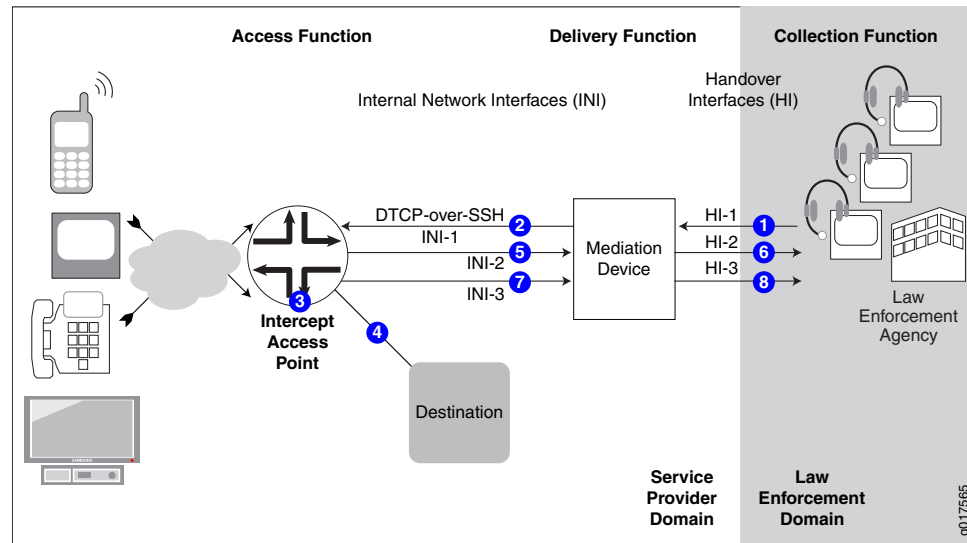
**Related  
Documentation**

- [Subscriber Secure Policy Traffic Mirroring Architecture Using DTCP on page 408](#)
- [DTCP-Initiated Traffic Mirroring Process on page 412](#)

## DTCP-Initiated Traffic Mirroring Process

Figure 31 on page 412 shows the process for a DTCP-initiated subscriber mirroring operation.

Figure 31: DTCP-Initiated Subscriber Secure Policy Model



### Related Documentation

- [Subscriber Secure Policy Traffic Mirroring Architecture Using DTCP on page 408](#)
- [DTCP-Initiated Traffic Mirroring Interfaces on page 410](#)
- [DTCP Messages Used for Subscriber Secure Policy on page 413](#)
- [DTCP Traffic Mirroring Triggers on page 413](#)



## DTCP Messages Used for Subscriber Secure Policy

You can use DTCP to provision traffic mirroring on the router by sending DTCP messages from the mediation device to the router.

There are three types of DTCP messages:

- **ADD**—Triggers mirroring of subscriber secure policy sessions. You include an attribute that triggers the router to begin mirroring a subscriber session. You can also include attributes that identify where to send the mirrored session data and how to uniquely identify traffic when simultaneous intercepts are active. The ADD message also provides instructions to populate fields in the encapsulation header for packets sent to the mediation device.
- **LIST**—Requests information about sessions that are currently being mirrored. This information is returned in a LIST response.
- **DELETE**—Removes a subscriber mirroring trigger or can be used to disable all mirroring.

### Related Documentation

- [DTCP-Initiated Traffic Mirroring Process on page 412](#)
- [DTCP Traffic Mirroring Triggers on page 413](#)
- [ADD DTCP on page 436](#)
- [DELETE DTCP on page 439](#)
- [LIST DTCP on page 443](#)

## DTCP Traffic Mirroring Triggers

Table 47 on page 413 lists the DTCP attributes that you can use in DTCP ADD messages to trigger traffic mirroring.

**Table 47: DTCP Mirroring Triggers for Use in ADD Messages**

| Attribute Name     | DTCP Message Semantic | Description                                                                                                                                                                                                                                                                           |
|--------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Account Session ID | X-Act-Sess-Id         | <p>Trigger that is based on the text string of the Account Session ID associated with the subscriber session.</p> <p>If the subscriber logs out, the intercept terminates. We recommend that you use other triggers to ensure that all sessions for a subscriber are intercepted.</p> |

Table 47: DTCP Mirroring Triggers for Use in ADD Messages (*continued*)

| Attribute Name       | DTCP Message Semantic | Description                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Calling Station ID   | X-Call-Sta-Id         | <p>Trigger that is based on the text string of the Calling Station ID associated with the subscriber.</p> <p>If the subscriber is not logged on, the policy is applied at any current or subsequent subscriber log in.</p>                                                                                                                                                             |
| IP Address           | X-IP-Addr             | <p>Trigger for the IPv4 address that is associated with a subscriber.</p> <p>If you use the IP Address trigger, and the subscriber is not using the default logical system, you must include the Logical System attribute in your DTCP message. If the subscriber is not using the default routing instance, you must include the Routing Instance attribute in your DTCP message.</p> |
| Interface Identifier | X-Interface-Id        | <p>Trigger for subscribers that are configured to use a specific router interface. All subscribers that use the interface have their traffic mirrored.</p> <p>Add this attribute as a text string that identifies the physical interface; for example, <b>ge-0/0/0.1</b> or <b>demux0.107472834</b>.</p>                                                                               |
| NAS Port ID          | X-NAS-Port-Id         | <p>Trigger that is based on the NAS port ID of the subscriber.</p>                                                                                                                                                                                                                                                                                                                     |
| Remote Circuit ID    | X-RM-Circuit-Id       | <p>For DHCP subscribers, trigger that is used with the Remote Agent ID to specify the DHCP option 82 that is associated with this session to completely specify a trigger.</p> <p>For PPPoE subscribers, agent circuit ID (ACI) in the PPPoE Intermediate Agent (PPPoE IA) tag.</p>                                                                                                    |

Table 47: DTCP Mirroring Triggers for Use in ADD Messages (*continued*)

| Attribute Name       | DTCP Message Semantic | Description                                                                                                                                                                                                                                                                                                                                                           |
|----------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Remote Agent ID      | X-RM-Agent-Id         | <p>For DHCP subscribers, trigger that is used with the Remote Circuit ID to specify the session or by itself to completely specify the trigger.</p> <p>For PPPoE subscribers, agent remote identifier (ARI) in the PPPoE Intermediate Agent (PPPoE IA) tag.</p>                                                                                                       |
| Logical System       | X-Logical-System      | <p>Trigger attribute that you can use with the IP Address or Subscriber User Name triggers. It is ignored for other triggers.</p> <p>The value <b>default</b> is used if no logical system exists for the subscriber.</p>                                                                                                                                             |
| Routing Instance     | X-Router-Instance     | <p>Trigger attribute that you can use with the IP Address or Subscriber User Name triggers. It is ignored for other triggers.</p> <p>The value <b>default</b> is used if no routing instance exists for the subscriber.</p>                                                                                                                                           |
| Subscriber User Name | X-UserName            | <p>Trigger based on a subscriber username.</p> <p>If you use the Subscriber User Name trigger, and the subscriber is not using the default logical system, you must include the Logical System attribute in your DTCP message. If the subscriber is not using the default routing instance, you must include the Routing Instance attribute in your DTCP message.</p> |

### Triggering Subscriber Secure Policy for Subscribers on Dynamic Authenticated VLANs



**BEST PRACTICE:** When you have DHCPv4/DHCPv6 subscribers over VLANs, two sessions are created for each subscriber—one for the Layer 2 VLAN, and one for DHCP. In this case do not use a trigger, such as Remote Circuit ID (ACI), that applies to both the VLAN and the DHCP sessions. If the DHCP and VLAN sessions match the same trigger, the DHCP subscriber login fails and

subscriber secure policy is not triggered. You need to select a traffic mirroring trigger that matches only one of these sessions.

.....

## Order in Which Trigger Attributes Are Processed

If a subscriber matches more than one of the DTCP mirroring triggers, the router processes mirroring triggers in ADD messages in the following order:

1. Account Session ID
2. Calling Station ID
3. IP Address
4. Interface Identifier
5. NAS Port ID
6. Remote Agent ID
7. Subscriber User Name
8. Drop Policy Name

### Related Documentation

- [Packet Header for Mirrored Traffic Sent to Mediation Device on page 426](#)
- [ADD DTCP on page 436](#)
- [DELETE DTCP on page 439](#)
- [LIST DTCP on page 443](#)
- [Example: Using DTCP Messages to Trigger, Verify, and Disable Traffic Mirroring for Subscribers on page 431](#)

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## Terminating DTCP-Initiated Subscriber Traffic Mirroring Sessions

You can terminate DTCP-initiated traffic mirroring sessions by the following action:

- DTCP DELETE message receipt—Terminated upon receipt of a DTCP DELETE message. The DTCP administrator configures the DELETE message to include the same mirroring attributes that are used in the ADD message to initiate mirroring.

### Related Documentation

- [DELETE DTCP on page 439](#)
- [DTCP Messages Used for Subscriber Secure Policy on page 413](#)

## CHAPTER 37

# Configuring Intercept-Related Information for Subscriber Secure Policy

- [Intercept-Related Events Transmitted to the Mediation Device on page 417](#)
- [SNMP Traps for Subscriber Secure Policy LAES Compliance on page 417](#)
- [Configuring SNMPv3 Traps for Subscriber Secure Policy Mirroring on page 419](#)
- [Example: SNMPv3 Traps Configuration for Subscriber Secure Policy Mirroring on page 419](#)

## Intercept-Related Events Transmitted to the Mediation Device

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You can use SNMPv3 traps to report intercept-related events to the mediation device. These events include identifying information for subscribers, such as username or IP address, and subscriber session events, such as login or logout events or mirroring session activation or deactivation. The router sends the events to the mediation device in SNMP traps. Using SNMPv3 provides secure traps that are visible only to authorized individuals on the intended secure mediation device. The traps help support compliance with the Communications Assistance for Law Enforcement Act (CALEA), which defines electronic surveillance guidelines for telecommunications companies.

The supported SNMPv3 traps map to messages defined by the *Lawfully Authorized Electronic Surveillance (LAES) for IP Network Access, American National Standard For Telecommunications*. “[SNMP Traps for Subscriber Secure Policy LAES Compliance](#)” on [page 417](#) describes the supported SNMPv3 traps and their related LAES messages.

### Related Documentation

- [Subscriber Secure Policy Overview on page 385](#)
- [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)
- [Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 406](#)
- [SNMP Traps for Subscriber Secure Policy LAES Compliance on page 417](#)
- [Example: SNMPv3 Traps Configuration for Subscriber Secure Policy Mirroring on page 419](#)

## SNMP Traps for Subscriber Secure Policy LAES Compliance

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[Table 48 on page 418](#) describes the SNMPv3 traps that subscriber secure policy mirroring uses to provide information that maps to messages defined in the *Lawfully Authorized Electronic Surveillance (LAES) for IP Network Access, American National Standard for*

*Telecommunications.* These messages enable subscriber secure policy to comply with the *Communications Assistance for Law Enforcement Act (CALEA)*. The Juniper Packet Mirroring MIB, **jnx-js-packet-mirror.mib**, provides the SNMP trap.

**Table 48: Subscriber Secure Policy SNMPv3 Traps for LAES Messages**

| SNMPv3 Trap                                     | LAES Message                                                                                                                                                                                                                                             | Description                                                                                                                              |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| jnxPacketMirrorLiSubscriberLoggedIn             | <ul style="list-style-type: none"> <li>• <b>access-attempt</b> (implied)</li> <li>• <b>access-session-accept</b></li> <li>• <b>packet-data-session-start</b></li> </ul>                                                                                  | A subscriber, who is identified to have a mirrored service that is activated at login, has successfully logged in.                       |
| jnxPacketMirrorSessionLiSubscriberLogInFailed   | <ul style="list-style-type: none"> <li>• <b>access-attempt</b> (implied)</li> <li>• <b>access-failed</b> (all termination reasons except authentication-reject)</li> <li>• <b>access-reject</b> (termination reason is authentication-reject)</li> </ul> | A subscriber, who is identified to have a mirrored service that is activated at login, has failed to log in.                             |
| jnxPacketMirrorInterfaceLiSubscriberLoggedOut   | <ul style="list-style-type: none"> <li>• <b>access-session-end</b></li> <li>• <b>packet-data-session-end</b></li> </ul>                                                                                                                                  | A subscriber, who had an active mirrored service, has logged out.                                                                        |
| jnxPacketMirrorInterfaceLiServiceActivated      | <ul style="list-style-type: none"> <li>• <b>packet-data-session-already-established</b></li> </ul>                                                                                                                                                       | A mirrored session has been activated.                                                                                                   |
| jnxPacketMirrorSessionLiServiceActivationFailed | —                                                                                                                                                                                                                                                        | A mirrored session for a subscriber has failed.                                                                                          |
| jnxPacketMirrorSessionLiServiceDeactivated      | —                                                                                                                                                                                                                                                        | A mirrored session for an established subscriber has been deactivated.                                                                   |
| jnxPacketMirrorMirroringFailure                 | —                                                                                                                                                                                                                                                        | <p>A mirrored service request failed due to an invalid value in the request.</p> <p>Note: This trap is not related to LAES messages.</p> |
| jnxPacketMirrorTriggerType                      | —                                                                                                                                                                                                                                                        | The type of trigger that caused the mirroring session to be activated.                                                                   |
| jnxPacketMirrorCallingStationIdentifier         | —                                                                                                                                                                                                                                                        | The calling station ID of the subscriber whose traffic is currently being mirrored.                                                      |
| jnxPacketMirrorNasIdentifier                    | —                                                                                                                                                                                                                                                        | The NAS ID of the session in which traffic is being mirrored.                                                                            |
| jnxPacketMirrorTargetIPv6Address                | —                                                                                                                                                                                                                                                        | The IPv6 address of the subscriber interface that is being mirrored.                                                                     |

- Related Documentation**
- [Intercept-Related Events Transmitted to the Mediation Device on page 417](#)
  - [Example: SNMPv3 Traps Configuration for Subscriber Secure Policy Mirroring on page 419](#)

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## Configuring SNMPv3 Traps for Subscriber Secure Policy Mirroring

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This topic provides an overview of the SNMPv3 configuration process as it pertains to subscriber secure policy.

To configure SNMPv3 trap support for subscriber secure policy and to send the trap information to the mediation device:

1. Configure the MIB view.

See *Configuring MIB Views*.

2. Configure the trap notification and trap notification filter. See the following topics:

- *Configuring the SNMPv3 Trap Notification*
- *Configuring the Trap Notification Filter*

3. Configure the target device. The target device is the mediation device that receives the trap information.

See *Configuring SNMPv3 Traps on a Device Running Junos OS*.

4. Configure the SNMPv3 user, authentication method and password, and privacy method and password. See the following topics:

- *Creating SNMPv3 Users*
- *Configuring the SNMPv3 Authentication Type*
- *Configuring the SNMPv3 Encryption Type*

5. Configure user access privileges to management information.

See *Defining Access Privileges for an SNMP Group*.

- Related Documentation**
- *SNMPv3 Overview*
  - [Intercept-Related Events Transmitted to the Mediation Device on page 417](#)
  - [SNMP Traps for Subscriber Secure Policy LAES Compliance on page 417](#)
  - [Example: SNMPv3 Traps Configuration for Subscriber Secure Policy Mirroring on page 419](#)

---

## Example: SNMPv3 Traps Configuration for Subscriber Secure Policy Mirroring

---

This example shows an SNMP configuration that provides SNMPv3 trap support.

Configure the SNMPv3 trap support at the **[edit snmp]** hierarchy level.

```
[edit snmp]
v3 {
 usm {
```

```
local-engine {
 user mediation-device1 { ## Name of the mediation device
 authentication-md5 {
 authentication-key "yourAuthenticataionKey"; ## SECRET-DATA
 }
 privacy-des {
 privacy-key "YourPrivacyKey"; ## SECRET-DATA
 }
 }
}
target-address london-1 {
 address 172.19.87.240; ## Address of the mediation device receiving the traps
 port 162;
 tag-list mediation-8;
 target-parameters tp1;
}
target-parameters tpi {
 parameters {
 message-processing-model v3;
 security-model usm;
 security-level authentication;
 security-name mediation-device1; ## Name of the mediation device
 }
 notify-filter nf1;
}
notify n1 {
 type trap;
 tag mediation-8;
}
notify-filter nf1 {
 oid .1 include;
}
}
view system {
 oid 1.3.6.1.2.1.1 include;
}
view all {
 oid .1 include;
}
```

- Related Documentation**
- [Subscriber Secure Policy Overview on page 385](#)
  - [Configuring SNMPv3 Traps for Subscriber Secure Policy Mirroring on page 419](#)
  - [SNMPv3 Overview](#)



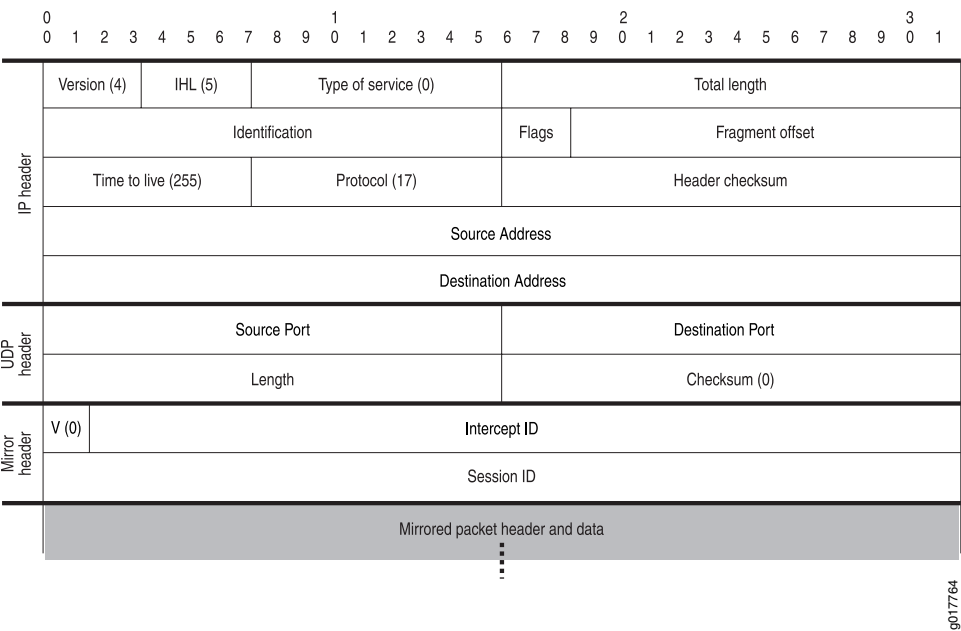
# Configuring the Mediation Device for Subscriber Secure Policy

- [Using the Packet Header to Track Subscribers on the Mediation Device on page 421](#)
- [Packet Header for Mirrored Traffic Sent to Mediation Device on page 426](#)
- [Configuring the Mediation Device as a User on the Router on page 428](#)
- [Configuring the Mediation Device to Provision Traffic Mirroring on page 429](#)
- [Configuring a DTCP-over-SSH Connection to the Mediation Device on page 429](#)

## Using the Packet Header to Track Subscribers on the Mediation Device

When the router sends mirrored traffic to the mediation device, it encapsulates it in a packet header. [Figure 32 on page 421](#) is the mirrored packet header and payload that the router sends to the mediation device.

Figure 32: Mirrored Packet Header and Payload



[Table 49 on page 422](#) describes the fields in the packet header of mirrored packets.

**Table 49: Mirrored Packet Header and Payload Field Descriptions For the Mediation Device**

| Field               | Value                                                                                     | Length (Bits) |
|---------------------|-------------------------------------------------------------------------------------------|---------------|
| <b>IP Header</b>    |                                                                                           |               |
| Version             | 4                                                                                         | 4             |
| IHL                 | 5                                                                                         | 4             |
| Type of Service     | 0                                                                                         | 8             |
| Total Length        | Dynamically computed                                                                      | 16            |
| Identification      | Dynamically computed                                                                      | 16            |
| Flags               | Dynamically computed                                                                      | 3             |
| Fragment Offset     | Dynamically computed                                                                      | 13            |
| Time to Live        | 255                                                                                       | 8             |
| Protocol            | 17                                                                                        | 8             |
| Header Checksum     | Dynamically computed                                                                      | 16            |
| Source Address      | IP address of the router interface that sends mirrored traffic to the mediation device    | 32            |
| Destination Address | IP address of the mediation device to which mirrored traffic is forwarded (VSA 26-60)     | 32            |
| <b>UDP Header</b>   |                                                                                           |               |
| Source Port         | UDP port number on the router from which mirrored traffic is sent to the mediation device | 16            |
| Destination Port    | UDP port on the mediation device to which mirrored traffic is forwarded (VSA 26-61)       | 16            |
| Length              | Dynamically computed                                                                      | 16            |
| Checksum            | 0                                                                                         | 16            |

**Table 49: Mirrored Packet Header and Payload Field Descriptions For the Mediation Device (*continued*)**

| Field                   | Value                                                                                                              | Length (Bits) |
|-------------------------|--------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Mirror Header</b>    |                                                                                                                    |               |
| V (mirror header value) | 0                                                                                                                  | 2             |
| Intercept ID            | See "Format of the Mirror Header Values Used to Track Subscribers and Subscriber Sessions" on page 424 for details | 30            |
| Session-ID              | See "Format of the Mirror Header Values Used to Track Subscribers and Subscriber Sessions" on page 424 for details | 32            |

## Format of the Mirror Header Values Used to Track Subscribers and Subscriber Sessions

The packet header includes mirror header attributes that the mediation device can use to track subscribers and subscriber sessions. The router creates values for these attributes based on information that it receives from RADIUS. There are three mirror header attributes in the packet header:

- **V (mirror header value)**—Used by the router to specify how the values of the Session ID and Intercept ID are determined. The value received from RADIUS can be a 0 or a 1. However, the value is always 0 in the packet header sent to the mediation device.
- **Session ID**—Used by the mediation device to identify the session of the mirrored subscriber. The value is assigned to a subscriber session by the Junos OS. The Session ID changes with each new session for a subscriber.
- **Intercept ID**—Used along with the Session ID by the mediation device to track a subscriber across multiple login and logout events. The value is assigned to a subscriber whose traffic is being intercepted. The Intercept ID is constant; it does not change as a subscriber logs in and logs out of sessions.

The values of the Intercept ID and the Session ID are determined by the value that the router receives in VSA 26-59. VSA 26-59 is declared as a hexadecimal string that can be either 4 bytes or 8 bytes long. The mirror header value specifies whether a 4-byte value or an 8-byte value is used to form the Intercept ID and the Session ID.

### 4-Byte Format

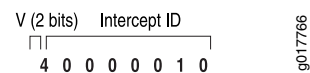
The 4-byte format allows you to manually specify the Intercept ID. The Session ID value is automatically created based on the least significant 32 bits of the Acct-Session-ID (RADIUS attribute 44).

To use the 4-byte format of VSA 26-59, you configure the first two most significant bits of the VSA to a value of 1, which indicates a single word in the VSA. The remaining 30 bits of the word form the Intercept ID value.

For example, a value of 40000010 for VSA 26-59 configures the following fields in the mirror header, as shown in [Figure 33 on page 424](#):

- V = 1
- Intercept ID = 0x10

**Figure 33: 4-Byte Format of VSA 26-59**



### 8-Byte Format

The 8-byte format of VSA 26-59 enables you to manually specify both the Session-ID value and the Intercept ID value.

To use the 8-byte format, you configure the first two most significant bits of the first word of the VSA to a value of 0, which indicates two words in the VSA. The remaining 30 bits of the first word form the Intercept ID value, and the second word is the Session-ID field. You cannot change the order of these two words.

For example, a value of 00000300000000090 in VSA 26-59 configures the following fields in the mirror header, as shown in [Figure 34 on page 425](#):

- V = 0
- Intercept-ID = 0x300
- Session-ID = 0x90

**Figure 34: 8-Byte Format of VSA 26-59**



**Related  
Documentation**

- [RADIUS-Initiated Subscriber Secure Policy Overview on page 389](#)
- [Subscriber Secure Policy Traffic Mirroring Architecture Using RADIUS on page 392](#)

## Packet Header for Mirrored Traffic Sent to Mediation Device

When the router sends mirrored traffic to the mediation device, it encapsulates the mirrored payload in a packet header before it sends the mirrored traffic to the mediation device.

Figure 35 on page 426 is the mirrored packet header that the router sends to the mediation device.

**Figure 35: Mirrored Packet Header**

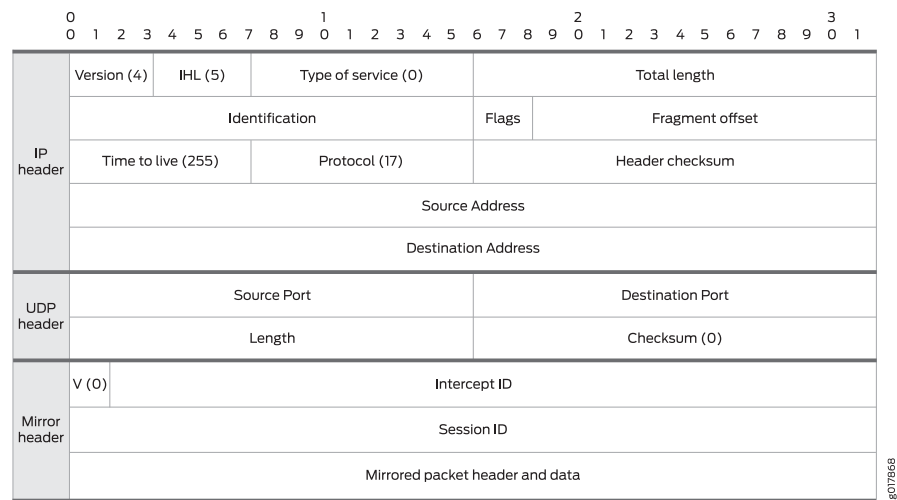


Table 50 on page 426 describes the fields in the packet header of mirrored packets.

**Table 50: Packet Header Field Descriptions**

| Field            | Value                | Length (Bits) |
|------------------|----------------------|---------------|
| <b>IP Header</b> |                      |               |
| Version          | 4                    | 4             |
| IHL              | 5                    | 4             |
| Type of Service  | 0                    | 8             |
| Total Length     | Dynamically computed | 16            |
| Identification   | Dynamically computed | 16            |
| Flags            | Dynamically computed | 3             |
| Fragment Offset  | Dynamically computed | 13            |

Table 50: Packet Header Field Descriptions (*continued*)

| Field                   | Value                                                                                                                                                                                           | Length (Bits) |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Time to Live            | 255                                                                                                                                                                                             | 8             |
| Protocol                | 17                                                                                                                                                                                              | 8             |
| Header Checksum         | Dynamically computed                                                                                                                                                                            | 16            |
| Source Address          | IP address of the router interface that sends mirrored traffic to the mediation device                                                                                                          | 32            |
| Destination Address     | IP address of the mediation device to which mirrored traffic is forwarded. This value is taken from the X-JTap-Cdest-Dest-Address attribute that is sent to the router in the DTCP ADD command. | 32            |
| <b>UDP Header</b>       |                                                                                                                                                                                                 |               |
| Source Port             | UDP port number on the router from which mirrored traffic is sent to the mediation device                                                                                                       | 16            |
| Destination Port        | UDP port on the mediation device to which mirrored traffic is forwarded. This value is taken from the X-JTap-Cdest-Dest-Port attribute that is sent to the router in the DTCP ADD command.      | 16            |
| Length                  | Dynamically computed                                                                                                                                                                            | 16            |
| Checksum                | 0                                                                                                                                                                                               | 16            |
| <b>Mirror Header</b>    |                                                                                                                                                                                                 |               |
| V (mirror header value) | 0                                                                                                                                                                                               | 2             |
| Intercept ID            | Value of the X-MD-Intercept-Id that is sent to the router in the DTCP ADD command.                                                                                                              | 30            |

- Related Documentation**
- [DTCP-Initiated Subscriber Secure Policy Overview on page 405](#)
  - [ADD DTCP on page 436](#)
  - [Example: Using DTCP Messages to Trigger, Verify, and Disable Traffic Mirroring for Subscribers on page 431](#)

---

## Configuring the Mediation Device as a User on the Router

In order for the router to receive DTCP messages from the mediation device, you need to configure the mediation device as a user on the router. To do so, create a login class that provides flow-tap operation permission and then create a login account that uses the login class.

To configure the mediation device as a user on the router:

1. Create the login class and configure **flow-tap-operation** permissions for the class.

- a. Specify that you want to configure login properties.

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

- b. Create and name the class.

```
[edit system login]
user@host# edit class class-name
```

- c. Configure the **flow-tap-operation** permission for the class.

```
[edit system login class class-name]
user@host# set permissions flow-tap-operation
```

2. Create the user login account for the mediation device.

- a. Create the user account.

```
[edit system login]
user@host# edit user username
```

- b. Configure the user ID.

```
[edit system login user username]
user@host# set uid uid-value
```

- c. Configure the class for the user account.

```
[edit system login user username]
user@host# set class class-name
```

- d. Configure the authentication for the user account.

```
[edit system login user username]
user@host# set authentication encrypted-password password
```



## Configuring the Mediation Device to Provision Traffic Mirroring

To set up the mediation device to provision traffic mirroring on the router, use the following DTCP messages:

- To configure traffic-mirroring triggers, use the **ADD DTCP** message.
- To remove an existing traffic-mirroring trigger, use the **DELETE DTCP** message.
- To show existing traffic-mirroring triggers, use the **LIST DTCP** message.

For an example of how to use the DTCP messages, see “[Example: Using DTCP Messages to Trigger, Verify, and Disable Traffic Mirroring for Subscribers](#)” on page 431.

### Related Documentation

- [Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 406](#)

## Configuring a DTCP-over-SSH Connection to the Mediation Device

DTCP-initiated subscriber secure policy requires a DTCP-over-SSH connection for the flow-tap service. This connection is used to send provisioning information from the mediation device to the router.

To enable the DTCP-over-SSH flow-tap service to support subscriber secure policy mirroring:

1. Access the **flow-tap-dtcp** service.

```
[edit system services]
user@host# edit flow-tap-dtcp
```

2. Enable SSH support for DTCP.

```
[edit system services flow-tap-dtcp]
user@host# set ssh
```

3. (Optional) Configure maximum number of established connections allowed for the DTCP service.

```
[edit system services flow-tap-service ssh]
user@host# set connection-limit limit
```

4. (Optional) Configure the maximum number of connection attempts allowed per minute for DTCP.

```
[edit system services flow-tap-service ssh]
user@host# set rate-limit limit
```

### Related Documentation

- [Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 406](#)



# Monitoring and Managing DTCP Messages

- [Example: Using DTCP Messages to Trigger, Verify, and Disable Traffic Mirroring for Subscribers on page 431](#)
- [ADD DTCP](#)
- [DELETE DTCP](#)
- [DISABLE DTCP](#)
- [ENABLE DTCP](#)
- [LIST DTCP](#)

## Example: Using DTCP Messages to Trigger, Verify, and Disable Traffic Mirroring for Subscribers

---

This example shows how to create DTCP messages to do the following:

- Trigger traffic mirroring for two subscribers based on interface ID.
- Trigger a drop policy if one does not already exist.
- Remove an existing drop policy.
- Verify that subscriber traffic on the two interfaces is being mirrored.
- Disable traffic mirroring on the two subscriber interfaces.
- Verify that traffic mirroring was stopped on the two subscriber interfaces.

In this example, SSH is being used to communicate with the router.

### Creating DTCP ADD Messages to Trigger Traffic Mirroring

This section shows examples of DTCP ADD messages on a mediation device that use the interface ID to trigger traffic mirroring on interfaces demux0.30010002 and demux0.30010001.

```
ADD DTCP/0.7
Csource-ID: dtcp1
Cdest-ID: cd1
Priority: 2
X-JTap-Cdest-Dest-Address: 192.0.40.168
X-JTap-Cdest-Dest-Port: 65535
X-JTap-Cdest-Source-Address: 198.15.0.10
X-JTap-Cdest-Source-Port: 50000
```

X-JTap-Cdest-TTL: 64  
X-Interface-Id: demux0.30010002 /\*Used as trigger\*/  
X-MD-Intercept-Id: 0x0101010130010002  
Flags: BOTH  
Seq: 7  
Authentication-Info: c16d2d9d1679facf0c4a66683af6114d341e4033

DTCP/0.7 200 OK  
SEQ: 7  
CRITERIA-ID: 2  
TIMESTAMP: 2011-02-13 15:56:49.609  
AUTHENTICATION-INFO: 4880de4b8cead98c95813fd9b95e240b107d4693

ADD DTCP/0.7  
Csource-ID: dtcp1  
Cdest-ID: cd1  
Priority: 2  
X-JTap-Cdest-Dest-Address: 192.0.40.168  
X-JTap-Cdest-Dest-Port: 65535  
X-JTap-Cdest-Source-Address: 198.15.0.10  
X-JTap-Cdest-Source-Port: 50000  
X-JTap-Cdest-TTL: 64  
X-Interface-Id: demux0.30010001 /\*Used as trigger\*/  
X-MD-Intercept-Id: 0x0101010130010001  
Flags: STATIC  
Seq: 8  
Authentication-Info: dc3c55481a3810c7dd29fdc1b4681d978ff4e7c4

DTCP/0.7 200 OK  
SEQ: 8  
CRITERIA-ID: 3  
TIMESTAMP: 2011-02-13 15:57:20.640  
AUTHENTICATION-INFO: 4b31ef1311647e5ba52d2d5d4237b9e5beaa47b7

ADD DTCP/0.7  
Csource-ID: ft-user1  
Cdest-ID: cd1  
Priority: 2  
X-JTap-Cdest-Dest-Address: 1.1.1.2  
X-JTap-Cdest-Dest-Port: 7899  
X-JTap-Cdest-Source-Address: 2.2.2.9  
X-JTap-Cdest-Source-Port: 12321  
X-Username: testuser  
X-MD-Intercept-Id: 55667789  
Flags: STATIC

DTCP/0.7 200 OK  
SEQ: 100  
CRITERIA-ID: 1

## Creating DTCP ENABLE Messages to Trigger Traffic Mirroring

This section shows an example of DTCP ENABLE messages on a mediation device that use the interface ID to trigger traffic mirroring on interfaces demux0.30010002 and demux0.30010001.

```
ENABLE DTCP/0.8
Csource-ID: ft-user1
Cdest-ID: cd1
X-Drop-Policy: vod
Flags: STATIC
```

## Creating DTCP DISABLE Messages to Trigger Traffic Mirroring

This section shows examples of DTCP DISABLE messages on a mediation device that use the interface ID to trigger traffic mirroring on interfaces demux0.30010002 and demux0.30010001. Whether you used DTCP ADD plus a policy or DTCP ADD and DTCP ENABLE, you can turn the policy off with DTCP DISABLE.

```
DISABLE DTCP/0.8
Csource-ID: ft-user1
Criteria-ID: 1
X-Drop-Policy: vod
Flags: STATIC
```

```
DISABLE DTCP/0.8
Csource-ID: ft-user1
Cdest-ID: cd1
X-Drop-Policy: vod
Flags: STATIC
```

## Using LIST Messages to Verify That Subscriber Traffic Is Being Mirrored

This section shows examples of a LIST message on the mediation device. The LIST message requests information about the subscribers being mirrored. The information is returned in a LIST response. The response shows that traffic for the two interfaces—demux0.30010002 and demux0.30010001—is being mirrored.

```
LIST DTCP/0.7
Csource-ID: dtcp1
Cdest-ID: cd1
Seq: 9
Authentication-Info: f6dd64643021debb167ce2fb2d3c7b6622a87e09
```

```
DTCP/0.7 200 OK
SEQ: 9
TIMESTAMP: 2011-02-13 15:57:47.667
CRITERIA-ID: 2
CSOURCE-ID: dtcp1
CDEST-ID: cd1
CSOURCE-ADDRESS: 10.10.4.224
FLAGS: BOTH
X-JTAP-CDEST-DEST-ADDRESS: 192.0.40.168
X-JTAP-CDEST-DEST-PORT: 65535
X-JTAP-CDEST-SOURCE-ADDRESS: 198.15.0.10
X-JTAP-CDEST-SOURCE-PORT: 50000
```

```
X-JTAP-CDEST-TTL: 64
X-INTERFACE-ID: demux0.30010002 /*subscriber interface*/
X-MD-INTERCEPT-ID: 0x0101010130010002
CRITERIA-NUM: 1
CRITERIA-COUNT: 0

CRITERIA-ID: 3
CSOURCE-ID: dtcp1
CDEST-ID: cd1
CSOURCE-ADDRESS: 10.10.4.224
FLAGS: BOTH
X-JTAP-CDEST-DEST-ADDRESS: 192.0.40.168
X-JTAP-CDEST-DEST-PORT: 65535
X-JTAP-CDEST-SOURCE-ADDRESS: 198.15.0.10
X-JTAP-CDEST-SOURCE-PORT: 50000
X-JTAP-CDEST-TTL: 64
X-INTERFACE-ID: demux0.30010001 /*subscriber interface*/
X-MD-INTERCEPT-ID: 0x0101010130010001
CRITERIA-NUM: 2
CRITERIA-COUNT: 2
AUTHENTICATION-INFO: 361171ccb24dde6afe8ef66021287f9b8ac16028
```

## Using DELETE Messages to Remove Traffic Mirroring Triggers

This section shows examples of DELETE messages used to remove traffic mirroring triggers on demux0.30010001 and demux0.30010002. DTCP DELETE can use either Criteria-ID to delete only that criteria or Cdest-ID to delete everything with cdest-ID that you previously created.

```
DELETE DTCP/0.7
Csource-ID: dtcp1
CRITERIA-ID: 2
Flags: STATIC
Seq: 10
Authentication-Info: 7e84ae871b12f2da023b038774115bb8d955f17e
```

```
DTCP/0.7 200 OK
SEQ: 10
CRITERIA-COUNT: 1
TIMESTAMP: 2011-02-13 16:00:02.802
AUTHENTICATION-INFO: 2834ff32ec07d84753a046cfb552e072cc27d50b
```

```
DELETE DTCP/0.7
Csource-ID: dtcp1
CRITERIA-ID: 3
Flags: STATIC
Seq: 12
Authentication-Info: 7653fd94659a7183a990bdea654a1b97c0895348
```

```
DTCP/0.7 200 OK
SEQ: 12
CRITERIA-COUNT: 1
TIMESTAMP: 2011-02-13 16:01:35.895
AUTHENTICATION-INFO: 7cd8171057a327434e1b2d9b35f43b88305f9a74
```

## Verifying That Traffic Mirroring Was Stopped on the Subscriber Interfaces

This section shows an example of a LIST message used to show that traffic mirroring on demux0.30010001 and demux0.30010002 is disabled.

```
LIST DTCP/0.7
Csource-ID: dtcp1
Cdest-ID: cd1
Seq: 13
Authentication-Info: 7c9f825427cfeaecebb0d13ea3842af1021c7d26
```

```
DTCP/0.7 430 Unknown Content Destination
SEQ: 13
AUTHENTICATION-INFO: 5ca2eec65106354fe59c878b4c36b7de3c511acd
```

- Related Documentation**
- [DTCP-Initiated Subscriber Secure Policy Overview on page 405](#)
  - [Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 406](#)

## ADD DTCP

---

**Syntax**    **ADD DTCP/0.7**  
              **Csource-ID:** *user-name*  
              **Cdest-ID:** *variable*  
              **Priority:** *priority-number*  
              **X-Drop-Policy:** *policy-name*  
              **X-JTap-Cdest-Dest-Address:** *ipv4-address*  
              **X-JTap-Cdest-Dest-Port:** *udp-port*  
              **X-JTap-Cdest-Source-Address:** *ipv4-address*  
              **X-JTap-Cdest-Source-Port:** *port-number*  
              **X-JTap-Cdest-TTL:** *time-to-live*  
              **X-MD-Intercept-Id:** *8-byte-id*  
              **Dtcp-trigger:** *trigger-value*  
              **Dtcp-attribute:** *attribute-value*  
              **Flags:** *flag*  
              **Seq:** *sequence-number*  
              **Authentication-Info:** *ssh-authentication-string*

**Description**    Specify the DTCP attributes used in ADD messages to cause the router to trigger traffic mirroring and provide instructions to populate fields in the encapsulation header for packets sent to the mediation device.

The DTCP ADD message can be sent either before or after subscribers log in through the interface.

The following attributes are added to the packet header of mirrored packets that the router sends to the mediation device. These attributes are required in the DTCP ADD message.

- **X-JTap-Cdest-Dest-Address**
- **X-JTap-Cdest-Dest-Port**
- **X-MD-Intercept-Id**

**Options**        **Csource-ID:** *user-name*—Username on the router. This username must be configured as a DTCP user on the router using the **set system login class** or **set system login user** statements.

**Cdest-ID:** *variable*—ID of the mediation device.

**Flags:** *flag*—STATIC is the only flag supported.

**Priority:** *priority-number*—This implementation of DTCP does not use the priority number.

**X-Drop-Policy** *policy-name*—Name of the policy used to determine which mirrored packets are no longer sent to the mediation device.

**X-JTap-Cdest-Dest-Address:** *ipv4-address*—Destination IPv4 address of the mediation device to which intercepted packets are sent. You must include this attribute in your ADD messages.. It is used in the header of mirrored traffic that is sent to the mediation device.



**X-JTap-Cdest-Dest-Port:** *udp-port*—Destination port of the mediation device to which intercepted packets are sent. You must include this attribute in your ADD messages. It is used in the header of mirrored traffic that is sent to the mediation device.

**X-JTap-Cdest-Source-Address:** *ipv4-address*—Source IPv4 address. You must include this attribute in your ADD messages. If the value entered does not match the value configured on the router using the **set services radius-flow-tap source-ipv4-address source-ipv4-address** statement, it is replaced by configured value.

**X-JTap-Cdest-Source-Port:** *port-number*—Source port. You must include this attribute in your ADD messages. If the value entered does not match the value of X-Jtap-Cdest-Dest-Port, it is ignored.

**X-JTap-Cdest-TTL:** *time-to-live*—TTL value to be used in the forwarded packet.

**X-MD-Intercept-Id 8-byte-id**—An Id that is used to identify a subscriber. You must include this attribute in your ADD messages. This ID is used in the header of mirrored traffic that is sent to the mediation device to allow the device to track a subscriber. The X-MD-Intercept-ID attribute must consist of 8-bytes, and the first two bits must be 00.

**Dtcp-trigger:** *trigger-value*—DTCP attribute used to trigger traffic mirroring. [“DTCP Traffic Mirroring Triggers” on page 413](#) lists the DTCP attributes that you can use in DTCP ADD messages to trigger traffic mirroring.

**Dtcp-attribute:** *attribute-value*—DTCP attribute included in the ADD messages. [“DTCP Traffic Mirroring Triggers” on page 413](#) lists the DTCP attributes that you can use in ADD messages.

**Seq:** *sequence-number*—Number added by the mediation device. DTCP messages contain a monotonically increasing sequence number for each successive message.

**Authentication-Info:** *ssh-authentication-string*—String used when you are using SSH to connect to the router.

**Required Privilege Level** Not applicable.

**Related Documentation**

- [DTCP Traffic Mirroring Triggers on page 413](#)
- [DTCP-Initiated Subscriber Secure Policy Overview on page 405](#)
- [DELETE DTCP on page 439](#)
- [LIST DTCP on page 443](#)

## Sample Output

```
ADD DTCP/0.7
Csource-ID: ft-user1
Cdest-ID: cd1
Priority: 2
X-JTap-Cdest-Dest-Address: 10.10.2.50
X-JTap-Cdest-Dest-Port: 7890
```

X-JTap-Cdest-Source-Address: 10.10.2.9  
X-JTap-Cdest-Source-Port: 12321  
X-Interface-Id: ge-0/0/2.1  
X-MD-Intercept-Id: 55667788  
Flags: STATIC  
Seq: 1  
Authentication-Info: c16d2d9d1679facf0c4a66683af6114d341e4033  
  
DTCP/0.7 200 OK  
SEQ: 7  
CRITERIA-ID: 2  
TIMESTAMP: 2011-02-13 15:56:49.609

## DELETE DTCP

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | DELETE DTCP/0.7<br>Csource-ID: <i>user-name</i><br>CRITERIA-ID: <i>criteria-id</i><br>Cdest-ID: <i>variable</i><br>Flags: <i>flag</i><br>Seq: <i>sequence-number</i><br>Authentication-Info: <i>ssh-authentication-string</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b>              | Disable traffic mirroring for a subscriber. Mirroring of the existing subscriber is stopped.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Options</b>                  | <p><b>Csource-ID: <i>user-name</i></b>—Username on the router. This name must be configured on the router.</p> <p><b>CRITERIA-ID: <i>criteria-id</i></b>—ID that DTCP assigns for the mirrored session when you create a DTCP ADD message. Use this ID in your DELETE messages to disable the intercept for a specific subscriber. To view the ID, use the DTCP LIST message. The CRITERIA-ID and the Cdest-ID are mutually exclusive in DELETE messages.</p> <p><b>Cdest-ID: <i>variable</i></b>—ID of the mediation device. Use this ID in your DELETE messages to remove all mirroring sessions associated with a mediation device. The Cdest-ID and the CRITERIA-ID are mutually exclusive in DELETE messages.</p> <p><b>Flags: <i>flag</i></b>—STATIC is the only flag supported.</p> <p><b>Seq: <i>sequence-number</i></b>—Number added by the mediation device. DTCP messages contain a monotonically increasing sequence number for each successive message.</p> <p><b>Authentication-Info: <i>ssh-authentication-string</i></b>—String used when you are using SSH to connect to the router.</p> |
| <b>Required Privilege Level</b> | Not applicable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">DTCP Traffic Mirroring Triggers on page 413</a></li> <li>• <a href="#">DTCP-Initiated Subscriber Secure Policy Overview on page 405</a></li> <li>• <a href="#">ADD DTCP on page 436</a></li> <li>• <a href="#">LIST DTCP on page 443</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>List of Sample Output</b>    | <a href="#">DELETE DTCP on page 440</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## Sample Output

The following sample shows how to disable mirroring for a specific subscriber by using the CRITERIA-ID.

## DELETE DTCP

DELETE DTCP/0.7  
Csource-ID: dtcp1  
CRITERIA-ID: 2  
Flags: STATIC  
Seq: 10  
Authentication-Info: 7e84ae871b12f2da023b038774115bb8d955f17e

DTCP/0.7 200 OK  
SEQ: 10  
CRITERIA-COUNT: 1  
TIMESTAMP: 2011-02-13 16:00:02.802  
AUTHENTICATION-INFO: 2834ff32ec07d84753a046cfb552e072cc27d50b

## DISABLE DTCP

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | DISABLE DTCP/0.7<br>Csource-ID: <i>user-name</i><br>Criteria-ID: <i>variable</i><br>X-Drop-Policy: <i>variable</i><br>Flags: <i>flags</i>                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>      | Command introduced in Junos OS Release 12.3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b>              | <p>Specify the DTCP ENABLE message to remove a drop policy that exists because of a prior DTCP ADD or DTCP ENABLE command</p> <p>The DTCP DISABLE message can only be issued on a Criteria-ID that was returned in a response to a previous DTCP ADD. The policy applies to any new subscribers that match the trigger corresponding to the Criteria-ID. Any existing mirroring remains in place, the policy is not be applied to them.</p>                                                                                                         |
| <b>Options</b>                  | <p><b>Csource-ID: <i>user-name</i></b>—Username on the router. This username must be configured as a DTCP user on the router using the <b>set system login class</b> or <b>set system login user</b> statements.</p> <p><b>Criteria-ID: <i>variable</i></b>—Identifies the subscriber on which the policy update occurs.</p> <p><b>Flags: <i>flag</i></b>—STATIC is the only flag supported.</p> <p><b>X-Drop-Policy: <i>variable</i></b>—Name of the policy that determines which mirrored packets are no longer sent to the mediation device.</p> |
| <b>Required Privilege Level</b> | Not applicable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">ENABLE DTCP on page 442</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

## Sample Output

```

DISABLE DTCP/0.7
Csource-ID: ft-user1
Criteria-ID: 1
X-Drop: T1
Flags: STATIC
Seq: 1
Authentication-Info: c16d2d9d1679facf0c4a66683af6114d341e4033

DTCP/0.7 200 OK
SEQ: 7
CRITERIA-ID: 2
TIMESTAMP: 2011-02-13 15:56:49.609

```

## ENABLE DTCP

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | ENABLE DTCP/0.7<br>Csource-ID: <i>user-name</i><br>Criteria-ID: <i>variable</i><br>X-Drop-Policy: <i>variable</i><br>Flags: <i>flags</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | Command introduced in Junos OS Release 12.3.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b>              | <p>Specify the DTCP attributes used in ENABLE messages to cause the router to trigger a drop policy if one does not already exist from a prior DTCP ADD or DTCP ENABLE command.</p> <p>The DTCP ENABLE message can only be issued on a Criteria-ID that was returned in a response to a previous DTCP ADD command. The policy applies to any new subscribers who match the trigger corresponding to the Criteria-ID. Any existing mirroring remains in place and the policy is not be applied to them. The DTCP ENABLE command stops only the traffic that is identified by the specified policy from being sent to the mediation device.</p> |
| <b>Options</b>                  | <p><b>Csource-ID: <i>user-name</i></b>—Username on the router. This username must be configured as a DTCP user on the router using the <b>set system login class</b> or <b>set system login user</b> statements.</p> <p><b>Criteria-ID: <i>variable</i></b>—Value returned from a prior DTCP ADD that identifies the trigger on which to disable this drop policy.</p> <p><b>Flags: <i>flag</i></b>—STATIC is the only flag supported.</p> <p><b>X-Drop-Policy: <i>variable</i></b>—Name of the policy that determines which mirrored packets are no longer sent to the mediation device.</p>                                                 |
| <b>Required Privilege Level</b> | Not applicable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">DISABLE DTCP on page 441</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## Sample Output

```
ENABLE DTCP/0.7
Csource-ID: ft-user1
Criteria-ID: 1
X-Drop: T1
Flags: STATIC
Seq: 1
Authentication-Info: c16d2d9d1679facf0c4a66683af6114d341e4033

DTCP/0.7 200 OK
SEQ: 7
CRITERIA-ID: 2
TIMESTAMP: 2011-02-13 15:56:49.609
```

## LIST DTCP

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <p>LIST DTCP/0.7</p> <p>Csource-ID: <i>user-name</i></p> <p>Cdest-ID: <i>variable</i></p> <p>Flags: BOTH</p> <p>Seq: <i>sequence-number</i></p> <p>Authentication-Info: <i>ssh-authentication-string</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>              | Request information that is returned in a LIST response. The response lists triggers only. It does not return sessions that are being mirrored.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Options</b>                  | <p><b>Csource-ID: <i>user-name</i></b>—Username on the router. This name must be configured on the router.</p> <p><b>Cdest-ID: <i>variable</i></b>—ID of the mediation device.</p> <p>If a LIST DTCP command is sent with multiple Cdest-IDs, the error <b>400 Bad Request</b> is displayed.</p> <p><b>Flags: <i>flag</i></b>—BOTH is the only flag supported. This field must be included in the LIST message.</p> <p><b>Seq: <i>sequence-number</i></b>—Number added by the mediation device. DTCP messages contain a monotonically increasing sequence number for each successive message.</p> <p><b>Authentication-Info: <i>ssh-authentication-string</i></b>—String used when you are using SSH to connect to the router.</p> |
| <b>Required Privilege Level</b> | Not applicable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">DTCP Traffic Mirroring Triggers on page 413</a></li> <li>• <a href="#">DTCP-Initiated Subscriber Secure Policy Overview on page 405</a></li> <li>• <a href="#">ADD DTCP on page 436</a></li> <li>• <a href="#">DELETE DTCP on page 439</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>List of Sample Output</b>    | <a href="#">LIST DTCP on page 443</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## Sample Output

### LIST DTCP

```

LIST DTCP/0.7
Csource-ID: dtcp1
Cdest-ID: cd1
Flags: BOTH
Seq: 9
Authentication-Info: f6dd64643021debb167ce2fb2d3c7b6622a87e09

DTCP/0.7 200 OK
SEQ: 9

```

TIMESTAMP: 2011-02-13 15:57:47.667  
CRITERIA-ID: 2  
CSOURCE-ID: dtcp1  
CDEST-ID: cd1  
CSOURCE-ADDRESS: 10.10.4.224  
FLAGS: BOTH  
X-JTAP-CDEST-DEST-ADDRESS: 192.0.40.168  
X-JTAP-CDEST-DEST-PORT: 65535  
X-JTAP-CDEST-SOURCE-ADDRESS: 198.15.0.10  
X-JTAP-CDEST-SOURCE-PORT: 50000  
X-JTAP-CDEST-TTL: 64  
X-INTERFACE-ID: demux0.30010002  
X-MD-INTERCEPT-ID: 0x0101010130010002  
CRITERIA-NUM: 1  
CRITERIA-COUNT: 0

CRITERIA-ID: 3  
CSOURCE-ID: dtcp1  
CDEST-ID: cd1  
CSOURCE-ADDRESS: 10.10.4.224  
FLAGS: BOTH  
X-JTAP-CDEST-DEST-ADDRESS: 192.0.40.168  
X-JTAP-CDEST-DEST-PORT: 65535  
X-JTAP-CDEST-SOURCE-ADDRESS: 198.15.0.10  
X-JTAP-CDEST-SOURCE-PORT: 50000  
X-JTAP-CDEST-TTL: 64  
X-INTERFACE-ID: demux0.30010001  
X-MD-INTERCEPT-ID: 0x0101010130010001  
CRITERIA-NUM: 2  
CRITERIA-COUNT: 2  
AUTHENTICATION-INFO: 361171ccb24dde6afe8ef66021287f9b8ac16028



## PART 6

# Troubleshooting

- [Contacting Juniper Networks Technical Support on page 447](#)
- [CoS System Log Messages on page 451](#)



## CHAPTER 40

# Contacting Juniper Networks Technical Support

- [Collecting Subscriber Access Logs Before Contacting Juniper Networks Technical Support on page 447](#)

## Collecting Subscriber Access Logs Before Contacting Juniper Networks Technical Support

---

**Problem**    **Description:** When you experience a subscriber access problem in your network, we recommend that you collect certain logs before you contact Juniper Networks Technical Support. This topic shows you the most useful logs for a variety of network implementations. In addition to the relevant log information, you must also collect standard troubleshooting information and send it to Juniper Networks Technical Support in your request for assistance.

**Solution**    To collect standard troubleshooting information:

- Redirect the command output to a file.  
`user@host> request support information | save rsi-1`

To configure logging to assist Juniper Networks Technical Support:

1. Review the following blocks of statements to determine which apply to your configuration.

[edit]

```
set system syslog archive size 100m files 25
set system auto-configuration traceoptions file filename
set system auto-configuration traceoptions file filename size 100m files 25
set protocols ppp-service traceoptions file filename size 100m files 25
set protocols ppp-service traceoptions level all
set protocols ppp-service traceoptions flag all
set protocols ppp traceoptions file filename size 100m files 25
set protocols ppp traceoptions level all
set protocols ppp traceoptions flag all
set protocols ppp monitor-session all
set interfaces pp0 traceoptions flag all
set demux traceoptions file filename size 100m files 25
set demux traceoptions level all
set demux traceoptions flag all
set system processes dhcp-service traceoptions file filename
set system processes dhcp-service traceoptions file size 100m
set system processes dhcp-service traceoptions file files 25
set system processes dhcp-service traceoptions flag all
set class-of-service traceoptions file filename
set class-of-service traceoptions file size 100m
set class-of-service traceoptions flag all
set class-of-service traceoptions file files 25
set routing-options traceoptions file filename
set routing-options traceoptions file size 100m
set routing-options traceoptions flag all
set routing-options traceoptions file files 25
set interfaces traceoptions file filename
set interfaces traceoptions file size 100m
set interfaces traceoptions flag all
set interfaces traceoptions file files 25
set system processes general-authentication-service traceoptions file filename
set system processes general-authentication-service traceoptions file size 100m
set system processes general-authentication-service traceoptions flag all
set system processes general-authentication-service traceoptions file files 25
```

2. Copy the relevant statements into a text file and modify the log filenames as you want.
3. Copy the statements from the text file and paste them into the CLI on your router to configure logging.
4. Commit the logging configuration to begin collecting information.



**NOTE:** The maximum file size for DHCP local server and DHCP relay log files is 1 GB. The maximum number of log files for DHCP local server and DHCP relay is 1000.

---



**BEST PRACTICE:** Enable these logs only to collect information when troubleshooting specific problems. Enabling these logs during normal operations can result in reduced system performance.

**Related  
Documentation**

- *Compressing Troubleshooting Logs from /var/logs to Send to Juniper Networks Technical Support*



## CHAPTER 41

# CoS System Log Messages

This chapter describes messages with the **COSD** prefix. They are generated by the class-of-service (CoS) process (cosd), which enables the routing platform to provide different levels of service to applications based on packet classifications.

### COSD\_AGGR\_CONFIG\_INVALID

---

|                           |                                                                                                                             |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Error: Cannot have config <i>error-message interface-name</i>                                                               |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) did not apply the config on this interface because it was not valid in this case. |
| <b>Type</b>               | Error: An error occurred                                                                                                    |
| <b>Severity</b>           | error                                                                                                                       |
| <b>Facility</b>           | LOG_DAEMON                                                                                                                  |
| <b>Cause</b>              | One possible cause is if any Class-of-Service is configured on an interface which is a part of an aggregated interface      |
| <b>Action</b>             | Remove or change the config from/on the interface.                                                                          |

### COSD\_CHASSIS\_SCHED\_MAP\_INVALID

---

|                           |                                                                                                                                                                                                                                                                                                           |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Chassis scheduler map incorrectly applied to interface <i>interface-name: error-message</i>                                                                                                                                                                                                               |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) did not apply a chassis scheduler map to the indicated interface, because the configuration used to apply the scheduler map was invalid.                                                                                                                        |
| <b>Type</b>               | Error: An error occurred                                                                                                                                                                                                                                                                                  |
| <b>Severity</b>           | error                                                                                                                                                                                                                                                                                                     |
| <b>Facility</b>           | LOG_DAEMON                                                                                                                                                                                                                                                                                                |
| <b>Cause</b>              | One possible cause is that the chassis scheduler map is applied to a specific interface. For most interface types, a scheduler map must be applied to all interfaces on the PIC; therefore, a wildcard must be used to specify the interfaces. One exception to this rule is the Gigabit Ethernet IQ PIC. |

**Action** Correct the configuration used to apply the chassis scheduler map to the interface.

---

## COSD\_CLASSIFIER\_NO\_SUPPORT\_LSI

---

**System Log Message** Cannot support classifier type *classifier-type* on lsi interface *interface-name*

**Description** The Differentiated Services code point (DSCP) classifier and the 802.1p classifier are only supported on I-Chip based Flexible PIC Concentrators (FPCs).

**Type** Error: An error occurred

**Severity** error

**Facility** LOG\_DAEMON

**Action** Remove the DSCP or the 802.1p classifier configuration from the routing instance

---

## COSD\_CLASS\_8021P\_UNSUPPORTED

---

**System Log Message** ieee-802.1 classifier is not valid on interface *interface-name*

**Description** The IEEE 802.1p classifier is not supported on the indicated interface.

**Type** Error: An error occurred

**Severity** warning

**Facility** LOG\_DAEMON

**Action** Remove the 802.1p classifier configuration from the interface, or configure an interface encapsulation type that supports 802.1p classifiers.

---

## COSD\_CLASS\_NO\_SUPPORT\_IFD

---

**System Log Message** BA/Fixed Classifier or Rewrite on Physical Interface is not allowed when ethernet switching family is configured: interace *interface-name*

**Description** The Rewrite is not supported on this interface when ethernet switching is enabled

**Type** Error: An error occurred

**Severity** error

**Facility** LOG\_DAEMON

**Action** Remove the classifier configuration from the interface, instead apply it on the logical interface where ethernet switching family is enabled

**Action** Remove the Rewrite configuration from the interface, instead apply it on the logical interface where ethernet switching family is enabled



## COSD\_CLASS\_NO\_SUPPORT\_L3\_IFL

|                           |                                                                                                                                                                     |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | BA/Fixed Classifier or Rewrite config is not allowed on logical interface ( <i>interface-name</i> ) with inet/inet6 family                                          |
| <b>Description</b>        | The Rewrite is not supported on this logical interface                                                                                                              |
| <b>Type</b>               | Error: An error occurred                                                                                                                                            |
| <b>Severity</b>           | error                                                                                                                                                               |
| <b>Facility</b>           | LOG_DAEMON                                                                                                                                                          |
| <b>Action</b>             | Remove the classifier configuration from the logical interface, instead apply it on the main interface if inet/inet6 is configured on one of its logical interfaces |
| <b>Action</b>             | Remove the Rewrite configuration from the logical interface, instead apply it on the main interface if inet/inet6 is configured on one of its logical interfaces    |

## COSD\_CONF\_OPEN\_FAILURE

|                           |                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Unable to open: <i>filename</i> , using default CoS forwarding classes, do 'commit full' in cli to avoid this message                                                                                                                                                                                                                                                                |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) could not read configuration data.                                                                                                                                                                                                                                                                                                         |
| <b>Type</b>               | Error: An error occurred                                                                                                                                                                                                                                                                                                                                                             |
| <b>Severity</b>           | error                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Facility</b>           | ANY                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Cause</b>              | All of the following reasons: mgd -l fails after upgrade-the file cosd.conf does not exist and is not created because of the mgd -l failure The first commit is 'commit' and not 'commit full'-the file cosd.conf does not commit and is not created automatically [class-of-service forwarding-classes] does not exist-the file cosd.conf does not get exported with plain 'commit' |
| <b>Action</b>             | Do a 'commit full'                                                                                                                                                                                                                                                                                                                                                                   |

## COSD\_DB\_OPEN\_FAILED

|                           |                                                                                                       |
|---------------------------|-------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Unable to open configuration database: <i>error-message(name)</i>                                     |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) could not read configuration data for the indicated reason. |
| <b>Type</b>               | Error: An error occurred                                                                              |
| <b>Severity</b>           | error                                                                                                 |
| <b>Facility</b>           | LOG_DAEMON                                                                                            |
| <b>Cause</b>              | The specified database does not exist                                                                 |

**Action** Contact your technical support representative.

## **COSD\_EXACT\_RATE\_UNSUPP\_INTERFACE**

---

**System Log Message** Unable to apply scheduler map *scheduler-map* to interface *interface-name* because it does not support exact-rate transmission

**Description** The class-of-service (CoS) process (cosd) did not apply the indicated scheduler map to the indicated interface, because a scheduler named in the scheduler map specifies exact transmission rate. The interface is housed on a type of PIC that does not support exact transmission rate, such as an IQ2 PIC. In terms of configuration, the 'exact' statement is included in the scheduler definition at the [edit class-of-service schedulers <scheduler-name> transmit-rate (<rate> | percent <percentage>)] hierarchy level. The scheduler is included in the scheduler map that is applied to the interface.

**Type** Error: An error occurred

**Severity** error

**Facility** LOG\_DAEMON

**Action** Remove the 'exact' statement from the scheduler in the scheduler map applied to the interface.

## **COSD\_EXACT\_RATE\_UNSUPP\_SESSION**

---

**System Log Message** Unable to apply CoS to L2TP session *session-id*, because scheduler map *scheduler-map* specifies exact rate transmission

**Description** The class-of-service (CoS) process (cosd) did not apply CoS settings to the indicated Layer 2 Tunneling Protocol (L2TP) session, because the scheduler map specified by the RADIUS server for the session is configured for exact transmission rate. Exact transmission rate is not supported for L2TP sessions on the type of PIC that houses the interface, such as an IQ2 PIC. In terms of configuration, the 'exact' statement is included in a scheduler definition at the [edit class-of-service schedulers <scheduler-name> transmit-rate (<rate> | percent <percentage>)] hierarchy level. The scheduler is included in a scheduler map that is associated with a traffic control profile. The traffic control profile is named by an attribute in the RADIUS server's configuration file, which makes the profile apply to the session.

**Type** Error: An error occurred

**Severity** error

**Facility** LOG\_DAEMON

**Action** Remove the 'exact' statement from the scheduler in the scheduler map applied to the session.

## **COSD\_EXP\_RW\_L2\_IFL\_NOT\_SUPPORTED**

---

**System Log Message** EXP Rewrite on IFL is not allowed when ethernet switching family is configured: interace *interface-name*

|                    |                                                                  |
|--------------------|------------------------------------------------------------------|
| <b>Description</b> | EXP rewrite is not supported on this logical interface.          |
| <b>Type</b>        | Error: An error occurred                                         |
| <b>Severity</b>    | error                                                            |
| <b>Facility</b>    | LOG_DAEMON                                                       |
| <b>Action</b>      | Remove the exp rewrite configuration from the logical interface. |

## COSD\_FRAGMENTATION\_MAP\_CONFLICT

|                           |                                                                                                                                                                                                                                                                                                                                               |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Interface <i>compression-device</i> matches wildcard <i>wildcard-interface-name</i> , but fragmentation map <i>fragmentation-map</i> was not applied because interface is compression device for link interface <i>link-interface-name</i>                                                                                                    |
| <b>Description</b>        | The indicated fragmentation map is normally applied to interfaces that match the indicated wildcard. The class-of-service (CoS) process (cosd) did not apply the fragmentation map to the indicated interface, even though it matches the wildcard, because the interface is acting as a compression device for the indicated link interface. |
| <b>Type</b>               | Error: An error occurred                                                                                                                                                                                                                                                                                                                      |
| <b>Severity</b>           | warning                                                                                                                                                                                                                                                                                                                                       |
| <b>Facility</b>           | LOG_DAEMON                                                                                                                                                                                                                                                                                                                                    |
| <b>Action</b>             | Correct the configuration of the fragmentation map.                                                                                                                                                                                                                                                                                           |

## COSD\_HIGH\_PRIO\_QUEUES\_INTERFACE

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Unable to apply scheduler map <i>scheduler-map</i> to interface <i>interface-name</i> , because multiple schedulers in map have "high," "medium-high," or "strict-high" priority                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) did not apply the indicated scheduler map to the indicated interface, because the map includes more than one scheduler that has high, medium-high, or strict-high priority. For interfaces that are housed by certain PICs, such as an IQ2 PIC, the scheduler map can include only one scheduler that specifies one of those three priority levels. In terms of configuration, the 'priority' statement at the [edit class-of-service schedulers <scheduler-name>] hierarchy level has the value 'high, ' 'medium-high, ' or 'strict-high' for more than one of the schedulers in the map. |
| <b>Type</b>               | Error: An error occurred                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Severity</b>           | error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Facility</b>           | LOG_DAEMON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Action</b>             | Correct the configuration so that the scheduler map includes only one scheduler with high, medium-high, or strict-high priority.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## COSD\_HIGH\_PRIO\_QUEUES\_SESSION

---

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Unable to apply CoS to L2TP session <i>session-id</i> , because multiple schedulers in scheduler map <i>scheduler-map</i> have "high," "medium-high," or "strict-high" priority                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) did not apply CoS settings to the indicated Layer 2 Tunneling Protocol (L2TP) session because the scheduler map specified by the RADIUS server for the session includes more than one scheduler that has high, medium-high, or strict-high priority. For interfaces that are housed by certain Physical Interface Cards (PICs), such as an IQ2 PIC, the scheduler map can include only one scheduler that specifies one of those three priority levels. In terms of configuration, the 'priority' statement at the [edit class-of-service schedulers <scheduler-name>] hierarchy level has the value 'high,' 'medium-high,' or 'strict-high' for more than one of the schedulers in the map. The map is associated with a traffic control profile that is named by an attribute in the RADIUS server's configuration file, which makes the profile apply to the session. |
| <b>Type</b>               | Error: An error occurred                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Severity</b>           | error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Facility</b>           | LOG_DAEMON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Action</b>             | Correct the configuration so that the scheduler map includes only one scheduler with high, medium-high, or strict-high priority.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## COSD\_IFD\_OUTPUT\_SHAPING\_RATE\_ERR

---

|                           |                                                                                                                          |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Traffic shaping not supported on interface device <i>interface-name</i>                                                  |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) did not apply the shaping rate that is configured for the indicated interface. |
| <b>Type</b>               | Error: An error occurred                                                                                                 |
| <b>Severity</b>           | error                                                                                                                    |
| <b>Facility</b>           | LOG_DAEMON                                                                                                               |
| <b>Cause</b>              | Shaping rate is valid only for interfaces housed by IQ and IQ2 PICs, and the interface is on a different type of PIC.    |
| <b>Action</b>             | Remove the shaping rate configuration from the interface.                                                                |

## COSD\_IFD\_SHAPER\_ERR

---

|                           |                                                                                             |
|---------------------------|---------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | port shaper not allowed on interface <i>interface-name</i>                                  |
| <b>Description</b>        | The non-queuing dense port concentrators (DPCs) did not support the specified shaping rate. |
| <b>Type</b>               | Error: An error occurred                                                                    |

|                 |                                                            |
|-----------------|------------------------------------------------------------|
| <b>Severity</b> | error                                                      |
| <b>Facility</b> | LOG_DAEMON                                                 |
| <b>Cause</b>    | The port shaper was not supported on the non-queuing DPCs. |
| <b>Action</b>   | Remove the shaping rate configuration from the interface.  |

---

## COSD\_INTERFACE\_NO\_MEDIA

---

|                           |                                                                                                        |
|---------------------------|--------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Unable to obtain media information for interface <i>interface-name</i>                                 |
| <b>Description</b>        | The message sent by the kernel for the indicated interface did not include required media information. |
| <b>Type</b>               | Error: An error occurred                                                                               |
| <b>Severity</b>           | error                                                                                                  |
| <b>Facility</b>           | LOG_DAEMON                                                                                             |
| <b>Cause</b>              | An internal software failure occurred.                                                                 |
| <b>Action</b>             | Contact your technical support representative.                                                         |

---

## COSD\_L2TP\_COS\_NOT\_CONFIGURED

---

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Unable to apply CoS to L2TP session <i>session-id</i> because session-aware CoS is not enabled for interface <i>interface-name</i>                                                                                                                                                                                                                                                                                |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) did not apply CoS settings to the indicated Layer 2 Tunneling Protocol (L2TP) session on the indicated interface, because the interface is not configured to support session-aware CoS for L2TP. In terms of configuration, the 'per-session-scheduler' statement is not included at the [edit interfaces <interface-name> unit <logical-unit-number>] hierarchy level. |
| <b>Type</b>               | Error: An error occurred                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Severity</b>           | error                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Facility</b>           | LOG_DAEMON                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Action</b>             | Include the 'per-session-scheduler' statement in the configuration for the interface.                                                                                                                                                                                                                                                                                                                             |

---

## COSD\_L2TP\_COS\_NOT\_SUPPORTED

---

|                           |                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Unable to apply CoS to L2TP session <i>session-id</i> on interface <i>interface-name</i> : it does not support CoS                                                                                                                                                                                                                                        |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) did not apply CoS settings to the indicated Layer 2 Tunneling Protocol (L2TP) session on the indicated interface. The interface is configured to support session-aware CoS for L2TP, but is not on a PIC that supports that feature, such as an IQ2 PIC. In terms of configuration, the 'per-session-scheduler' |

statement is included at the [edit interfaces <interface-name> unit <logical-unit-number>] hierarchy level.

|                 |                                                                                                                                     |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type</b>     | Error: An error occurred                                                                                                            |
| <b>Severity</b> | error                                                                                                                               |
| <b>Facility</b> | LOG_DAEMON                                                                                                                          |
| <b>Action</b>   | Determine whether the interface is on an PIC that supports session-aware CoS; if not, remove the 'per-session-scheduler' statement. |

---

## COSD\_L2TP\_SHAPING\_NOT\_CONFIGURED

---

**System Log Message** Unable to apply CoS to L2TP session *session-id* because session-aware shaping is not enabled for interface *interface-name*

**Description** The class-of-service (CoS) process (cosd) did not apply CoS settings to the indicated Layer 2 Tunneling Protocol (L2TP) session on the indicated interface, because session-aware traffic shaping for L2TP is not configured on the PIC that houses the interface. In terms of configuration, the 'session-shaping' statement is not included at the [edit chassis fpc <slot-number> pic <pic-number> traffic-manager mode] hierarchy level.

|                 |                                                                           |
|-----------------|---------------------------------------------------------------------------|
| <b>Type</b>     | Error: An error occurred                                                  |
| <b>Severity</b> | error                                                                     |
| <b>Facility</b> | LOG_DAEMON                                                                |
| <b>Action</b>   | Include the 'session-shaping' statement in the configuration for the PIC. |

---

## COSD\_LARGE\_DELAY\_BUFFER\_INVALID

---

**System Log Message** Error for interface *interface-name* *error-message*

**Description** The class-of-service (CoS) process (cosd) did not apply the large delay buffer setting that is configured for the indicated interface.

|                 |                                                                                      |
|-----------------|--------------------------------------------------------------------------------------|
| <b>Type</b>     | Error: An error occurred                                                             |
| <b>Severity</b> | error                                                                                |
| <b>Facility</b> | LOG_DAEMON                                                                           |
| <b>Cause</b>    | The interface is not housed on one of the PIC types that support large delay buffer. |
| <b>Action</b>   | Remove the large delay buffer configuration from the interface.                      |

---

## COSD\_MALLOC\_FAILED

---

**System Log Message** malloc failed: *error-message*

|                    |                                                                                                                                                                                                                                |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Description</b> | The class-of-service (CoS) process (cosd) could not dynamically allocate memory for the indicated reason.                                                                                                                      |
| <b>Type</b>        | Error: An error occurred                                                                                                                                                                                                       |
| <b>Severity</b>    | error                                                                                                                                                                                                                          |
| <b>Facility</b>    | LOG_DAEMON                                                                                                                                                                                                                     |
| <b>Cause</b>       | A software bug caused a memory leak or the Routing Engine did not have sufficient memory.                                                                                                                                      |
| <b>Action</b>      | Contact your technical support representative. For more information, see <a href="http://kb.juniper.net/InfoCenter/index?page=content&amp;id=KB18862">http://kb.juniper.net/InfoCenter/index?page=content&amp;id=KB18862</a> . |

---

### COSD\_MAX\_FORWARDING\_CLASSES\_ABC

---

|                           |                                                                                      |
|---------------------------|--------------------------------------------------------------------------------------|
| <b>System Log Message</b> | exceeding max 4 forwarding-class support.                                            |
| <b>Description</b>        | User configuration exceeds the maximum number of forwarding class that is supported. |
| <b>Type</b>               | Error: An error occurred                                                             |
| <b>Severity</b>           | warning                                                                              |
| <b>Facility</b>           | LOG_DAEMON                                                                           |
| <b>Action</b>             | Configure only four forwarding classes                                               |

---

### COSD\_MPLS\_DSCP\_CLASS\_NO\_SUPPORT

---

|                           |                                                                                                                                                                    |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Cannot support MPLS DSCP classifier on ifl <i>interface-name</i>                                                                                                   |
| <b>Description</b>        | The MPLS Differentiated Services code point (DSCP) classifier is only supported on I-Chip based Flexible PIC Concentrators (FPCs). It is not supported on Q2 PICs. |
| <b>Type</b>               | Error: An error occurred                                                                                                                                           |
| <b>Severity</b>           | error                                                                                                                                                              |
| <b>Facility</b>           | LOG_DAEMON                                                                                                                                                         |
| <b>Action</b>             | Remove the MPLS DSCP classifier configuration from the logical interface.                                                                                          |

---

### COSD\_MULTILINK\_CLASS\_CONFLICT

---

|                           |                                                                                                                                                                                                                                                                    |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Fragmentation map <i>fragmentation-map</i> for wildcard <i>wildcard-interface-name</i> specified multilink class <i>class-name</i> for queue <i>queue-number</i> on interface <i>interface-name</i> , which exceeds configured limit of <i>limit</i>               |
| <b>Description</b>        | The indicated fragmentation map is normally applied to interfaces that match the indicated wildcard, and specifies the indicated multilink class setting for queues on those interfaces. The class-of-service (CoS) process (cosd) did not apply the fragmentation |

map to the indicated interface, even though it matches the wildcard, because the setting in the map exceeds the indicated class limit, which is configured on the interface itself.

|                 |                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Type</b>     | Error: An error occurred                                                                                                                  |
| <b>Severity</b> | warning                                                                                                                                   |
| <b>Facility</b> | LOG_DAEMON                                                                                                                                |
| <b>Action</b>   | Correct the configuration so that the multilink class setting in the fragmentation map does not exceed the class limit for the interface. |

---

## COSD\_NULL\_INPUT\_ARGUMENT

---

|                           |                                                        |
|---------------------------|--------------------------------------------------------|
| <b>System Log Message</b> | NULL input argument : <i>error-message</i>             |
| <b>Description</b>        | The pointer that was passed to this function was NULL. |
| <b>Type</b>               | Error: An error occurred                               |
| <b>Severity</b>           | error                                                  |
| <b>Facility</b>           | LOG_DAEMON                                             |
| <b>Action</b>             | Contact your technical support representative.         |

---

## COSD\_OUT\_OF\_DEDICATED\_QUEUES

---

|                           |                                                                                             |
|---------------------------|---------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Queue usage count for interface <i>interface-name</i> is at <i>percentage-value</i> percent |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) is running out of dedicated queues.               |
| <b>Type</b>               | Event: This message reports an event, not an error                                          |
| <b>Severity</b>           | warning                                                                                     |
| <b>Facility</b>           | LOG_DAEMON                                                                                  |

---

## COSD\_RATE\_LIMIT\_INVALID

---

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Unable to apply scheduler map <i>scheduler-map</i> to interface <i>interface-name</i> . <i>description</i> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) did not apply the indicated scheduler map to the indicated interface, because the number of rate limited queues in the scheduler map exceeded the limit supported by this interface or the priority is not supported. The interface is housed in a type of PIC that does not support the number of configured rate limited queues or the priority is not supported. In terms of configuration, the 'rate-limit' statement is included in the scheduler definition at the [edit class-of-service schedulers <scheduler-name> transmit-rate <rate>   percent <percentage>] hierarchy level. The scheduler is included in the scheduler map applied to the interface. |
| <b>Type</b>               | Error: An error occurred                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Severity</b>           | error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Facility</b>           | LOG_DAEMON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |



**Action** Either limit the number of rate-limited schedulers in this scheduler map to the allowed maximum for this PIC and interface type or check the allowed priority for rate-limited queues

## COSD\_RATE\_LIMIT\_NOT\_SUPPORTED

**System Log Message** Unable to apply scheduler map *scheduler-map* to interface *interface-name* because it does not support rate limiting

**Description** The class-of-service (CoS) process (cosd) did not apply the indicated scheduler map to the indicated interface, because a scheduler named in the scheduler map is configured for rate limiting. The interface is housed in a type of PIC that does not support rate limiting. In terms of configuration, the 'rate-limit' statement is included in the scheduler definition at the [edit class-of-service schedulers <scheduler-name> transmit-rate <rate> | percent <percentage>] hierarchy level. The scheduler is included in the scheduler map applied to the interface.

**Type** Error: An error occurred

**Severity** error

**Facility** LOG\_DAEMON

**Action** Remove the 'rate-limit' statement from the scheduler in the scheduler map applied to the interface.

## COSD\_REWRITE\_RULE\_LIMIT\_EXCEEDED

**System Log Message** Number of rewrite rules applied to interface *interface-name* exceeds limit (*maximum-value*)

**Description** The class-of-service (CoS) process (cosd) determined that the number of rewrite rules applied to the indicated interface exceeds the indicated limit for the interface. In terms of configuration, too many rewrite rules are included at the [edit class-of-service interfaces <interface-name> unit <logical-unit-number> rewrite-rules] hierarchy level.

**Type** Error: An error occurred

**Severity** error

**Facility** LOG\_DAEMON

**Action** Remove rewrite rules from the configuration for the interface.

## COSD\_RL\_IFL\_NEEDS\_SHAPING

**System Log Message** "rate-limit" configured in *scheduler-map*, but ifl *interface-name* does not have output shaper configured. It will use the ifd-shaping rate/ifd-transmit rate for implementation of rate-limit.

**Description** The 'rate-limit' statement is configured in one or more schedulers that are part of the indicated scheduler map. In order to apply this scheduler map to the indicated interface,

output shaping rate should be configured on the interface. Since no output shaping rate is configured, the transmit rate or shaping rate of the parent interface will be used instead.

|                 |                                                           |
|-----------------|-----------------------------------------------------------|
| <b>Type</b>     | Error: An error occurred                                  |
| <b>Severity</b> | warning                                                   |
| <b>Facility</b> | LOG_DAEMON                                                |
| <b>Action</b>   | Configure output shaping rate for the indicated interface |

---

## COSD\_SCHEDULER\_MAP\_CONFLICT

---

**System Log Message** Forwarding classes "*first-forwarding-class*" and "*second-forwarding-class*" in scheduler map *scheduler-map* both map to queue *queue-number*

**Description** Both of the indicated forwarding classes, which are defined in the indicated scheduler map, map to the same indicated queue. The double mapping is invalid.

|                 |                                             |
|-----------------|---------------------------------------------|
| <b>Type</b>     | Error: An error occurred                    |
| <b>Severity</b> | error                                       |
| <b>Facility</b> | LOG_DAEMON                                  |
| <b>Action</b>   | Map only one forwarding class to the queue. |

---

## COSD\_SCHED\_AVG\_CONST\_UNSUPPORTED

---

**System Log Message** Averaging constant not supported on interface *interface-name*. Value set in scheduler-map *scheduler-map* (scheduler *name*) will be ignored.

**Description** Configuring averaging constant is not supported on the indicated interface. Value set in the indicated scheduler will be ignored.

|                 |                                                                           |
|-----------------|---------------------------------------------------------------------------|
| <b>Type</b>     | Error: An error occurred                                                  |
| <b>Severity</b> | warning                                                                   |
| <b>Facility</b> | LOG_DAEMON                                                                |
| <b>Action</b>   | Remove the averaging-constant configuration from the indicated scheduler. |

---

## COSD\_SCHED\_MAP\_GROUP\_CONFLICT

---

**System Log Message** Interface *interface-name* cannot be bound to scheduler-map *scheduler-map*. It will be bound to default scheduler-map

**Description** Interfaces belonging to a group cannot be bound to different scheduler maps. They will be bound to the default scheduler map.

|                 |                          |
|-----------------|--------------------------|
| <b>Type</b>     | Error: An error occurred |
| <b>Severity</b> | error                    |

**Facility** LOG\_DAEMON

**Action** Map only one scheduler map to all the interfaces of a group.

---

## COSD\_SHAPER\_GROUP\_CONFLICT

---

**System Log Message** Interface *interface-name* cannot be bound to configured shaping-rate. It will be bound to default rate

**Description** Interfaces belonging to a group cannot be bound to different shaping rates. They will be bound to the default shaping rate.

**Type** Error: An error occurred

**Severity** error

**Facility** LOG\_DAEMON

**Action** Map only one shaping rate to all interfaces of a group.

---

## COSD\_STREAM\_IFD\_CREATE\_FAILURE

---

**System Log Message** Unable to create special master interface device for *interface-name*

**Description** The class-of-service (CoS) process (cosd) could not create the indicated internal interface device, which it needs for application of a chassis scheduler map.

**Type** Error: An error occurred

**Severity** error

**Facility** LOG\_DAEMON

**Cause** An internal software failure occurred.

**Action** Contact your technical support representative.

---

## COSD\_TIMER\_ERROR

---

**System Log Message** Unable to set retry timer for rtsock write operation: *error-message*

**Description** The class-of-service (CoS) process (cosd) used a routine from the rtsock library to write to the kernel, but the kernel did not accept the request. The cosd process could not set the retry timer for the request, for the indicated reason.

**Type** Error: An error occurred

**Severity** error

**Facility** LOG\_DAEMON

**Cause** An internal software failure occurred.

**Action** Contact your technical support representative.

## COSD\_TRICOLOR\_ALWAYS\_ON

---

|                           |                                                                                              |
|---------------------------|----------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | tri-color is always enabled in this platform. There is no need to explicitly set it.         |
| <b>Description</b>        | Tri-color marking is always enabled on this platform. There is no need to explicitly set it. |
| <b>Type</b>               | Error: An error occurred                                                                     |
| <b>Severity</b>           | warning                                                                                      |
| <b>Facility</b>           | LOG_DAEMON                                                                                   |
| <b>Action</b>             | Remove the 'tri-color' configuration statement                                               |

## COSD\_TRICOLOR\_NOT\_SUPPORTED

---

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Unable to apply scheduler <i>scheduler-map</i> to interface <i>interface-name</i> , because it does not support tricolor marking                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) did not apply the indicated scheduler map to the indicated interface, because a scheduler included in the map specifies a packet loss priority (PLP) that is supported only with tricolor marking (TCM). The interface does not support TCM, either because TCM is not enabled or the interface is on a router that does not support TCM. In terms of configuration, the value 'medium-high' or 'medium-low' is specified for the 'loss-priority' statement in a scheduler definition at the [edit class-of-service schedulers <scheduler-name> drop-profile-map] hierarchy level. The scheduler is included in the scheduler map applied to the interface, but the 'tri-color' statement is either not included at the [edit class-of-service] hierarchy level, or is not supported. |
| <b>Type</b>               | Error: An error occurred                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Severity</b>           | error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Facility</b>           | LOG_DAEMON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Action</b>             | Change the value of the 'loss-priority' statement in the scheduler or include the 'tri-color' statement to enable TCM on the router.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## COSD\_TX\_QUEUE\_RATES\_TOO\_HIGH

---

|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | Unable to apply scheduler map <i>scheduler-map</i> to interface <i>interface-name</i> : sum of scheduler transmission rates exceeds interface shaping or transmission rate                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) did not apply the indicated scheduler map to the indicated interface, because the sum of the queue transmission rates defined in the schedulers in the scheduler map exceeds the shaping or transmission rate for the interface. In terms of configuration, the 'transmit-rate' statement is specified for each scheduler at the [edit class-of-service schedulers <scheduler-name>] hierarchy level. The sum of the configured transmission rates exceeds the transmission or shaping rate of the interface. |
| <b>Type</b>               | Error: An error occurred                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

|                 |                                                                                                                                       |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>Severity</b> | error                                                                                                                                 |
| <b>Facility</b> | LOG_DAEMON                                                                                                                            |
| <b>Action</b>   | Decrease the value of one or more 'transmit-rate' statements so that the sum is less than the interface transmission or shaping rate. |

---

## COSD\_UNKNOWN\_CLASSIFIER

---

|                           |                                                                                                                    |
|---------------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | classifier type <i>classifier-type</i> is invalid                                                                  |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) did not recognize the indicated classifier type from the rtsock library. |
| <b>Type</b>               | Error: An error occurred                                                                                           |
| <b>Severity</b>           | warning                                                                                                            |
| <b>Facility</b>           | LOG_DAEMON                                                                                                         |
| <b>Cause</b>              | An internal software failure occurred.                                                                             |
| <b>Action</b>             | Contact your technical support representative.                                                                     |

---

## COSD\_UNKNOWN\_REWRITE

---

|                           |                                                                                                                 |
|---------------------------|-----------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | rtsock rewrite type <i>type</i> is invalid                                                                      |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) did not recognize the indicated rewrite type from the rtsock library. |
| <b>Type</b>               | Error: An error occurred                                                                                        |
| <b>Severity</b>           | warning                                                                                                         |
| <b>Facility</b>           | LOG_DAEMON                                                                                                      |
| <b>Cause</b>              | An internal software failure occurred.                                                                          |
| <b>Action</b>             | Contact your technical support representative.                                                                  |

---

## COSD\_UNKNOWN\_TRANSLATION\_TABLE

---

|                           |                                                                                                                           |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>System Log Message</b> | rtsock translation table type <i>translation-table-type</i> is invalid                                                    |
| <b>Description</b>        | The class-of-service (CoS) process (cosd) did not recognize the indicated translation table type from the rtsock library. |
| <b>Type</b>               | Error: An error occurred                                                                                                  |
| <b>Severity</b>           | warning                                                                                                                   |
| <b>Facility</b>           | LOG_DAEMON                                                                                                                |
| <b>Cause</b>              | An internal software failure occurred.                                                                                    |

**Action** For more information, see  
<http://kb.juniper.net/InfoCenter/index?page=content&id=KB18866>.

## PART 7

# Configuration Statements and Operational Commands

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## CHAPTER 42

# Configuration Statements

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---

## [edit class-of-service] Hierarchy Level

This topic shows the complete configuration for class of service (CoS) statements for the **[edit class-of-service]** hierarchy level, listing all possible configuration statements and showing their level in the configuration hierarchy. When you are configuring the Junos OS, your current hierarchy level is shown in the banner on the line preceding the **user@host#** prompt.

**[edit class-of-service]**

```

adjustment-control-profiles {
 profile-name {
 application {
 ancp;
 radius-coa;
 pppoe-tags;
 }
 }
}
classifiers {
 (dscp | dscp-ipv6 | exp | ieee-802.1 | inet-precedence) classifier-name {
 import (classifier-name | default);
 forwarding-class class-name {
 loss-priority level code-points [aliases] [bit-patterns];
 }
 }
}
code-point-aliases {
 (dscp | dscp-ipv6 | exp | ieee-802.1 | inet-precedence) {
 alias-name bits;
 }
}
copy-plp-all;
drop-profiles {
 profile-name {
 fill-level percentage drop-probability percentage;
 interpolate {
 drop-probability [values];
 fill-level [values];
 }
 }
}
fabric {
 scheduler-map {
 priority (high | low) scheduler scheduler-name;
 }
}
forwarding-classes {
 class class-name queue-num queue-number priority (high | low);
 queue queue-number class-name priority (high | low) [policing-priority (premium |
 normal)];
}
forwarding-class-map forwarding-class-map-name {
 class class-name queue-num queue-number [restricted-queue queue-number];
}
forwarding-policy {
 next-hop-map map-name {
 forwarding-class class-name {
 next-hop [next-hop-name];
 lsp-next-hop [lsp-regular-expression];
 non-lsp-next-hop;
 discard;
 }
 }
}
class class-name {
 classification-override {

```

```
 forwarding-class class-name;
 }
}
}
fragmentation-maps {
 map-name {
 forwarding-class class-name {
 drop-timeout milliseconds;
 fragment-threshold bytes;
 multilink-class number;
 no-fragmentation;
 }
 }
}
host-outbound-traffic {
 forwarding-class class-name;
 dscp-code-point value;
 forwarding-class class-name;
 ieee-802.1 {
 default value;
 rewrite-rules;
 }
}
interfaces {
 interface-name {
 classifiers {
 dscp (classifier-name | default);
 ieee-802.1 (classifier-name | default) vlan-tag (inner | outer | classifier-name);
 inet-precedence (classifier-name | default);
 }
 input-scheduler-map map-name;
 input-shaping-rate rate;
 irb {
 unit logical-unit-number {
 classifiers {
 dscp (classifier-name | default) {
 family [inet mpls];
 }
 dscp-ipv6 (classifier-name | default) {
 family [inet mpls];
 }
 exp (classifier-name | default);
 ieee-802.1 (classifier-name | default) vlan-tag (inner | outer | transparent);
 }
 rewrite-rules {
 dscp (rewrite-name | default);
 dscp-ipv6 (rewrite-name | default);
 exp (rewrite-name | default) protocol protocol-types;
 ieee-802.1 (rewrite-name | default) vlan-tag (outer | outer-and-inner);
 inet-precedence (rewrite-name | default);
 }
 }
 }
 }
 output-forwarding-class-map forwarding-class-map-name;
 member-link-scheduler (replicate | scale);
 rewrite-rules {
 dscp (rewrite-name | default);
 }
}
```



```

 ieee-802.1 (rewrite-name | default) vlan-tag (outer);
 inet-precedence (rewrite-name | default);
 }
}
scheduler-map map-name;
scheduler-map-chassis map-name;
shaping-rate rate;
unit logical-unit-number {
 classifiers {
 (dscp | dscp-ipv6 | exp | ieee-802.1 | inet-precedence) (classifier-name | default)
 family (mpls | inet);
 }
 forwarding-class class-name;
 fragmentation-map map-name;
 input-scheduler-map map-name;
 input-shaping-rate (percent percentage | rate);
 input-traffic-control-profile profile-name shared-instance instance-name;
 loss-priority-maps {
 frame-relay-de (name | default);
 }
 loss-priority-rewrites {
 frame-relay-de (name | default);
 }
 output-traffic-control-profile profile-name shared-instance instance-name;
 per-session-scheduler;
 rewrite-rules {
 dscp (rewrite-name | default) protocol protocol-types;
 dscp-ipv6 (rewrite-name | default);
 exp (rewrite-name | default) protocol protocol-types;
 exp-push-push-push default;
 exp-swap-push-push default;
 ieee-802.1 (rewrite-name | default) vlan-tag (outer | outer-and-inner);
 inet-precedence (rewrite-name | default) protocol protocol-types;
 }
 scheduler-map map-name;
 shaping-rate rate;
 translation-table (to-dscp-from-dscp | to-dscp-ipv6-from-dscp-ipv6 |
 to-exp-from-exp | to-inet-precedence-from-inet-precedence) table-name;
}
}
}
loss-priority-maps {
 frame-relay-de (Defining Loss Priority Maps)name {
 loss-priority level code-points [alias | bits];
 }
}
loss-priority-rewrites {
 frame-relay-de (Defining Loss Priority Maps)name {
 loss-priority level code-point (alias | bits);
 }
}
restricted-queues {
 forwarding-class class-name queue queue-number;
}
rewrite-rules {
 (dscp | dscp-ipv6 | exp | ieee-802.1 | ieee-802.1ad | inet-precedence) rewrite-name {

```

```

import (rewrite-name | default);
forwarding-class class-name {
 loss-priority level code-point (alias | bits);
}
}
routing-instances routing-instance-name {
 classifiers {
 exp (classifier-name | default);
 dscp (classifier-name | default);
 dscp-ipv6 (classifier-name | default);
 }
}
scheduler-maps {
 map-name {
 forwarding-class class-name scheduler scheduler-name;
 }
}
schedulers {
 scheduler-name {
 buffer-size (percent percentage | remainder | temporal microseconds);
 drop-profile-map loss-priority (any | low | medium-low | medium-high | high) protocol
 (any | non-tcp | tcp) drop-profile profile-name;
 excess-priority (low | high);
 excess-rate percent percentage;
 excess-rate (percent percentage | proportion value);
 priority priority-level;
 transmit-rate (rate | percent percentage | remainder) <exact | rate-limit>;
 }
}
system-defaults {
 classifiers (classifier-name | exp)
traffic-control-profiles profile-name {
 delay-buffer-rate (percent percentage | rate);
 excess-rate (percent percentage | proportion value);
 guaranteed-rate (percent percentage | rate);
 overhead-accounting (frame-mode | cell-mode) <bytes byte-value>;
 scheduler-map map-name;
 shaping-rate (percent percentage | rate);
}
translation-table {
 (to-dscp-from-dscp | to-dscp-ipv6-from-dscp-ipv6 | to-exp-from-exp |
 to-inet-precedence-from-inet-precedence) table-name {
 to-code-point value from-code-points (* | [values]);
 }
}
}
tri-color;

```

On Juniper Networks MX Series 3D Universal Edge Routers with Enhanced Queuing DPCs, you can configure the following CoS statements at the **[edit class-of-service interfaces]** hierarchy level:

```

interface-set interface-set-name {
 excess-bandwidth-share (proportional value | equal);
 internal-node;
 traffic-control-profiles profile-name;
}

```

```

 output-traffic-control-profile-remaining profile-name;
}

```

## [edit dynamic-profiles] Hierarchy Level

```

dynamic-profiles {
 profile-name {
 class-of-service {
 interfaces {
 interface-name {
 unit logical-unit-number {
 classifiers {
 type (classifier-name | default);
 }
 output-traffic-control-profile (profile-name |
 $junos-cos-traffic-control-profile);
 rewrite-rules {
 dscp (rewrite-name | default);
 dscp-ipv6 (rewrite-name | default);
 ieee-802.1 (rewrite-name | default) vlan-tag (outer | outer-and-inner);
 inet-precedence (rewrite-name | default);
 }
 }
 }
 }
 }
 }
 scheduler-maps {
 map-name {
 forwarding-class class-name scheduler scheduler-name;
 }
 }
 schedulers {
 (scheduler-name) {
 buffer-size (percent percentage | remainder | temporal microseconds |
 $junos-cos-scheduler-bs);
 drop-profile-map loss-priority (any | low | medium-low | medium-high | high)
 protocol (any | non-tcp | tcp) drop-profile (profile-name | predefined-variable);
 excess-priority (low | high | $junos-cos-scheduler-excess-priority);
 excess-rate (percent percentage | percent $junos-cos-scheduler-excess-rate);
 overhead-accounting (shaping-mode) <bytes (byte-value>;
 priority (priority-level | $junos-cos-scheduler-priority);
 shaping-rate (rate | predefined-variable);
 transmit-rate (rate | percent percentage | remainder | percent percentage
 $junos-cos-scheduler-tx) <exact | rate-limit>;
 }
 }
 traffic-control-profiles profile-name {
 delay-buffer-rate (percent percentage | rate);
 excess-rate (percent percentage | proportion value | percent
 $junos-cos-excess-rate);
 guaranteed-rate (percent percentage | rate);
 overhead-accounting (shaping-mode) <bytes (byte-value>;
 scheduler-map map-name;
 shaping-rate (percent percentage | rate | predefined-variable);
 }
}

```

```
}
firewall {
 family family {
 fast-update-filter filter-name {
 interface-specific;
 }
 match-order [match-order];
 term term-name {
 from {
 match-conditions;
 }
 then {
 action;
 action-modifiers;
 }
 }
 only-at-create;
 }
 filter filter-name {
 interface-specific;
 term term-name {
 from {
 match-conditions;
 }
 then {
 action;
 action-modifiers;
 }
 }
 }
}
policer policer-name {
 filter-specific;
 if-exceeding {
 (bandwidth-limit bps | bandwidth-percent percentage);
 burst-size-limit bytes;
 }
 logical-bandwidth-policer;
 logical-interface-policer;
 physical-interface-policer;
 then {
 policer-action;
 }
}
hierarchical-policer policer-name {
 aggregate {
 if-exceeding {
 bandwidth-limit-limit bps;
 burst-size-limit bytes;
 }
 then {
 policer-action;
 }
 }
}
premium {
 if-exceeding {
 bandwidth-limit bps;
 burst-size-limit bytes;
 }
 then {
 policer-action;
 }
}
```

```

 }
 }
}
three-color-policer policer-name {
 action {
 loss-priority high then discard;
 }
 logical-interface-policer;
 single-rate {
 (color-aware | color-blind);
 committed-burst-size bytes;
 committed-information-rate bps;
 excess-burst-size bytes;
 }
 two-rate {
 (color-aware | color-blind);
 committed-burst-size bytes;
 committed-information-rate bps;
 peak-burst-size bytes;
 peak-information-rate bps;
 }
}
}
}
policy-options {
 prefix-list name {
 ip-addresses;
 dynamic-db;
 }
}
interfaces {
 interface-name {
 unit logical-unit-number {
 family family {
 access-concentrator name;
 address address;
 direct-connect;
 duplicate-protection;
 dynamic-profile profile-name;
 filter {
 adf {
 counter;
 input-precedence precedence;
 not-mandatory;
 output-precedence precedence;
 rule rule-value;
 }
 input filter-name {
 precedence precedence;
 shared-name filter-shared-name;
 }
 output filter-name {
 precedence precedence;
 shared-name filter-shared-name;
 }
 }
 }
 }
 }
}

```

```
max-sessions number;
max-sessions-vsa-ignore;
rpf-check {
 fail-filter filter-name;
 mode loose;
}
service {
 input {
 service-set service-set-name {
 service-filter filter-name;
 }
 post-service-filter filter-name;
 }
 output {
 service-set service-set-name {
 service-filter filter-name;
 }
 }
}
service-name-table table-name;
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
 maximum-seconds>;
unnumbered-address interface-name <preferred-source-address address>;
}
ppp-options {
 chap;
 pap;
}
vlan-id number;
}
vlan-tagging;
}
interface-set interface-set-name {
 interface interface-name {
 unit logical-unit-number;
 }
}
}
demux0 {
 unit logical-unit-number {
 demux-options {
 underlying-interface interface-name
 }
 demux-source {
 source-prefix;
 }
 family family {
 access-concentrator name;
 address address;
 direct-connect;
 duplicate-protection;
 dynamic-profile profile-name;
 filter {
 input filter-name;
 output filter-name;
 }
 mac-validate (loose | strict):
```

```

 max-sessions number;
 max-sessions-vsa-ignore;
 service-name-table table-name;
 short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
 maximum-seconds>;
 unnumbered-address interface-name <preferred-source-address address>;
 }
}
}
pp0 {
 unit logical-unit-number {
 keepalives interval seconds;
 no-keepalives;
 pppoe-options {
 underlying-interface interface-name;
 server;
 }
 ppp-options {
 authentication [authentication-protocols];
 chap {
 challenge-length minimum minimum-length maximum maximum-length;
 }
 pap;
 }
 family inet {
 unnumbered-address interface-name;
 address address;
 service {
 input {
 service-set service-set-name {
 service-filter filter-name;
 }
 post-service-filter filter-name;
 }
 output {
 service-set service-set-name {
 service-filter filter-name;
 }
 }
 }
 filter {
 input filter-name {
 precedence precedence;
 }
 output filter-name {
 precedence precedence;
 }
 }
 }
 }
}
}
protocols {
 igmp {
 interface interface-name {
 accounting;
 }
 }
}

```

```

 disable;
 group-policy;
 immediate-leave
 no-accounting;
 promiscuous-mode;
 ssm-map ssm-map-name;
 static {
 group group {
 source source;
 }
 }
 version version;
}
mld {
 interface interface-name {
 disable;
 (accounting | no-accounting);
 group-policy;
 immediate-leave;
 oif-map;
 passive;
 ssm-map ssm-map-name;
 static {
 group multicast-group-address {
 exclude;
 group-count number;
 group-increment increment;
 source ip-address {
 source-count number;
 source-increment increment;
 }
 }
 }
 version version;
 }
}
router-advertisement {
 interface interface-name {
 current-hop-limit number;
 default-lifetime seconds;
 (managed-configuration | no-managed-configuration);
 max-advertisement-interval seconds;
 min-advertisement-interval seconds;
 (other-stateful-configuration | no-other-stateful-configuration);
 prefix prefix {
 (autonomous | no-autonomous);
 (on-link | no-on-link);
 preferred-lifetime seconds;
 valid-lifetime seconds;
 }
 reachable-time milliseconds;
 retransmit-timer milliseconds;
 }
}
}
}

```



```

}
routing-instances routing-instance-name {
 interface interface-name;
 routing-options {
 access {
 route prefix {
 next-hop next-hop;
 metric route-cost;
 preference route-distance;
 tag route-tag;
 }
 }
 access-internal {
 route subscriber-ip-address {
 qualified-next-hop underlying-interface {
 mac-address address;
 }
 }
 }
 multicast {
 interface interface-name {
 no-qos-adjust;
 }
 }
 }
}
rib routing-table-name {
 access {
 route prefix {
 next-hop next-hop;
 metric route-cost;
 preference route-distance;
 tag route-tag;
 }
 }
 access-internal {
 route subscriber-ip-address {
 qualified-next-hop underlying-interface {
 mac-address address;
 }
 }
 }
}
}
routing-options {
 access {
 route prefix {
 next-hop next-hop;
 metric route-cost;
 preference route-distance;
 tag route-tag;
 }
 }
 access-internal {
 route subscriber-ip-address {
 qualified-next-hop underlying-interface {
 mac-address address;

```

```
 }
 }
}
multicast {
 interface interface-name {
 no-qos-adjust;
 }
}
}
variables {
 variable-name {
 default-value default-value;
 equals expression;
 mandatory;
 uid;
 uid-reference;
 }
}
```

**Related  
Documentation**

- *Dynamic Profiles Overview*
- [CoS for Subscriber Access Overview on page 3](#)
- *Configuring a Basic Dynamic Profile*
- [Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 33](#)
- *Two-Color Policer Configuration Overview*
- *Three-Color Policer Configuration Overview*
- *Hierarchical Policer Configuration Overview*
- *Guidelines for Applying Traffic Policers*

---

## [\[edit services captive-portal-content-delivery\]](#) Hierarchy Level

```
services {
 captive-portal-content-delivery {
 rule rule-name {
 match-direction (input | output | input-output);
 term term-name {
 from {
 application [junos-http, junos-https, junos-httpproxy];
 destination-address address <except>;
 destination-prefix-list list-name <except>;
 }
 then {
 accept;
 redirect <url>;
 rewrite <destination-address address> <destination-port port-number>;
 syslog;
 }
 }
 }
 }
}
```

```

 }
 rule-set rule-set-name {
 [rule rule-name];
 }
}
}

```

- Related Documentation**
- [Notational Conventions Used in Junos OS Configuration Hierarchies](#)
  - [\[edit services\] Hierarchy Level](#)

## [edit services radius-flow-tap] Hierarchy Level

```

services {
 radius-flow-tap {
 forwarding-class class-name;
 interfaces interface-name;
 multicast-interception;
 policy policy-name {
 inet {
 drop-policy rule-name {
 from {
 apply-groups group-name;
 apply-groups-except group-name;
 destination-address address;
 destination-port port-number;
 dscp dscp-value;
 protocol protocol;
 source-address address;
 source-port port-number;
 }
 }
 }
 }
 inet6 {
 drop-policy rule-name {
 from {
 apply-groups group-name;
 apply-groups-except group-name;
 destination-address address;
 destination-port port-number;
 dscp dscp-value;
 protocol protocol;
 source-address address;
 source-port port-number;
 }
 }
 }
 source-ipv4-address ipv4-address;
 }
}

```

- Related Documentation**
- [Subscriber Secure Policy Overview on page 385](#)
  - [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)

## accounting (Dynamic IGMP Interface)

---

|                                 |                                                                                                                                                                                                                                                                             |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | (accounting   no-accounting);                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>igmp interface</b> <i>interface-name</i> ],                                                                                                                                                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                               |
| <b>Description</b>              | Enable or disable the collection of IGMP join and leave event statistics for dynamically created IGMP interfaces.                                                                                                                                                           |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li><li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li><li>• <i>Recording IGMP Join and Leave Events</i></li></ul> |

## accounting (Dynamic MLD Interface)

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|                                 |                                                                                                                                                                                |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | (accounting   no-accounting);                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>mld interface</b> <i>interface-name</i> ]                                                                              |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                 |
| <b>Description</b>              | Enable or disable the collection of MLD join and leave event statistics for a dynamic interface.                                                                               |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li><li>• <i>Example: Recording MLD Join and Leave Events</i></li></ul> |

## action

|                            |                                                                                                                                                                                                                                                                                                                                 |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>action {   loss-priority high then discard; }</pre>                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>     | [edit <a href="#">dynamic-profiles profile-name</a> firewall <a href="#">three-color-policer name</a> ],<br>[edit firewall <a href="#">three-color-policer name</a> ],<br>[edit logical-systems <i>logical-system-name</i> firewall <a href="#">three-color-policer name</a> ]                                                  |
| <b>Release Information</b> | Statement introduced in Junos OS Release 8.2.<br>Logical systems support introduced in Junos OS Release 9.3.<br>Support at the [edit <a href="#">dynamic-profiles ... three-color-policer</a> ] hierarchy level introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches. |
| <b>Description</b>         | Discard traffic on a logical interface using tricolor marking policing.                                                                                                                                                                                                                                                         |



**NOTE:** This statement is supported only on IQ2 interfaces.

The remaining statement is explained separately.

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | firewall—To view this statement in the configuration.<br>firewall-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Three-Color Policer Configuration Overview</i></li> <li>• <i>Basic Single-Rate Three-Color Policers</i></li> <li>• <i>Basic Two-Rate Three-Color Policers</i></li> <li>• <i>Two-Color and Three-Color Logical Interface Policers</i></li> <li>• <i>Two-Color and Three-Color Physical Interface Policers</i></li> <li>• <i>Two-Color and Three-Color Policers at Layer 2</i></li> <li>• <a href="#">loss-priority high then discard on page 604</a></li> </ul> |

## adf (Dynamic Firewalls)

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|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                   | <pre>adf {<br/>    counter;<br/>    input-precedence <i>precedence</i>;<br/>    not-mandatory;<br/>    output-precedence <i>precedence</i>;<br/>    rule <i>rule-value</i>;<br/>}</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Hierarchy Level          | [edit <a href="#">dynamic-profiles profile-name interfaces interface-name unit logical-unit-number family family filter</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Release Information      | Statement introduced in Junos OS Release 10.4.<br>Option <b>not-mandatory</b> introduced in Junos OS Release 12.2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Description              | Configure an Ascend-Data-Filter that the dynamic profile applies to a subscriber session.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Options                  | <p><b>counter</b>—Enable a counter that increments each time the Ascend-Data-Filter rule is used. Typically used for testing purposes.</p> <p><b>not-mandatory</b>—Suppress router from reporting an error when the RADIUS reply message does not include the \$junos-adf-rule-v4 or \$junos-adf-rule-v6 variable that is configured for the Ascend-Data-Filter in the dynamic profile. In this circumstance, the Ascend-Data-Filter is not created.</p> <p><b>precedence</b>—Precedence value that sets the order in which dynamic service filters are applied on the interface. The lower the precedence value, the higher the precedence that is given. The precedence setting is used in conjunction with the precedence settings of all dynamic service filters configured (not only Ascend-Data-Filters) on the same interface to establish the order. For example, the order also includes any configured <b>input filter-name precedence precedence</b> and <b>output filter-name precedence precedence</b> statements.</p> <p><b>Range:</b> 0 through 255</p> <p><b>Default:</b> 0</p> <p><b>rule-value</b>—Ascend-Data-Filter rule. You can specify either a Junos predefined variable that maps the Ascend-Data-Filter actions to Junos filter functionality or you can manually configure the Ascend-Data-Filter rule. The router supports two predefined variables depending on family type: <b>\$junos-adf-rule-v4</b> for family <b>inet</b> and <b>\$junos-adf-rule-v6</b> for family <b>inet6</b>.</p> |
| Required Privilege Level | <b>interface</b> —To view this statement in the configuration.<br><b>interface-control</b> —To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Related Documentation    | <ul style="list-style-type: none"><li>• <a href="#">Understanding Dynamic Firewall Filters on page 249</a></li><li>• <a href="#">Classic Filters Overview on page 253</a></li><li>• <a href="#">Basic Classic Filter Syntax on page 256</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

- *Guidelines for Configuring Service Filters*

## adjustment-control-profiles

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>adjustment-control-profiles {   profile-name {     application {       ancp;       radius-coa;       pppoe-tags;     }   } }</pre>                                                                                                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit class-of-service]                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 13.2.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>              | Configure the CoS adjustment control profile.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Options</b>                  | <p><b><i>profile-name</i></b>—Name of the adjustment control profile.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                                                                                                                                                 |
| <b>Required Privilege Level</b> | <p>interfaces—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">CoS Adjustment Control Profiles Overview on page 189</a></li> <li>• <a href="#">Configuring CoS Adjustment Control Profiles on page 191</a></li> <li>• <a href="#">Verifying the CoS Adjustment Control Profile Configuration on page 191</a></li> <li>• <a href="#">application (Adjustment Control Profiles) on page 496</a></li> <li>• <a href="#">overhead-accounting (Dynamic Traffic Shaping) on page 614</a></li> </ul> |

## adjust-minimum (Dynamic Shaping and Scheduling)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>adjust-minimum (rate   \$junos-cos-adjust-minimum);</code>                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> class-of-service <a href="#">schedulers scheduler-name</a> ],<br>[edit dynamic-profiles <i>profile-name</i> class-of-service <a href="#">traffic-control-profiles traffic-control-profile-name</a> ]                                                                                                                                                                                                                                    |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>              | <p>For adjustments performed by the ANCP or multicast applications on EQ DPCs and MPC/MIC interfaces, specify the minimum shaping rate for an adjusted scheduler node. The node is associated with a traffic-control profile.</p> <p>For adjustments performed by the multicast application on MPC/MIC interfaces, specify the minimum shaping rate for an adjusted queue. The queue is associated with a scheduler.</p>                                                           |
| <b>Options</b>                  | <p><b>rate</b>—Minimum shaping rate for a node or a queue, in Mbps</p> <p><b>\$junos-cos-adjust-minimum</b>—Junos OS predefined variable that is replaced with the minimum shaping rate for a node that is obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached. Use this variable at the [edit dynamic-profiles <i>profile-name</i> class-of-service <b>traffic-control-profiles</b>] hierarchy level.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring a Dynamic Minimum Adjusted Shaping Rate on Scheduler Nodes on page 106</a></li><li>• <a href="#">Configuring a Dynamic Shaping-Rate Adjustment for Queues on page 107</a></li></ul>                                                                                                                                                                                                                                |



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## adjust-percent (Dynamic Schedulers)

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|                                 |                                                                                                                                        |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | adjust-percent <i>percentage</i> ;                                                                                                     |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> class-of-service schedulers <i>scheduler-name</i> ]                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.4.                                                                                         |
| <b>Description</b>              | For a MPC/MIC interface, determine the percentage of adjustment for the shaping rate of a queue.                                       |
| <b>Options</b>                  | <b><i>percentage</i></b> —Percentage of the shaping rate to adjust.<br><b>Range:</b> 0 through 100 percent                             |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring a Dynamic Shaping-Rate Adjustment for Queues on page 107</a></li></ul> |

## aggregate (Hierarchical Policier)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>aggregate {<br/>    if-exceeding {<br/>        bandwidth-limit <i>bandwidth</i>;<br/>        burst-size-limit <i>burst</i>;<br/>    }<br/>    then {<br/>        discard;<br/>    }<br/>}</pre>                                                                                                                                                                                                                                                                     |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles profile-name</a> firewall <a href="#">hierarchical-policer name</a> ],<br>[edit firewall <a href="#">hierarchical-policer</a> ]                                                                                                                                                                                                                                                                                                       |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.5.<br>Support at the [edit <a href="#">dynamic-profiles ... hierarchical-policer name</a> ] hierarchy level introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                                              |
| <b>Description</b>              | <p>On M40e, M120, and M320 edge routers with Flexible PIC Concentrator (FPC) input as FFPC and FPC output as SFPC, and on MX Series, T320, T640, and T1600 edge routers with Enhanced Intelligent Queuing (IQE) PICs, T4000 routers with Type 5 FPC and Enhanced Scaling Type 4 FPC, configure an aggregate hierarchical policer.</p> <p>The remaining statements are explained separately.</p>                                                                          |
| <b>Required Privilege Level</b> | firewall—To view this statement in the configuration.<br>firewall-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Hierarchical Policier Configuration Overview</i></li><li>• <i>Hierarchical Policers</i></li><li>• <i>bandwidth-limit (Hierarchical Policier)</i></li><li>• <a href="#">burst-size-limit (Hierarchical Policier) on page 507</a></li><li>• <a href="#">hierarchical-policer on page 574</a></li><li>• <a href="#">if-exceeding (Hierarchical Policier) on page 579</a></li><li>• <a href="#">premium on page 629</a></li></ul> |

## ancp (Adjustment Control Profiles)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> ancp {     priority <i>priority</i>;     algorithm <i>algorithm</i>; } </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit class-of-service <a href="#">adjustment-control-profiles</a> <i>profile-name</i> <a href="#">application</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 13.1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>              | Configure the shaping rate adjustment controls for the ANCP application.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Options</b>                  | <p><b><i>priority</i></b>—Priority of the ANCP application in the adjustment control profile.</p> <p><b>Range:</b> 1 through 10; 1 being the highest priority.</p> <p><b>Default:</b> 1</p> <p><b><i>algorithm</i></b>—Rate adjustment algorithm used by the ANCP application.</p> <p><b>Values:</b></p> <ul style="list-style-type: none"> <li>• <b>adjust-never</b>—Do not perform rate adjustments.</li> <li>• <b>adjust-always</b>—Adjust the shaping rate unconditionally.</li> <li>• <b>adjust-less</b>—Adjust the shaping rate if it is less than the configured value.</li> <li>• <b>adjust-less-or-equal</b>—Adjust the shaping rate if it is less than or equal to the configured value.</li> <li>• <b>adjust-greater</b>—Adjust the shaping rate if it is greater than the configured value.</li> <li>• <b>adjust-greater-or-equal</b>—Adjust the shaping rate if it is greater than or equal to the configured value.</li> </ul> <p><b>Default:</b> adjust-always</p> |
| <b>Required Privilege Level</b> | <p><b>interfaces</b>—To view this statement in the configuration.</p> <p><b>interface-control</b>—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">CoS Adjustment Control Profiles Overview on page 189</a></li> <li>• <a href="#">Configuring CoS Adjustment Control Profiles on page 191</a></li> <li>• <a href="#">Verifying the CoS Adjustment Control Profile Configuration on page 191</a></li> <li>• <a href="#">adjustment-control-profiles on page 491</a></li> <li>• <a href="#">application (Adjustment Control Profiles) on page 496</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## application (Adjustment Control Profiles)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>application {<br/>    ancp;<br/>    radius-coa;<br/>    pppoe-tags;<br/>}</pre>                                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit class-of-service <a href="#">adjustment-control-profiles</a> <i>profile-name</i> ]                                                                                                                                                                                                                                                                                    |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 13.1.                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b>              | <p>Configure which applications in the adjustment control profile can make shaping rate adjustments.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                          |
| <b>Required Privilege Level</b> | <p>interfaces—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">CoS Adjustment Control Profiles Overview on page 189</a></li><li>• <a href="#">Configuring CoS Adjustment Control Profiles on page 191</a></li><li>• <a href="#">Verifying the CoS Adjustment Control Profile Configuration on page 191</a></li><li>• <a href="#">adjustment-control-profiles on page 491</a></li></ul> |

## application (Captive Portal Content Delivery)

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|                                 |                                                                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>application <i>application-name</i>;</pre>                                                                                                         |
| <b>Hierarchy Level</b>          | [edit services captive-portal-content-delivery rule <i>rule-name</i> term <i>term-name</i> <a href="#">from (Captive Portal Content Delivery)</a> ]     |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.4.                                                                                                          |
| <b>Description</b>              | Identify the application for inclusion in a rule.                                                                                                       |
| <b>Options</b>                  | <i>application-name</i> —Application for rule to match, <a href="#">junos-http</a> , <a href="#">junos-https</a> , or <a href="#">junos-httpproxy</a> . |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Redirecting HTTP Requests Overview on page 353</a></li></ul>                                        |

## apply-groups (Subscriber Secure Policy)

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|                                 |                                                                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>apply-groups <i>group-name</i>;</code>                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit services <a href="#">radius-flow-tap policy <i>policy-name</i> inet drop-policy <i>rule-name</i> from</a> ],<br>[edit services <a href="#">radius-flow-tap policy <i>policy-name</i> inet6 drop-policy <i>rule-name</i> from</a> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3.                                                                                                                                                                                           |
| <b>Description</b>              | Specify groups from which to inherit configuration data for the radius-flow-tap policy.                                                                                                                                                  |
| <b>Options</b>                  | <i>group-name</i> — Name of the group that inherits the configuration data.                                                                                                                                                              |
| <b>Required Privilege Level</b> | flow-tap—To view this statement in the configuration.<br>flow-tap-control—To add this statement to the configuration.                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Subscriber Secure Policy Overview on page 385</a></li> <li>• <a href="#">Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390</a></li> </ul>        |

## apply-groups-except (Subscriber Secure Policy)

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|                                 |                                                                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>apply-groups-except <i>group-name</i>;</code>                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit services <a href="#">radius-flow-tap policy <i>policy-name</i> inet drop-policy <i>rule-name</i> from</a> ],<br>[edit services <a href="#">radius-flow-tap policy <i>policy-name</i> inet6 drop-policy <i>rule-name</i> from</a> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3.                                                                                                                                                                                           |
| <b>Description</b>              | Specify groups from which to inherit configuration data for the radius-flow-tap policy.                                                                                                                                                  |
| <b>Options</b>                  | <i>group-name</i> — Name of the group that does not inherit the configuration data.                                                                                                                                                      |
| <b>Required Privilege Level</b> | flow-tap—To view this statement in the configuration.<br>flow-tap-control—To add this statement to the configuration.                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Subscriber Secure Policy Overview on page 385</a></li> <li>• <a href="#">Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390</a></li> </ul>        |

## authentication (Login)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>authentication {<br/>  (encrypted-password "password"   plain-text-password);<br/>  load-key-file URL filename;<br/>  ssh-dsa "public-key";<br/>  ssh-ecdsa "public-key";<br/>  ssh-rsa "public-key";<br/>}</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit system login <b>user</b> <i>username</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 9.0 for EX Series switches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>              | Authentication methods that a user can use to log in to the router or switch. You can assign multiple authentication methods to a single user.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Options</b>                  | <p><b>encrypted-password "password"</b>—Message Digest 5 (MD5) or other encrypted authentication. Specify the MD5 or other password. You can specify only one encrypted password for each user.</p> <p>You cannot configure a blank password for <b>encrypted-password</b> using blank quotation marks (" "). You must configure a password whose number of characters range from 1 through 128 characters and enclose the password in quotation marks.</p> <p><b>load-key-file URL filename</b>—Load previously-generated RSA (SSH version 1 and SSH version 2) and DSA (SSH version 2) public keys from a named file at a specified URL location. The file contains one or more SSH keys.</p> <p><b>plain-text-password</b>—When using this option, the command-line interface (CLI) prompts you for the password and then encrypts it.</p> <p><b>ssh-dsa "public-key"</b>—SSH version 2 authentication. Specify the DSA public key. You can specify one or more public keys for each user.</p> <p><b>ssh-ecdsa "public-key"</b>—SSH version 2 authentication. Specify the ECDSA public key. You can specify one or more public keys for each user.</p> <p><b>ssh-rsa "public-key"</b>—SSH version 1 and SSH version 2 authentication. Specify the RSA public key. You can specify one or more public keys for each user.</p> |
| <b>Required Privilege Level</b> | <b>admin</b> —To view this statement in the configuration.<br><b>admin-control</b> —To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Junos OS User Accounts</i></li><li>• <i>root-authentication</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## authentication-order

|                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                                                                                                                                                                                                                                               | <code>authentication-order [ <i>authentication-methods</i> ];</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>                                                                                                                                                                                                                                                                                                                                                                                                                      | <code>[edit access <i>profile</i> <i>profile-name</i>]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Release Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                  | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 9.0 for EX Series switches.<br>Option <b>none</b> introduced in Junos OS Release 11.2.                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                          | Set the order in which the Junos OS tries different authentication methods when verifying that a client can access the router or switch. For each login attempt, the software tries the authentication methods in order, from first to last.                                                                                                                                                                                                                                                                                                                                  |
| <b>Default</b>                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>password</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Options</b>                                                                                                                                                                                                                                                                                                                                                                                                                              | <p><b><i>authentication-methods</i></b></p> <ul style="list-style-type: none"> <li>• <b>none</b>—Grants authentication without examining the client credentials. Can be used, for example, when the Diameter function Gx-Plus is employed for notification during subscriber provisioning.</li> <li>• <b>password</b>—Verify the client using the information configured at the <code>[edit access profile <i>profile-name</i> client <i>client-name</i>]</code> hierarchy level.</li> <li>• <b>radius</b>—Verify the client using RADIUS authentication services.</li> </ul> |
| <div style="display: flex; align-items: center;">  <div> <p><b>NOTE:</b> For subscriber access management, you must always specify the <b>radius</b> method. Subscriber access management does not support the <b>password</b> option (the default), and authentication fails when no method is specified.</p> </div> </div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Required Privilege Level</b>                                                                                                                                                                                                                                                                                                                                                                                                             | <p><b>admin</b>—To view this statement in the configuration.</p> <p><b>admin-control</b>—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Related Documentation</b>                                                                                                                                                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"> <li>• <i>Example: Configuring CHAP Authentication with RADIUS</i></li> <li>• <i>Specifying the Authentication and Accounting Methods for Subscriber Access</i></li> <li>• <i>Configuring Access Profiles for L2TP or PPP Parameters</i></li> </ul>                                                                                                                                                                                                                                                                                         |

## authentication-server

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|                                 |                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | authentication-server [ <i>ip-address</i> ];                                                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit access <a href="#">profile</a> <i>profile-name</i> <a href="#">radius</a> ]                                                                                                                                                                                                                                       |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.1.                                                                                                                                                                                                                                                                           |
| <b>Description</b>              | Specify a list of the RADIUS authentication servers used to authenticate DHCP, L2TP, and PPP clients. The servers in the list are also used as RADIUS dynamic-request servers, from which the router accepts and processes RADIUS disconnect requests, CoA requests, and dynamic service activations and deactivations. |
| <b>Options</b>                  | <i>ip-address</i> —IPv4 address.                                                                                                                                                                                                                                                                                        |
| <b>Required Privilege Level</b> | admin—To view this statement in the configuration.<br>admin-control—To add this statement to the configuration.                                                                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring RADIUS Server Parameters for Subscriber Access</i></li></ul>                                                                                                                                                                                                     |



## bandwidth (Tunnel Services)

|                            |                                                                                                                                                                                                                                                                                                              |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <code>bandwidth <i>bandwidth-value</i>;</code>                                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>     | <code>[edit chassis fpc <i>slot-number</i> pic <i>number</i> <b>tunnel-services</b>]</code>                                                                                                                                                                                                                  |
| <b>Release Information</b> | Statement introduced in Junos OS Release 8.2.                                                                                                                                                                                                                                                                |
| <b>Description</b>         | (MX Series 3D Universal Edge Routers and T4000 Core Routers only) Specify the amount of bandwidth in gigabits per second to reserve for tunnel services.                                                                                                                                                     |
| <b>Options</b>             | <i>bandwidth-value</i> —Define the amount of bandwidth in gigabits per second to reserve for tunnel services. On MX Series routers, the bandwidth values can be <b>1g</b> , <b>10g</b> , <b>20g</b> , or <b>40g</b> . On T4000 routers, the bandwidth values are multiples of <b>10g</b> up to <b>100g</b> . |




**NOTE:** The bandwidth that you specify determines the port number of the tunnel interfaces that are created. When you specify a bandwidth of **1g**, the port number is always 10. When you specify any other bandwidth, the port number is always 0.



**NOTE:** If you specify a bandwidth that is not compatible with the type of DPCs or MPCs and their respective Packet Forwarding Engine, tunnel services are not activated. For example, you cannot specify 1 gigabit per second bandwidth for a Packet Forwarding Engine on a 10-Gigabit Ethernet 4-port DPC.

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Example: Configuring Tunnel Interfaces on a Gigabit Ethernet 40-Port DPC</i></li> <li>• <i>Configuring Tunnel Interfaces on MX Series Routers</i></li> <li>• <i>Configuring Tunnel Interfaces on T4000 Routers</i></li> <li>• <i>Example: Configuring Tunnel Interfaces on a 10-Gigabit Ethernet 4-Port DPC</i></li> <li>• <i>Example: Configuring Tunnel Interfaces on the MPC3E</i></li> <li>• <i>Configuring Layer 3 Tunnel Services Interfaces on an MX Series Router with a DPC</i></li> <li>• <a href="#">tunnel-services (Chassis) on page 678</a></li> <li>• <i>[edit chassis] Hierarchy Level</i></li> </ul> |

## bandwidth-limit (Policer)

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <code>bandwidth-limit <i>bps</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>     | [edit <code>dynamic-profiles <i>profile-name</i> firewall <b>policer</b> <i>policer-name</i> if-exceeding</code> ],<br>[edit firewall <code><b>policer</b> <i>policer-name</i> if-exceeding</code> ],<br>[edit logical-systems <code><i>logical-system-name</i> <b>policer</b> <i>policer-name</i> if-exceeding</code> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b> | Statement introduced before Junos OS Release 7.4.<br>Support at the [edit <code>dynamic-profiles ... if-exceeding</code> ] hierarchy level introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b>         | <p>For a single-rate two-color policer, configure the bandwidth limit as a number of bits per second. Single-rate two-color policing uses the single token bucket algorithm to measure traffic-flow conformance to a two-color policer rate limit.</p> <p>Traffic at the interface that conforms to the bandwidth limit is categorized green. Traffic that exceeds the specified rate is also categorized as green provided that sufficient tokens remain in the single token bucket. Packets in a green flow are implicitly marked with <b>low</b> packet loss priority (PLP) and then passed through the interface.</p> <p>Traffic that exceeds the specified rate when insufficient tokens remain in the single token bucket is categorized red. Depending on the configuration of the two-color policer, packets in a red traffic flow might be implicitly discarded; or the packets might be re-marked with a specified forwarding class, a specified PLP, or both, and then passed through the interface.</p> <div style="border: 1px solid #ccc; padding: 10px; margin-top: 10px;"> <p> <b>NOTE:</b> This statement specifies the bandwidth limit as an absolute number of bits per second. Alternatively, for single-rate two-color policers only, you can use the <code>bandwidth-percent <i>percentage</i></code> statement to specify the bandwidth limit as a percentage of either the physical interface port speed or the configured logical interface shaping rate.</p> </div> <p>Single-rate two-color policing allows bursts of traffic for short periods, whereas single-rate and two-rate three-color policing allows more sustained bursts of traffic.</p> <p>Hierarchical policing is a form of two-color policing that applies different policing actions based on whether the packets are classified for expedited forwarding (EF) or for a lower priority. You apply a hierarchical policer to ingress Layer 2 traffic to allow bursts of EF traffic for short period and bursts of non-EF traffic for short periods, with EF traffic always taking precedence over non-EF traffic.</p> |
| <b>Options</b>             | <p><b><i>bps</i></b>—You can specify the number of bits per second either as a decimal number or as a decimal number followed by the abbreviation <b>k</b> (1000), <b>m</b> (1,000,000), or <b>g</b> (1,000,000,000).</p> <p><b>Range:</b> (M Series, MX Series, and T Series routers) 8000 through 100,000,000,000</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

**Default:** None.

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

**Related Documentation**

- *Two-Color Policer Configuration Overview*
- *Policer Bandwidth and Burst-Size Limits*
- *Policer Color-Marking and Actions*
- *Single Token Bucket Algorithm*
- *Determining Proper Burst Size for Traffic Policers*
- [bandwidth-percent on page 504](#)
- [burst-size-limit \(Policer\) on page 508](#)

## bandwidth-percent

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <code>bandwidth-percent <i>percentage</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Hierarchy Level</b>     | [edit <code>dynamic-profiles <i>profile-name</i> firewall <b>policer</b> <i>policer-name</i> if-exceeding</code> ],<br>[edit firewall <code><b>policer</b> <i>policer-name</i> if-exceeding</code> ],<br>[edit logical-systems <code><i>logical-system-name</i> <b>policer</b> <i>policer-name</i> if-exceeding</code> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Release Information</b> | Statement introduced before Junos OS Release 7.4.<br>Support at the [edit <code>dynamic-profiles ... if-exceeding</code> ] hierarchy level introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>         | For a single-rate two-color policer, configure the bandwidth limit as a percentage value. Single-rate two-color policing uses the <i>single token bucket algorithm</i> to measure traffic-flow conformance to a two-color policer rate limit.<br><br>Traffic at the interface that conforms to the bandwidth limit is categorized green. Traffic that exceeds the specified rate is also categorized as green provided that sufficient tokens remain in the single token bucket. Packets in a green flow are implicitly marked with <b>low</b> packet loss priority and then passed through the interface.<br><br>Traffic that exceeds the specified rate when insufficient tokens remain in the single token bucket is categorized red. Depending on the configuration of the two-color policer, packets in a red traffic flow might be implicitly discarded; or the packets might be re-marked with a specified forwarding class, a specified PLP, or both, and then passed through the interface. |



**NOTE:** This statement specifies the bandwidth limit as a percentage of either the physical interface port speed or the configured logical interface shaping rate. Alternatively, you can use the `bandwidth-limit bps` statement to specify the bandwidth limit as an absolute number of bits per second.

The function of the bandwidth limit is extended by the burst size (configured using the `burst-size-limit bytes` statement) to allow bursts of traffic up to a limit based on the overall traffic load:

- When a single-rate two-color policer is applied to the input or output traffic at an interface, the initial capacity for traffic bursting is equal to the number of bytes specified by this statement.
- During periods of relatively low traffic (traffic that arrives at or departs from the interface at overall rates below the token arrival rate), unused tokens accumulate in the bucket, but only up to the configured token bucket depth.

Single-rate two-color policing allows bursts of traffic for short periods, whereas single-rate and two-rate three-color policing allows more sustained bursts of traffic.

Hierarchical policing is a form of two-color policing that applies different policing actions based on whether the packets are classified for expedited forwarding (EF) or for a lower priority. You apply a hierarchical policer to ingress Layer 2 traffic to allow bursts of EF traffic for short periods and bursts of non-EF traffic for short periods, with EF traffic always taking precedence over non-EF traffic.

**Options** *percentage*—Traffic rate as a percentage of either the physical interface media rate or the logical interface configured shaping rate. You can configure a shaping rate on a logical interface by using class-of-service statement.



**NOTE:** You cannot rate-limit based on bandwidth percentage for tunnel or software interfaces. The bandwidth percentage policer also cannot be used for forwarding table filters. Bandwidth percentage policers can only be used for interface-specific filters. Bandwidth percentage policers applied on an aggregated Ethernet bundle or an aggregated SONET bundle *do* match the effective bandwidth and burst-size to user-configured values by default and do not require shared-bandwidth-policer configuration.

**Range:** 0 through 100

**Default:** None.

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

- Related Documentation**
- *Two-Color Policer Configuration Overview*
  - *Policer Bandwidth and Burst-Size Limits*
  - *Policer Color-Marking and Actions*
  - *Single Token Bucket Algorithm*
  - *Determining Proper Burst Size for Traffic Policers*
  - *Bandwidth Policers*
  - [bandwidth-limit \(Policer\) on page 502](#)
  - [burst-size-limit \(Policer\) on page 508](#)

## buffer-size (Dynamic Scheduling)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>buffer-size (percent (<i>percentage</i>   \$junos-cos-scheduler-bs)   remainder   temporal (<i>microseconds</i>   \$junos-cos-scheduler-bs));</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> <a href="#">schedulers</a> <i>scheduler-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.3.<br>The <code>\$junos-cos-scheduler-bs</code> predefined variable introduced in Junos OS Release 9.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b>              | Specify buffer size.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Default</b>                  | If you do not include this statement, the default scheduler transmission rate and buffer size percentages for queues 0 through 7 are 95, 0, 0, 5, 0, 0, 0, and 0 percent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Options</b>                  | <p><b>percent <i>percentage</i></b>—Buffer size as a percentage of total buffer.</p> <p><b>remainder</b>—Remaining buffer available.</p> <p><b>temporal <i>microseconds</i></b>—Buffer size as a temporal value. The queuing algorithm starts dropping packets when it queues more than a computed number of bytes. This maximum is computed by multiplying the logical interface speed by the configured temporal value.</p> <p><b>Range:</b> The ranges vary by platform as follows:</p> <ul style="list-style-type: none"><li>• For IQ PICs on M320 routers: 1 through 50,000 microseconds.</li><li>• For IQ PICs on other M Series routers: 1 through 100,000 microseconds.</li><li>• For other M Series routers: 1 through 200,000 microseconds.</li></ul> <p><b>\$junos-scheduler-bs</b>—Junos predefined variable that is replaced with the buffer size obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> |
| <b>Required Privilege Level</b> | <b>interface</b> —To view this statement in the configuration.<br><b>interface-control</b> —To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li><li>• <a href="#">Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13</a></li><li>• <a href="#">scheduler (Dynamic Scheduler Maps) on page 647</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## burst-size-limit (Hierarchical Policer)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>burst-size-limit bytes;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles profile-name</a> firewall <a href="#">hierarchical-policer aggregate if-exceeding</a> ],<br>[edit <a href="#">dynamic-profiles profile-name</a> firewall <a href="#">hierarchical-policer premium if-exceeding</a> ],<br>[edit firewall <a href="#">hierarchical-policer aggregate if-exceeding</a> ],<br>[edit firewall <a href="#">hierarchical-policer premium if-exceeding</a> ]                                                                                                                                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.5.<br>Support at the [edit <a href="#">dynamic-profiles ... if exceeding</a> ] hierarchy level introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>              | On M40e, M120, and M320 (with FFPC and SFPC) edge routers; on MPCs hosted on MX Series routers; on T320, T640, and T1600 core routers with Enhanced Intelligent Queuing (IQE) PICs; and on T4000 routers with Type 5 FPC and Enhanced Scaling Type 4 FPC, configure the burst-size limit for premium or aggregate traffic in a hierarchical policer.                                                                                                                                                                                                                                              |
| <b>Options</b>                  | <b>bytes</b> —Burst-size limit in bytes. The minimum recommended value is the maximum transmission unit (MTU) of the IP packets being policed. You can specify the value either as a complete decimal number or as a decimal number followed by the abbreviation <b>k</b> (1000), <b>m</b> (1,000,000), or <b>g</b> (1,000,000,000).<br><b>Range:</b> 1500 through 2,147,450,880 (1500 through 100,000,000,000 on MPCs hosted on MX Series routers)                                                                                                                                               |
| <b>Required Privilege Level</b> | <b>firewall</b> —To view this statement in the configuration.<br><b>firewall-control</b> —To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Hierarchical Policer Configuration Overview</i></li> <li>• <i>Policer Bandwidth and Burst-Size Limits</i></li> <li>• <i>Policer Color-Marking and Actions</i></li> <li>• <i>Single Token Bucket Algorithm</i></li> <li>• <i>Determining Proper Burst Size for Traffic Policers</i></li> <li>• <i>Hierarchical Policers</i></li> <li>• <a href="#">aggregate (Hierarchical Policer) on page 494</a></li> <li>• <a href="#">bandwidth-limit (Hierarchical Policer)</a></li> <li>• <a href="#">premium (Hierarchical Policer) on page 629</a></li> </ul> |

## burst-size-limit (Policer)

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|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <code>burst-size-limit bytes;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>     | <code>[edit dynamic-profiles profile-name firewall policer policer-name if-exceeding]</code> ,<br><code>[edit firewall policer policer-name if-exceeding]</code> ,<br><code>[edit logical-systems logical-system-name policer policer-name if-exceeding]</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Release Information</b> | Statement introduced before Junos OS Release 7.4.<br>Support at the <code>[edit dynamic-profiles ... if-exceeding]</code> hierarchy level introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b>         | <p>For a single-rate two-color policer, configure the burst size as a number of bytes. The burst size allows for short periods of traffic bursting (back-to-back traffic at average rates that exceed the configured bandwidth limit). Single-rate two-color policing uses the <i>single token bucket algorithm</i> to measure traffic-flow conformance to a two-color policer rate limit.</p> <p>Traffic at the interface that conforms to the bandwidth limit is categorized green. Traffic that exceeds the specified rate is also categorized as green provided that sufficient tokens remain in the single token bucket. Packets in a green flow are implicitly marked with <b>low</b> packet loss priority and then passed through the interface.</p> <p>Traffic that exceeds the specified rate when insufficient tokens remain in the single token bucket is categorized red. Depending on the configuration of the two-color policer, packets in a red traffic flow might be implicitly discarded; or the packets might be re-marked with a specified forwarding class, a specified PLP, or both, and then passed through the interface.</p> <p>The burst size extends the function of the bandwidth limit (configured using either the <b>bandwidth-limit bps</b> statement or the <b>bandwidth-percent percentage</b> statement) to allow bursts of traffic up to a limit based on the overall traffic load:</p> <ul style="list-style-type: none"><li>• When a single-rate two-color policer is applied to the input or output traffic at an interface, the initial capacity for traffic bursting is equal to the number of bytes specified by this statement.</li><li>• During periods of relatively low traffic (traffic that arrives at or departs from the interface at overall rates below the token arrival rate), unused tokens accumulate in the bucket, but only up to the configured token bucket depth.</li></ul> <p>Single-rate two-color policing allows bursts of traffic for short periods, whereas single-rate and two-rate three-color policing allows more sustained bursts of traffic.</p> <p>Hierarchical policing is a form of two-color policing that applies different policing actions based on whether the packets are classified for expedited forwarding (EF) or for a lower priority. You apply a hierarchical policer to ingress Layer 2 traffic to allow bursts of EF traffic for short period and bursts of non-EF traffic for short periods, with EF traffic always taking precedence over non-EF traffic.</p> |



Table 51 on page 509 summarizes the relationship between the **bandwidth-limit** and the token arrival rate. This information is useful in calculating the minimum **burst-size-limit**.

**Table 51: Bandwidth Limits and Token Rates**

| Bandwidth Limit     | Token Rate         |
|---------------------|--------------------|
| 0-333 Mbps          | low (262 $\mu$ s)  |
| 334-666 Mbps        | high (8.2 $\mu$ s) |
| 667-1333 Mbps       | low                |
| 1334 Mbps and above | high               |

The burst-size limit enforced is based on the burst-size limit you configure. For a rate-limited logical interface, the Packet Forwarding Engine calculates the optimum burst-size-limit values and then applies the value closest to the burst-size-limit value specified in the policer configuration.

On MX Series routers and EX Series switches, the burst-size limit is not as freely configurable as it is on other platforms. Junos OS does not support an unlimited combination of policer bandwidth and burst-size limits on MX Series routers and EX Series switches. For a single-rate two-color policer on an MX Series router and on an EX Series switch, the minimum supported burst-size limit is equivalent to the amount of traffic allowed by the policer bandwidth limit in a time span of 1 millisecond. For example, for a policer configured with a **bandwidth-limit** value of 1 Gbps, the minimum supported value for **burst-size-limit** on an MX Series router is 125 KB. If you configure a value that is smaller than the minimum, Junos OS overrides the configuration and applies the actual minimum.

**Options** **bytes**—Burst-size limit in bytes. The minimum recommended value is the maximum transmission unit (MTU) of the IP packets being policed. You can specify the value either as a complete decimal number or as a decimal number followed by the abbreviation **k** (1000), **m** (1,000,000), or **g** (1,000,000,000).


**Range:** 1500 through 100,000,000,000

**Default:** None

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

- Related Documentation**
- [Two-Color Policer Configuration Overview](#)
  - [Policer Bandwidth and Burst-Size Limits](#)
  - [Policer Color-Marking and Actions](#)
  - [Single Token Bucket Algorithm](#)
  - [Determining Proper Burst Size for Traffic Policers](#)
  - [bandwidth-limit \(Policer\) on page 502](#)
  - [bandwidth-percent on page 504](#)

## bytes (Dynamic Traffic Shaping)

|                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                                                                                                                                                                                                         | <code>bytes bytes   \$junos-cos-byte-adjust;</code>                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>                                                                                                                                                                                                                                                                                                                                                                                | [edit <a href="#">dynamic-profiles profile-name class-of-service traffic-control-profiles profile-name overhead-accounting</a> ],<br>[edit <a href="#">class-of-service traffic-control-profiles profile-name overhead-accounting</a> ]                                                                                                                                                                                    |
| <b>Release Information</b>                                                                                                                                                                                                                                                                                                                                                                            | Statement introduced in Junos OS Release 10.2.                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                    | Configure the number of overhead bytes.                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Options</b>                                                                                                                                                                                                                                                                                                                                                                                        | <b>bytes</b> —Byte adjustment value for the <b>cell-mode</b> or <b>frame-mode</b> shaping options. This can be the predefined variable <b>\$junos-cos-byte-adjust</b> , which is the variable for byte adjustment that is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.                                               |
| <div>  <p><b>BEST PRACTICE:</b> We recommend using the <a href="#">cell-mode</a> <code>cell-mode-bytes</code> <a href="#">cell-mode-bytes</a> option or the <a href="#">frame-mode</a> <code>frame-mode-bytes</code> <a href="#">frame-mode-bytes</a> option rather than the <code>bytes</code> option.</p> </div> |                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Required Privilege Level</b>                                                                                                                                                                                                                                                                                                                                                                       | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                    |
| <b>Related Documentation</b>                                                                                                                                                                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>• <a href="#">CoS Adjustment Control Profiles Overview on page 189</a></li> <li>• <a href="#">Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 121</a></li> <li>• <a href="#">Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 119</a></li> <li>• <a href="#">egress-shaping-overhead</a></li> </ul> |

## captive-portal-content-delivery (Captive Portal Content Delivery)

```
Syntax captive-portal-content-delivery {
 rule rule-name {
 match-direction (input | output | input-output);
 term term-name {
 from {
 application [junos-http, junos-https, junos-httpproxy];
 destination-address address <except>;
 destination-prefix-list list-name <except>;
 }
 then {
 accept;
 redirect <url>;
 rewrite <destination-address address> <destination-port port-number>;
 syslog;
 }
 }
 }
 rule-set rule-set-name {
 [rule rule-name];
 }
 }
```

**Hierarchy Level** [edit [services](#)]

**Release Information** Statement introduced in Junos OS Release 10.4.

**Description** Configure the HTTP redirect service by specifying the location to which a subscriber's initial Web browser session is redirected, enabling initial provisioning and service selection for the subscriber.




The remaining statements are explained separately.

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

**Related Documentation**

- [Redirecting HTTP Requests Overview on page 353](#)

## cell-mode (Dynamic Traffic Shaping)

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                   | cell-mode ( <b>bytes</b> <i>bytes</i>   \$junos-cos-byte-adjust   cell-mode-bytes <i>cell-mode-bytes</i>  \$junos-cos-byte-adjust-cell);                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Hierarchy Level          | [edit <b>dynamic-profiles</b> <i>profile-name</i> <b>class-of-service</b> <b>traffic-control-profiles</b> <i>profile-name</i> <b>overhead-accounting</b> ],<br>[edit <b>class-of-service</b> <b>traffic-control-profiles</b> <i>profile-name</i> <b>overhead-accounting</b> ],                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Release Information      | Statement introduced in Junos OS Release 10.2.<br>Variable <i>\$junos-cos-byte-adjust-cell</i> introduced in Junos OS Release 13.1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Description              | Configure the mode to shape downstream ATM traffic as cells.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Options                  | <p><b>bytes</b>—Byte adjustment value for the <b>cell-mode</b> or <b>frame-mode</b> shaping options.</p> <p><i>\$junos-cos-byte-adjust</i>—Predefined variable for byte adjustment that is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> <p><b>cell-mode-bytes</b> <i>cell-mode-bytes</i>—Shaping is based on the number of bytes in cells, and accounts for the ATM cell encapsulation and padding overhead. The resulting traffic stream conforms to the policing rates configured in downstream ATM switches, reducing the number of packet drops in the Ethernet network.</p> <p><i>\$junos-cos-byte-adjust-cell</i>—Predefined variable for the cell mode shaping. This variable can not be used when the <b>overhead-accounting bytes bytes</b> option is configured.</p> |
|                          | <p> <b>BEST PRACTICE:</b> We recommend using the cell-mode-bytes <i>cell-mode-bytes</i> option rather than the bytes option.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                          | <p><b>Range:</b> –120 through 124 bytes</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                          | <p> <b>NOTE:</b> If you specify a value for the bytes <i>bytes</i> option, you cannot specify a value for either the cell-mode-bytes option.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                          | <p> <b>NOTE:</b> Cell mode is supported only on logical interfaces and interface sets; it is not supported on physical interfaces (ifd or ifd-remaining).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|                          | <p><b>Default:</b> The default is <b>frame-mode</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Required Privilege Level | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

- Related Documentation**
- [CoS Adjustment Control Profiles Overview on page 189](#)
  - [Configuring CoS Adjustment Control Profiles on page 191](#)
  - [adjustment-control-profiles on page 491](#)
  - [Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 121](#)
  - [Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 119](#)
  - [egress-shaping-overhead](#)
  - [bytes on page 510](#)
  - [frame-mode on page 564](#)

## class (Assigning a Class to an Individual User)

|                                 |                                                                                                                           |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>class <i>class-name</i>;</code>                                                                                     |
| <b>Hierarchy Level</b>          | [edit system login <a href="#">user</a> <i>username</i> ]                                                                 |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 9.0 for EX Series switches. |
| <b>Description</b>              | Assign a user to a login class. You must assign each user to a login class.                                               |
| <b>Options</b>                  | <i>class-name</i> —One of the classes defined at the [edit system login class] hierarchy level.                           |
| <b>Required Privilege Level</b> | admin—To view this statement in the configuration.<br>admin-control—To add this statement to the configuration.           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Junos OS User Accounts</a></li> </ul>                    |

## class (Defining Login Classes)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>class <i>class-name</i> {<br/>    allow-commands "<i>regular-expression</i>";<br/>    ( allow-configuration   allow-configuration-regexps ) "<i>regular expression 1</i>" "<i>regular<br/>expression 2</i>";<br/>    configuration-breadcrumbs;<br/>    deny-commands "<i>regular-expression</i>";<br/>    ( deny-configuration   deny-configuration-regexps ) "<i>regular expression 1</i>" "<i>regular expression<br/>2</i>";<br/>    idle-timeout <i>minutes</i>;<br/>    login-script <i>filename</i>;<br/>    login-tip;<br/>    <a href="#">permissions</a> [ <i>permissions</i> ];<br/>}</pre> |
| <b>Hierarchy Level</b>          | [edit system <a href="#">login</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 9.0 for EX Series switches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b>              | Define a login class.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Options</b>                  | <p><b><i>class-name</i></b>—A name you choose for the login class.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Required Privilege Level</b> | admin—To view this statement in the configuration.<br>admin-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Defining Junos OS Login Classes</i></li><li>• <a href="#">user on page 685</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |


## class-of-service (Dynamic Profiles)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>class-of-service { ... }</code>                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> ]                                                                                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b>              | Configure Junos OS CoS features in a dynamic profile.                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Default</b>                  | If you do not configure any CoS features, all packets are transmitted from output transmission queue 0.                                                                                                                                                                                                                                                                                                                     |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Configuring Static Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 33</a></li> <li>• <a href="#">Configuring Dynamic Hierarchical Scheduling and Queuing in a Dynamic Profile for Subscriber Access on page 34</a></li> </ul> |

## classifiers (Dynamic CoS Application)


|                                 |                                                                                                                                                                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> classifiers {   dscp (classifier-name   default);   dscp-ipv6 (classifier-name   default);   ieee-802.1 (classifier-name   default) vlan-tag (inner   outer)   inet-precedence (classifier-name   default); } </pre>                                                                                 |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> class-of-service interfaces <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> ]                                                                                                                                             |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                                                                                                             |
| <b>Description</b>              | Apply a CoS behavior aggregate classifier to a dynamic interface. You can apply a default classifier or one that is previously defined.                                                                                                                                                                    |
| <b>Options</b>                  | The remaining statements are explained separately.                                                                                                                                                                                                                                                         |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 226</a></li> <li>• <a href="#">classifiers (Definition)</a></li> </ul> |

## color-aware

|                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                             | color-aware;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>                                                                                                                                                    | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall <a href="#">three-color-policer</a> <i>name</i> <a href="#">single-rate</a> ],<br>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall <a href="#">three-color-policer</a> <i>name</i> <a href="#">two-rate</a> ],<br>[edit firewall <a href="#">three-color-policer</a> <i>policer-name</i> <a href="#">single-rate</a> ],<br>[edit firewall <a href="#">three-color-policer</a> <i>policer-name</i> <a href="#">two-rate</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b>                                                                                                                                                | Statement introduced in Junos OS Release 7.4.<br>Support at the [edit <a href="#">dynamic-profiles</a> ... <a href="#">single-rate</a> ] and [edit <a href="#">dynamic-profiles</a> ... <a href="#">two-rate</a> ] hierarchy levels introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b>                                                                                                                                                        | <p>For a three-color policer, configure the way preclassified packets are metered. In color-aware mode, the local router can assign a higher packet loss priority, but cannot assign a lower packet loss priority.</p> <p>For example, suppose an upstream router assigned medium-high packet loss priority to a packet because the packet exceeded the committed information rate on the upstream router interface.</p> <ul style="list-style-type: none"> <li>• If the local router applies color-aware policing to the packet, the router <i>cannot</i> change the packet loss priority to low, even if the packet conforms to the configured committed information route on the local router interface.</li> <li>• If the local router applies color-blind policing to the packet, the router <i>can</i> change the packet loss priority to low if the packet conforms to the configured committed information route on the local router interface.</li> </ul> |
| <div>  <b>NOTE:</b> A color-aware policer cannot be applied to Layer 2 traffic. </div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Default</b>                                                                                                                                                            | If you omit the <b>color-aware</b> statement, the default behavior is color-aware mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Required Privilege Level</b>                                                                                                                                           | firewall—To view this statement in the configuration.<br>firewall-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Related Documentation</b>                                                                                                                                              | <ul style="list-style-type: none"> <li>• <i>Three-Color Policer Configuration Overview</i></li> <li>• <i>Color Modes for Three-Color Policers</i></li> <li>• <a href="#">color-blind on page 517</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |



## color-blind

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | color-blind;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall <a href="#">three-color-policer</a> <i>name</i> <a href="#">single-rate</a> ],<br>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall <a href="#">three-color-policer</a> <i>name</i> <a href="#">two-rate</a> ],<br>[edit firewall <a href="#">three-color-policer</a> <i>policer-name</i> <a href="#">single-rate</a> ],<br>[edit firewall <a href="#">three-color-policer</a> <i>policer-name</i> <a href="#">two-rate</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 7.4.<br>Support at the [edit <a href="#">dynamic-profiles</a> ... <a href="#">single-rate</a> ] and [edit <a href="#">dynamic-profiles</a> ... <a href="#">two-rate</a> ] hierarchy levels introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b>              | <p>For a three-color policer, configure the way preclassified packets are metered. In color-blind mode, the local router ignores the preclassification of packets and can assign a higher or lower packet loss priority.</p> <p>For example, suppose an upstream router assigned medium-high packet loss priority to a packet because the packet exceeded the committed information rate on the upstream router interface.</p> <ul style="list-style-type: none"> <li>• If the local router applies color-aware policing to the packet, the router <i>cannot</i> change the packet loss priority to low, even if the packet conforms to the configured committed information route on the local router interface.</li> </ul> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p> <b>NOTE:</b> A color-aware policer cannot be applied to Layer 2 traffic.</p> </div> <ul style="list-style-type: none"> <li>• If the local router applies color-blind policing to the packet, the router <i>can</i> change the packet loss priority to low if the packet conforms to the configured committed information route on the local router interface.</li> </ul> |
| <b>Default</b>                  | If you omit the <b>color-blind</b> statement, the default behavior is color-aware mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Required Privilege Level</b> | firewall—To view this statement in the configuration.<br>firewall-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Three-Color Policer Configuration Overview</i></li> <li>• <i>Color Modes for Three-Color Policers</i></li> <li>• <a href="#">color-aware on page 516</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## committed-burst-size

|                            |                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <code>committed-burst-size bytes;</code>                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>     | [edit <code>dynamic-profiles profile-name firewall three-color-policer name single-rate</code> ],<br>[edit <code>dynamic-profiles profile-name firewall three-color-policer name two-rate</code> ],<br>[edit <code>firewall three-color-policer policer-name single-rate</code> ],<br>[edit <code>firewall three-color-policer policer-name two-rate</code> ] |
| <b>Release Information</b> | Statement introduced in Junos OS Release 7.4.<br>Support at the [edit <code>dynamic-profiles ... single-rate</code> ] and [edit <code>dynamic-profiles ... two-rate</code> ] hierarchy levels introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.                                                 |
| <b>Description</b>         | For a three-color policer, configure the committed burst size (CBS) as a number of bytes.                                                                                                                                                                                                                                                                     |



**NOTE:** When you include the `committed-burst-size` statement in the configuration, you must also include the `committed-information-rate` statement at the same hierarchy level.

In three-color policing, a committed information rate (CIR) defines the guaranteed bandwidth for traffic arriving at or departing from the interface under normal line conditions. A flow of traffic at an average rate that conforms to the CIR is categorized green.

During periods of average traffic rates below the CIR, any unused bandwidth capacity accumulates up to a maximum amount defined by the CBS. Short periods of bursting traffic (back-to-back traffic at averages rates that exceed the CIR) are also categorized as green provided that unused bandwidth capacity is available.

Traffic that exceeds both the CIR and the CBS is considered nonconforming.

Single-rate three-color policers use a *dual token bucket algorithm* to measure traffic against a single rate limit. Nonconforming traffic is categorized as yellow or red, based on the **excess-burst-size** statement included in the policer configuration.

Two-rate three-color policers use a *dual-rate dual token bucket algorithm* to measure traffic against two rate limits. Nonconforming traffic is categorized as yellow or red based on the **peak-information-rate** and **peak-burst-rate** statements included in the policer configuration.

**Options** **bytes**—Number of bytes. You can specify a value in bytes either as a complete decimal number or as a decimal number followed by the abbreviation **k** (1000), **m** (1,000,000), or **g** (1,000,000,000).

**Range:** 1500 through 100,000,000,000 bytes

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

**Related Documentation**

- *Three-Color Policer Configuration Overview*
- *Policer Bandwidth and Burst-Size Limits*
- *Policer Color-Marking and Actions*
- *Dual Token Bucket Algorithms*
- *Determining Proper Burst Size for Traffic Policers*
- [committed-information-rate on page 520](#)
- [excess-burst-size on page 542](#)
- [peak-burst-size on page 617](#)
- [peak-information-rate on page 619](#)

## committed-information-rate

|                            |                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <code>committed-information-rate bps;</code>                                                                                                                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>     | [edit <code>dynamic-profiles profile-name</code> firewall <code>three-color-policer name single-rate</code> ],<br>[edit <code>dynamic-profiles profile-name</code> firewall <code>three-color-policer name two-rate</code> ],<br>[edit firewall <code>three-color-policer policer-name single-rate</code> ],<br>[edit firewall <code>three-color-policer policer-name two-rate</code> ] |
| <b>Release Information</b> | Statement introduced in Junos OS Release 7.4.<br>Support at the [edit <code>dynamic-profiles ... single-rate</code> ] and [edit <code>dynamic-profiles ... two-rate</code> ] hierarchy levels introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.                                                                           |
| <b>Description</b>         | For a three-color policer, configure the committed information rate as a number of bits per second. The committed information rate (CIR) is the guaranteed bandwidth for traffic arriving at or departing from the interface under normal line conditions.                                                                                                                              |



**NOTE:** When you include the `committed-information-rate` statement in the configuration, you must also include the `committed-burst-size` statement at the same hierarchy level.

In three-color policing, a CIR defines the guaranteed bandwidth for traffic arriving at or departing from the interface under normal line conditions. A flow of traffic at an average rate that conforms to the CIR is categorized green.

During periods of average traffic rates below the CIR, any unused bandwidth capacity accumulates up to a maximum amount defined by the committed burst size (CBS). Short periods of bursting traffic (back-to-back traffic at averages rates that exceed the CIR) are also categorized as green provided that unused bandwidth capacity is available.

Traffic that exceeds both the CIR and the CBS is considered nonconforming.

Single-rate three-color policers use a *dual token bucket algorithm* to measure traffic against a single rate limit. Nonconforming traffic is categorized as yellow or red, based on the `excess-burst-size` statement included in the policer configuration.

Two-rate three-color policers use a *dual-rate dual token bucket algorithm* to measure traffic against two rate limits. Nonconforming traffic is categorized as yellow or red based on the `peak-information-rate` and `peak-burst-rate` statements included in the policer configuration.

**Options** `bps`—Number of bits per second. You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation `k` (1000), `m` (1,000,000), or `g` (1,000,000,000).

**Range:** 1500 through 100,000,000,000 bps

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

**Related Documentation**

- *Three-Color Policer Configuration Overview*
- *Policer Bandwidth and Burst-Size Limits*
- *Policer Color-Marking and Actions*
- *Dual Token Bucket Algorithms*
- *Determining Proper Burst Size for Traffic Policers*
- [committed-burst-size on page 518](#)
- [excess-burst-size on page 542](#)
- [peak-burst-size on page 617](#)
- [peak-information-rate on page 619](#)

## connection-limit

|                            |                                                                                                                                                                                                                                                                            |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | connection-limit <i>limit</i> ;                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>     | [edit system services finger],<br>[edit system services ftp],<br>[edit system services netconf ssh],<br>[edit system services ssh],<br>[edit system services telnet],<br>[edit system services xnm-clear-text],<br>[edit system services xnm-ssl]                          |
| <b>Release Information</b> | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 9.0 for EX Series switches.<br>Statement introduced in Junos OS Release 11.1 for the QFX Series.<br>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series. |
| <b>Description</b>         | Configure the maximum number of connections sessions for each type of system services (finger, ftp, ssh, telnet, xnm-clear-text, or xnm-ssl) per protocol (either IPv6 or IPv4).                                                                                           |
| <b>Options</b>             | <i>limit</i> —(Optional) Maximum number of established connections per protocol (either IPv6 or IPv4).<br><b>Range:</b> 1 through 250<br><b>Default:</b> 75                                                                                                                |



**NOTE:** The actual number of maximum connections depends on the availability of system resources, and might be fewer than the configured connection-limit value if the system resources are limited.

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | system—To view this statement in the configuration.<br>system-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring clear-text or SSL Service for Junos XML Protocol Client Applications</i></li> <li>• <i>Configuring DTCP-over-SSH Service for the Flow-Tap Application</i></li> <li>• <i>Configuring Finger Service for Remote Access to the Router</i></li> <li>• <i>Configuring FTP Service for Remote Access to the Router or Switch</i></li> <li>• <i>Configuring SSH Service for Remote Access to the Router or Switch</i></li> <li>• <i>Configuring Telnet Service for Remote Access to a Router or Switch</i></li> </ul> |

## delay-buffer-rate (Dynamic Traffic Shaping)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>delay-buffer-rate (percent <i>percentage</i>   <i>rate</i>   <code>\$junos-cos-delay-buffer-rate</code>);</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> <a href="#">traffic-control-profiles</a> <i>profile-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.<br>The <code>\$junos-cos-delay-buffer-rate</code> variable introduced in Junos OS Release 9.4.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b>              | Base the delay-buffer calculation on a delay-buffer rate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Default</b>                  | If you do not include this statement, the delay-buffer calculation is based on the guaranteed rate if one is configured, or the shaping rate if no guaranteed rate is configured.                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Options</b>                  | <p><b>rate</b>—Delay-buffer rate, in bits per second (bps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation <b>k</b> (1000), <b>m</b> (1,000,000), or <b>g</b> (1,000,000,000).</p> <p><b>Range:</b> 1000 through 6,400,000,000,000 bps</p> <p><b>\$junos-cos-delay-buffer-rate</b>—Junos predefined variable that is replaced with the delay-buffer rate obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Configuring Traffic Scheduling and Shaping for Subscriber Access on page 11</a></li> <li>• <a href="#">output-traffic-control-profile on page 613</a></li> </ul>                                                                                                                                                                                                                                                       |

## destination-address (Captive Portal Content Delivery)

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|                                 |                                                                                                                                                                    |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>destination-address <i>address</i> &lt;except&gt;;</code>                                                                                                    |
| <b>Hierarchy Level</b>          | [edit services captive-portal-content-delivery rule <i>rule-name</i> term <i>term-name</i> from (Captive Portal Content Delivery)]                                 |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.4.                                                                                                                     |
| <b>Description</b>              | Specify the destination address for rule matching.                                                                                                                 |
| <b>Options</b>                  | <b><i>address</i></b> —Destination IPv4 or IPv6 address or prefix value.<br><b><i>except</i></b> —(Optional) Exclude the specified prefix list from rule matching. |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Redirecting HTTP Requests Overview on page 353</a></li></ul>                                                   |

## destination-address (Subscriber Secure Policy)

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|                                 |                                                                                                                                                                                                                                        |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>destination-address <i>address</i>;</code>                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit services <a href="#">radius-flow-tap policy</a> <i>policy-name</i> inet drop-policy <i>rule-name</i> from],<br>[edit services <a href="#">radius-flow-tap policy</a> <i>policy-name</i> inet6 drop-policy <i>rule-name</i> from] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3.                                                                                                                                                                                         |
| <b>Description</b>              | Specify destination IP address or prefix value for radius-flow-tap policy rule mapping.                                                                                                                                                |
| <b>Options</b>                  | <b><i>address</i></b> — IPv4 or IPv6 address for the radius-flow-tap policy.                                                                                                                                                           |
| <b>Required Privilege Level</b> | flow-tap—To view this statement in the configuration.<br>flow-tap-control—To add this statement to the configuration.                                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Subscriber Secure Policy Overview on page 385</a></li><li>• <a href="#">Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390</a></li></ul>         |



## destination-prefix-list (Captive Portal Content Delivery)

|                                 |                                                                                                                                                                                                                     |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>destination-prefix-list <i>list-name</i> &lt;except&gt;;</code>                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit services captive-portal-content-delivery rule <i>rule-name</i> term <i>term-name</i> <b>from</b> ]                                                                                                            |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.4.                                                                                                                                                                      |
| <b>Description</b>              | Specify the destination prefix list for rule matching. You configure the prefix list by including the <b>prefix-list</b> statement at the [edit policy-options] hierarchy level.                                    |
| <b>Options</b>                  | <p><b><i>list-name</i></b>—Destination prefix list.</p> <p><b>except</b>—(Optional) Exclude the specified prefix list from rule matching.</p>                                                                       |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Redirecting HTTP Requests Overview on page 353</a></li> <li>• <a href="#">Understanding Prefix Lists for Use in Routing Policy Match Conditions</a></li> </ul> |

## destination-port (Subscriber Secure Policy)

|                                 |                                                                                                                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>destination-port <i>port-number</i>;</code>                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit services <b>radius-flow-tap</b> policy <i>policy-name</i> <b>inet</b> drop-policy <i>rule-name</i> <b>from</b> ],<br>[edit services <b>radius-flow-tap</b> policy <i>policy-name</i> <b>inet6</b> drop-policy <i>rule-name</i> <b>from</b> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3.                                                                                                                                                                                                     |
| <b>Description</b>              | Specify the destination IP address for the radius-flow-tap policy.                                                                                                                                                                                 |
| <b>Options</b>                  | <b><i>port-number</i></b> — Number of the IPv4 or IPv6 destination port for the radius-flow-tap policy.                                                                                                                                            |
| <b>Required Privilege Level</b> | <p>flow-tap—To view this statement in the configuration.</p> <p>flow-tap-control—To add this statement to the configuration.</p>                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Subscriber Secure Policy Overview on page 385</a></li> <li>• <a href="#">Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390</a></li> </ul>                  |

## disable (Dynamic IGMP)

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|                            |                                                                                                     |
|----------------------------|-----------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | "disable:\$junos-igmp-enable";                                                                      |
| <b>Hierarchy Level</b>     | [edit dynamic-profiles <i>profile-name</i> protocols <b>igmp interface</b> <i>interface-name</i> ], |
| <b>Release Information</b> | Statement introduced in Junos OS Release 9.2.                                                       |
| <b>Description</b>         | Disable IGMP on the interface.                                                                      |



**NOTE:** Though the purpose of this statement is to disable IGMP on interfaces, under the **dynamic-profiles** hierarchy you can use this statement and an enable variable (**disable:\$junos-igmp-enable**) to ensure that IGMP is not disabled by a AAA-based authentication and management method (RADIUS).

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|                                 |                                                                                                                                                                                                                                                                |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li><li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li><li>• <a href="#">Disabling IGMP</a></li></ul> |

## disable (Dynamic MLD)

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|                                 |                                                                                                                                                          |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | disable;                                                                                                                                                 |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>mld interface</b> <i>interface-name</i> ]                                                        |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                           |
| <b>Description</b>              | Disable MLD on the dynamic interface.                                                                                                                    |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li><li>• <a href="#">Disabling MLD</a></li></ul> |

## drop-policy (Subscriber Secure Policy)

**Syntax**

```
drop-policy rule-name {
 from {
 apply-groups group-name;
 apply-groups-except group-name;
 destination-address address;
 destination-port port-number;
 dscp dscp-value;
 protocol protocol;
 source-address address;
 source-port port-number;
 }
}
```

**Hierarchy Level** [edit services [radius-flow-tap policy policy-name inet](#) | [inet6](#)]

**Release Information** Statement introduced in Junos OS Release 12.3.

**Description** Specify the drop-policy that is applied to mirrored packets sent to a mediation device.

**Options** *rule-name*—Define the term name.

The remaining statements are explained separately.

**Required Privilege** flow-tap—To view this statement in the configuration.

**Level** flow-tap-control—To add this statement to the configuration.

- Related Documentation**
- [Subscriber Secure Policy Overview on page 385](#)
  - [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)

## drop-profile (Dynamic Schedulers)

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|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax              | <code>drop-profile (profile-name   predefined-variable);</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Hierarchy Level     | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service schedulers</a> <i>scheduler-name</i> <a href="#">drop-profile-map</a> <i>loss-priority</i> (any   low   medium-low   medium-high   high) <a href="#">protocol</a> (any   non-tcp   tcp)]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Release Information | Statement introduced in Junos OS Release 9.3.<br>The <code>\$junos-cos-scheduler-dropfile-low</code> , <code>\$junos-cos-scheduler-dropfile-medium-low</code> , <code>\$junos-cos-scheduler-dropfile-medium-high</code> , <code>\$junos-cos-scheduler-dropfile-high</code> , and <code>\$junos-cos-scheduler-dropfile-any</code> predefined variable introduced in Junos OS Release 9.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Description         | <p>Within the drop-profile map, specify the name of the drop profile to use for random early detection (RED) for a specific packet-loss priority (PLP) level and protocol type. A drop profile maps a fill level (fullness of a queue) to a drop probability (probability that a packet will be dropped). When a packet arrives, RED checks the queue fill level. If the fill level corresponds to a nonzero drop probability, the RED algorithm determines whether to drop the arriving packet.</p> <p>You enable RED by applying a drop profile to a scheduler.</p> <p>You configure drop profiles statically (at the <a href="#">[edit class-of-service drop-profiles]</a> hierarchy level).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Options             | <p><b>profile-name</b>—Name of the drop profile.</p> <p><b>predefined-variable</b>—One of the following Junos predefined variable that is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached:</p> <ul style="list-style-type: none"><li>• <b>\$junos-cos-scheduler-dropfile-low</b>—Name of the drop profile for PLP level <b>low</b> and protocol <b>any</b>, specified for a scheduler configured in a dynamic profile for subscriber access.</li><li>• <b>\$junos-cos-scheduler-dropfile-medium-low</b>—Name of the drop profile for PLP level <b>medium-low</b> and protocol <b>any</b>, specified for a scheduler configured in a dynamic profile for subscriber access.</li><li>• <b>\$junos-cos-scheduler-dropfile-medium-high</b>—Name of the drop profile for PLP level <b>medium-high</b> and protocol <b>any</b>, specified for a scheduler configured in a dynamic profile for subscriber access.</li><li>• <b>\$junos-cos-scheduler-dropfile-high</b>—Name of the drop profile for PLP level <b>high</b> and protocol <b>any</b>, specified for a scheduler configured in a dynamic profile for subscriber access.</li><li>• <b>\$junos-cos-scheduler-dropfile-lny</b>—Name of the drop profile for PLP level <b>any</b> and protocol <b>any</b>, specified for a scheduler configured in a dynamic profile for subscriber access.</li></ul> |

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13</a></li> <li>• <a href="#">scheduler (Dynamic Scheduler Maps) on page 647</a></li> <li>• <a href="#">Configuring Drop Profile Maps for Schedulers</a></li> </ul> |

## drop-profile-map (Dynamic Schedulers)

|                                 |                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | drop-profile-map <b>loss-priority</b> (any   low   medium-low   medium-high   high) <b>protocol</b> (any   non-tcp   tcp) <b>drop-profile</b> ( <i>profile-name</i>   <i>predefined-variable</i> );                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit <b>dynamic-profiles</b> <i>profile-name</i> <b>class-of-service</b> <b>schedulers</b> <i>scheduler-name</i> ]                                                                                                                                                                                                          |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.3.                                                                                                                                                                                                                                                                                |
| <b>Description</b>              | Define loss priority value for drop profile.<br><br>The statements are explained separately.                                                                                                                                                                                                                                 |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13</a></li> <li>• <a href="#">scheduler (Dynamic Scheduler Maps) on page 647</a></li> </ul> |

## dscp (Dynamic Classifiers)

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|                                 |                                                                                                                                                                                                                                                                                                        |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>dscp (classifier-name   default);</code>                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i> classifiers]                                                                                                                                                              |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                                                                                                         |
| <b>Description</b>              | For IPv4 traffic, apply a Differentiated Services (DiffServ) code point (DSCP) classifier to a subscriber interface in a dynamic profile.                                                                                                                                                              |
| <b>Options</b>                  | <p><b>classifier-name</b>—Name of a classifier mapping configured at the [edit class-of-service classifier dscp] hierarchy level.</p> <p><b>default</b>—The default mapping.</p>                                                                                                                       |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li><li>• <a href="#">Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 226</a></li><li>• <a href="#">classifiers (Definition)</a></li></ul> |

## dscp (Dynamic Rewrite Rules)

|                                 |                                                                                                                                                                                                                                                                                                              |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>dscp (rewrite-name   default);</code>                                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> class-of-service interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> <b>rewrite-rules</b> ]                                                                                                                                                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                                                                                                               |
| <b>Description</b>              | For IPv4 traffic, apply a Differentiated Services (DiffServ) code point (DSCP) rewrite rule to a subscriber interface in a dynamic profile.                                                                                                                                                                  |
| <b>Options</b>                  | <p><b>rewrite-name</b>—Name of a <b>rewrite-rules</b> mapping configured at the [edit class-of-service <b>rewrite-rules</b> <b>dscp</b>] hierarchy level.</p> <p><b>default</b>—The default mapping.</p>                                                                                                     |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile on page 225</a></li> <li>• <a href="#">rewrite-rules</a></li> </ul> |

## dscp (Subscriber Secure Policy)

|                                 |                                                                                                                                                                                                                                                                                |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>dscp value;</code>                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit services <b>radius-flow-tap</b> <b>policy</b> <i>policy-name</i> <b>inet</b> <b>drop-policy</b> <i>rule-name</i> <b>from</b> ],<br>[edit services <b>radius-flow-tap</b> <b>policy</b> <i>policy-name</i> <b>inet6</b> <b>drop-policy</b> <i>rule-name</i> <b>from</b> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3.                                                                                                                                                                                                                                 |
| <b>Description</b>              | Specify the DSCP value for the radius-flow-tap policy.                                                                                                                                                                                                                         |
| <b>Options</b>                  | <b>dscp-value</b> — IPv4 or IPv6 dscp value for the radius-flow-tap policy.                                                                                                                                                                                                    |
| <b>Required Privilege Level</b> | <p>flow-tap—To view this statement in the configuration.</p> <p>flow-tap-control—To add this statement to the configuration.</p>                                                                                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Subscriber Secure Policy Overview on page 385</a></li> <li>• <a href="#">Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390</a></li> </ul>                                              |

## dscp-ipv6 (Dynamic Classifiers)

---

|                                 |                                                                                                                                                                                                                                                                                               |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>dscp-ipv6 (classifier-name   default);</code>                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> class-of-service interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> <b>classifiers</b> ]                                                                                                                                      |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 10.1.                                                                                                                                                                                                                                            |
| <b>Description</b>              | For IPv6 traffic, apply a Differentiated Services (DiffServ) code point (DSCP) classifier to a subscriber interface in a dynamic profile.                                                                                                                                                     |
| <b>Options</b>                  | <b>classifier-name</b> —Name of a classifier mapping configured at the [edit class-of-service classifier <b>ieee-802.1</b> ] hierarchy level.<br><br><b>default</b> —The default mapping.                                                                                                     |
| <b>Required Privilege Level</b> | <b>interface</b> —To view this statement in the configuration.<br><b>interface-control</b> —To add this statement to the configuration.                                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li><li>• <a href="#">Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 226</a></li><li>• <i>classifiers (Definition)</i></li></ul> |

## dscp-ipv6 (Dynamic Rewrite Rules)

---

|                                 |                                                                                                                                                                                             |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>dscp-ipv6 (rewrite-name   default);</code>                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> class-of-service interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> <b>rewrite-rules</b> ]                                  |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 10.1.                                                                                                                                          |
| <b>Description</b>              | For IPv6 traffic, apply a DSCP rewrite rule to a subscriber interface in a dynamic profile.                                                                                                 |
| <b>Options</b>                  | <b>rewrite-name</b> —Name of a rewrite-rules mapping configured at the [edit class-of-service rewrite-rules <b>dscp-ipv6</b> ] hierarchy level.<br><br><b>default</b> —The default mapping. |
| <b>Required Privilege Level</b> | <b>interface</b> —To view this statement in the configuration.<br><b>interface-control</b> —To add this statement to the configuration.                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li><li>• <i>rewrite-rules</i></li></ul>                     |



## dynamic-class-of-service-options (Dynamic Traffic Shaping)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | dynamic-class-of-service-options {<br>vendor-specific-tags access-loop-encapsulation;<br>vendor-specific-tags actual-data-rate-downstream;<br>}                                                                                                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> ]                                                                                                                                                                                                                                                                                                                                                  |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.1.                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | Configure the shaping-rate and overhead-accounting class-of-service attributes based on access line parameters in PPPoE discovery packets on dynamic subscriber interfaces.                                                                                                                                                                                                                                                                    |
| <b>Options</b>                  | <p><b>vendor-specific-tags</b>—Use Vendor-Specific Point-to-Point Protocol over Ethernet (PPPoE) Tags [TR-101] to set the rate-shaping and overhead-accounting class-of-service attributes.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                      |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Setting Shaping Rate and Overhead Accounting Based on PPPoE Vendor-Specific Tags on page 129</a></li> <li>• <a href="#">Configuring the Shaping Rate and Overhead Accounting Based on PPPoE Vendor-Specific Tags on Dynamic Subscriber Interfaces on page 131</a></li> <li>• <a href="#">Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 119</a></li> </ul> |

## dynamic-profiles

```
Syntax dynamic-profiles {
 profile-name {
 class-of-service {
 interfaces {
 interface-name ;
 }
 unit logical-unit-number {
 classifiers {
 type (classifier-name | default);
 }
 output-traffic-control-profile (profile-name | $junos-cos-traffic-control-profile);
 rewrite-rules {
 dscp (rewrite-name | default);
 dscp-ipv6 (rewrite-name | default);
 ieee-802.1 (rewrite-name | default) vlan-tag (outer | outer-and-inner);
 inet-precedence (rewrite-name | default);
 }
 }
 }
 }
 scheduler-maps {
 map-name {
 forwarding-class class-name scheduler scheduler-name;
 }
 }
 schedulers {
 (scheduler-name) {
 buffer-size (seconds | percent percentage | remainder | temporal microseconds);
 drop-profile-map loss-priority (any | low | medium-low | medium-high | high)
 protocol (any | non-tcp | tcp) drop-profile profile-name;
 excess-priority (low | high | $junos-cos-scheduler-excess-priority);
 excess-rate (percent percentage | percent $junos-cos-scheduler-excess-rate);
 overhead-accounting (shaping-mode) <bytes (byte-value)>;
 priority priority-level;
 shaping-rate (rate | predefined-variable);
 transmit-rate (percent percentage | rate | remainder) <exact | rate-limit>;
 }
 }
 traffic-control-profiles profile-name {
 delay-buffer-rate (percent percentage | rate | $junos-cos-delay-buffer-rate);
 excess-rate (percent percentage | proportion value | percent $junos-cos-excess-rate);
 guaranteed-rate (percent percentage | rate | $junos-cos-guaranteed-rate);
 overhead-accounting (shaping-mode) <bytes (byte-value)>;
 scheduler-map map-name;
 shaping-rate (rate | predefined-variable);
 }
}
firewall {
 family family {
 fast-update-filter filter-name {
 interface-specific;
 match-order [match-order];
 }
 }
}
```

```

 term term-name {
 from {
 match-conditions;
 }
 then {
 action;
 action-modifiers;
 }
 only-at-create;
 }
}

filter uid {
 enhanced-mode-override;
 interface-shared;
 interface-specific;
 term term-name {
 from {
 match-conditions;
 }
 then {
 action;
 action-modifiers;
 }
 }
}

}

policer uid {
 filter-specific;
 if-exceeding {
 (bandwidth-limit bps | bandwidth-percent percentage);
 burst-size-limit bytes;
 }
 logical-bandwidth-policer;
 logical-interface-policer;
 physical-interface-policer;
 then {
 policer-action;
 }
}

hierarchical-policer uid {
 aggregate {
 if-exceeding {
 bandwidth-limit-limit bps;
 burst-size-limit bytes;
 }
 then {
 policer-action;
 }
 }
}

premium {
 if-exceeding {
 bandwidth-limit bps;
 burst-size-limit bytes;
 }
 then {
 policer-action;
 }
}

```

```

 }
 }
}
three-color-policer uid {
 action {
 loss-priority high then discard;
 }
 logical-interface-policer;
 single-rate {
 (color-aware | color-blind);
 committed-burst-size bytes;
 committed-information-rate bps;
 excess-burst-size bytes;
 }
 two-rate {
 (color-aware | color-blind);
 committed-burst-size bytes;
 committed-information-rate bps;
 peak-burst-size bytes;
 peak-information-rate bps;
 }
}
}
}
policy-options {
 prefix-list uid {
 ip-addresses;
 dynamic-db;
 }
}
interfaces interface-name {
 interface-set interface-set-name {
 interface interface-name {
 unit logical unit number {
 advisory-options {
 downstream-rate rate;
 upstream-rate rate;
 }
 }
 }
 }
}
unit logical-unit-number {
 auto-configure {
 agent-circuit-identifier {
 dynamic-profile profile-name;
 }
 }
 encapsulation (atm-ccc-cell-relay | atm-ccc-vc-mux | atm-cisco-nlpid |
 atm-tcc-vc-mux | atm-mlppp-llc | atm-nlpid | atm-ppp-llc | atm-ppp-vc-mux |
 atm-snap | atm-tcc-snap | atm-vc-mux | ether-over-atm-llc |
 ether-vpls-over-atm-llc | ether-vpls-over-fr | ether-vpls-over-ppp | ethernet |
 frame-relay-ccc | frame-relay-ppp | frame-relay-tcc | frame-relay-ether-type |
 frame-relay-ether-type-tcc | multilink-frame-relay-end-to-end | multilink-ppp |
 ppp-over-ether | ppp-over-ether-over-atm-llc | vlan-bridge | vlan-ccc | vlan-vci-ccc
 | vlan-tcc | vlan-vpls);
 family family {

```

```

address address;
filter {
 adf {
 counter;
 input-precedence precedence;
 not-mandatory;
 output-precedence precedence;
 rule rule-value;
 }
 input filter-name (
 precedence precedence;
)
 output filter-name {
 precedence precedence;
 }
}
rpf-check {
 fail-filter filter-name;
 mode loose;
}
service {
 input {
 service-set service-set-name {
 service-filter filter-name;
 }
 post-service-filter filter-name;
 }
 input-vlan-map {
 inner-tag-protocol-id tpid;
 inner-vlan-id number;
 (push | swap);
 tag-protocol-id tpid;
 vlan-id number;
 }
 output {
 service-set service-set-name {
 service-filter filter-name;
 }
 }
 output-vlan-map {
 inner-tag-protocol-id tpid;
 inner-vlan-id number;
 (pop | swap);
 tag-protocol-id tpid;
 vlan-id number;
 }
}
unnumbered-address interface-name <preferred-source-address address>;
}
ppp-options {
 chap;
 pap;
}
vlan-id number;
vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
}

```

```
}
interfaces {
 demux0 {...}
}
interfaces {
 pp0 {...}
}
protocols {
 igmp {
 interface interface-name {
 accounting;
 disable;
 group-policy;
 immediate-leave
 no-accounting;
 promiscuous-mode;
 ssm-map ssm-map-name;
 static {
 group group {
 source source;
 }
 }
 version version;
 }
 }
 mld {
 interface interface-name {
 disable;
 (accounting | no-accounting);
 group-policy;
 immediate-leave;
 oif-map;
 passive;
 ssm-map ssm-map-name;
 static {
 group multicast-group-address {
 exclude;
 group-count number;
 group-increment increment;
 source ip-address {
 source-count number;
 source-increment increment;
 }
 }
 }
 version version;
 }
 }
 router-advertisement {
 interface interface-name {
 current-hop-limit number;
 default-lifetime seconds;
 (managed-configuration | no-managed-configuration);
 max-advertisement-interval seconds;
 min-advertisement-interval seconds;
 (other-stateful-configuration | no-other-stateful-configuration);
 prefix prefix;
 }
 }
}
```

```

 reachable-time milliseconds;
 retransmit-timer milliseconds;
 }
}
}
routing-instances routing-instance-name {
 interface interface-name;
 routing-options {
 access {
 route prefix {
 next-hop next-hop;
 metric route-cost;
 preference route-distance;
 tag route-tag;
 }
 }
 access-internal {
 route subscriber-ip-address {
 qualified-next-hop underlying-interface {
 mac-address address;
 }
 }
 }
 multicast {
 interface interface-name {
 no-qos-adjust;
 }
 }
 }
}
rib routing-table-name {
 access {
 route prefix {
 next-hop next-hop;
 metric route-cost;
 preference route-distance;
 tag route-tag;
 }
 }
 access-internal {
 route subscriber-ip-address {
 qualified-next-hop underlying-interface {
 mac-address address;
 }
 }
 }
}
}
routing-options {
 access {
 route prefix {
 next-hop next-hop;
 metric route-cost;
 preference route-distance;
 tag route-tag;
 }
 }
}

```

```
 }
 access-internal {
 route subscriber-ip-address {
 qualified-next-hop underlying-interface {
 mac-address address;
 }
 }
 }
 }
 multicast {
 interface interface-name {
 no-qos-adjust;
 }
 }
}
variables {
 variable-name {
 default-value default-value;
 equals expression;
 mandatory;
 uid;
 uid-reference;
 }
}
}
```

**Hierarchy Level** [edit]

**Release Information** Statement introduced in Junos OS Release 9.2.  
Support at the **filter**, **policer**, **hierarchical-policer**, **three-color-policer**, and **policy options** hierarchy levels introduced in Junos OS Release 11.4.

**Description** Create dynamic profiles for use with DHCP or PPP client access.

**Options** *profile-name*—Name of the dynamic profile; string of up to 80 alphanumeric characters.  
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 a Basic Dynamic Profile*
- *Configuring Dynamic VLANs Based on Agent Circuit Identifier Information*
- *Dynamic Profiles Overview*



## effective-shaping-rate

---


|                                 |                                                                                                                                                                                                                          |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | effective-shaping-rate;                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit chassis]                                                                                                                                                                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 13.2.                                                                                                                                                                           |
| <b>Description</b>              | Specify that the Cos-Effective-Shaping-Rate VSA [26–177] included in RADIUS Acct-Start, Acct-Stop, and Interim-Acct messages reports the actual rate of the downstream traffic for a subscriber, in kilobits per second. |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Reporting the Effective Shaping Rate for Subscribers on page 131</a></li> </ul>                                                                                     |

## enhanced-policer

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | enhanced-policer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Hierarchy Level</b>          | [edit chassis]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3 for MX Series.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>              | <p>Collect additional statistics to be displayed using <b>show</b> commands. An FPC restart is required after changing this configuration.</p> <p>When you commit a configuration that contains the <b>enhanced-policer</b> statement at the <b>[edit chassis]</b> hierarchy level, a warning message is displayed stating that all the FPCs in the router need to be rebooted for the configuration changes to become effective. At this point, you must confirm that you want to proceed with the reboot of the FPCs. If you do not reboot the FPCs, the FPCs return all 0s (zeros) when you perform a query for the retrieval of detailed statistics—for example, when you issue the <b>show firewall detail</b> command.</p> |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Router Chassis Configuration Statements</i></li> <li>• <a href="#">Enhanced Policer Statistics Overview on page 339</a></li> <li>• <i>show policer</i></li> <li>• <a href="#">show firewall on page 748</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## excess-burst-size

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <code>excess-burst-size bytes;</code>                                                                                                                                                                                                                                                     |
| <b>Hierarchy Level</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | [edit <code>dynamic-profiles profile-name</code> firewall <code>three-color-policer name single-rate</code> ],<br>[edit firewall <code>three-color-policer policer-name single-rate</code> ]                                                                                              |
| <b>Release Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Statement introduced in Junos OS Release 7.4.<br>Support at the [edit <code>dynamic-profiles ... single-rate</code> ] hierarchy level introduced in Junos Release OS 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.                                     |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | For a single-rate three-color policer, configure the excess burst size (EBS) as a number of bytes. The EBS allows for moderate periods of bursting traffic that exceeds both the committed information rate (CIR) and the committed burst size (CBS).                                     |
| <div>  <p><b>NOTE:</b> When you include the <code>excess-burst-size</code> statement in the configuration, you must also include the <code>committed-burst-size</code> and <code>committed-information-rate</code> statements at the same hierarchy level.</p> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                           |
| <p>Traffic that exceeds both the CIR and the CBS is considered nonconforming.</p> <p>Single-rate three-color policing uses a <i>dual token bucket algorithm</i> to measure traffic against a single rate limit. Nonconforming traffic is categorized as yellow or red based on the <code>excess-burst-size</code> statement included in the policer configuration.</p> <p>During periods of traffic that conforms to the CIR, any unused portion of the guaranteed bandwidth capacity accumulates in the first token bucket, up to the maximum number of bytes defined by the CBS. If any accumulated bandwidth capacity overflows the first bucket, the excess accumulates in a second token bucket, up to the maximum number of bytes defined by the EBS.</p> <p>A nonconforming traffic flow is categorized yellow if its size conforms to bandwidth capacity accumulated in the first token bucket. Packets in a yellow flow are marked with <b>medium-high</b> packet loss priority (PLP) and then passed through the interface.</p> <p>A nonconforming traffic flow is categorized red if its size exceeds the bandwidth capacity accumulated in the second token bucket. Packets in a red traffic flow are marked with <b>high</b> PLP and then either passed through the interface or optionally discarded.</p> |                                                                                                                                                                                                                                                                                           |
| <b>Options</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | <p><b>bytes</b>—Number of bytes. You can specify a value in bytes either as a complete decimal number or as a decimal number followed by the abbreviation <b>k</b> (1000), <b>m</b> (1,000,000), or <b>g</b> (1,000,000,000).</p> <p><b>Range:</b> 1500 through 100,000,000,000 bytes</p> |
| <b>Required Privilege Level</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <p>firewall—To view this statement in the configuration.</p> <p>firewall-control—To add this statement to the configuration.</p>                                                                                                                                                          |

- Related Documentation**
- *Three-Color Policer Configuration Overview*
  - *Policer Bandwidth and Burst-Size Limits*
  - *Policer Color-Marking and Actions*
  - *Dual Token Bucket Algorithms*
  - *Determining Proper Burst Size for Traffic Policers*
  - [committed-burst-size on page 518](#)
  - [committed-information-rate on page 520](#)

## excess-priority (Dynamic Schedulers)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>excess-priority (low   high   \$junos-cos-scheduler-excess-priority   none);</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> <a href="#">schedulers</a> <i>scheduler-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.2.<br>Option <b>none</b> introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>              | Determine the priority of excess bandwidth traffic on a scheduler in a dynamic profile.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Options</b>                  | <p><b>low</b>—Excess traffic for this scheduler has low priority.</p> <p><b>high</b>—Excess traffic for this scheduler has high priority.</p> <p><b>\$junos-cos-scheduler-excess-priority</b>—Variable for the excess-priority that is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> <p><b>none</b>—System does not demote the priority of guaranteed traffic when the bandwidth exceeds the shaping rate or the guaranteed rate.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Managing Excess Bandwidth Distribution for Dynamic CoS on MIC and MPC Interfaces on page 142</a></li> <li>• <a href="#">scheduler on page 647</a></li> </ul>                                                                                                                                                                                                                                                                                                                              |

## excess-rate (Dynamic Schedulers)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | excess-rate percent ( <i>percentage</i>   \$junos-cos-scheduler-excess-rate);                                                                                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> <a href="#">schedulers</a> <i>scheduler-name</i> ]                                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.2.                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>              | Determine the percentage of excess bandwidth traffic to share.                                                                                                                                                                                                                                                                                                                                      |
| <b>Options</b>                  | <p><i>percentage</i>—Percentage of the excess bandwidth to share.</p> <p><b>Range:</b> 0 through 100 percent</p> <p><b>\$junos-cos-scheduler-excess-rate</b>—Variable for the excess rate that is specified for a scheduler. The variable is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li><li>• <a href="#">Managing Excess Bandwidth Distribution for Dynamic CoS on MIC and MPC Interfaces on page 142</a></li><li>• <a href="#">output-traffic-control-profile on page 613</a></li></ul>                                                                |

## excess-rate (Dynamic Traffic Shaping)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>excess-rate (percent <i>percentage</i>   \$junos-cos-excess-rate)   proportion <i>value</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> <a href="#">traffic-control-profiles</a> <i>profile-name</i> ]                                                                                                                                                                                                                                                                                                                                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>              | For an MPC interface, determine the percentage or proportion of excess bandwidth traffic to share for all priorities of traffic.                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Options</b>                  | <p><b><i>percentage</i></b>—Percentage of the excess bandwidth to share.<br/> <b>Range:</b> 0 through 100 percent</p> <p><b><i>value</i></b>—Proportion of the excess bandwidth to share.<br/> <b>Range:</b> 0 through 1000</p> <p><b>\$junos-cos-excess-rate</b>—Variable for the excess rate that is specified for the logical interface. The variable is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Managing Excess Bandwidth Distribution for Dynamic CoS on MIC and MPC Interfaces on page 142</a></li> <li>• <a href="#">output-traffic-control-profile on page 613</a></li> </ul>                                                                                                                                                                           |

## excess-rate-high (Dynamic Traffic Shaping)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>excess-rate-high ((percent <i>percentage</i>   \$junos-cos-excess-rate-high)   proportion <i>value</i>);</code>                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> <a href="#">traffic-control-profiles</a> <i>profile-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | For an MPC/MIC interface, determine the percentage of excess bandwidth for high-priority traffic to share.                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Options</b>                  | <p><b><i>percentage</i></b>—Percentage of the excess bandwidth to share.<br/><b>Range:</b> 0 through 100 percent</p> <p><b><i>value</i></b>—Proportion of the excess bandwidth to share.<br/><b>Range:</b> 0 through 1000</p> <p><b>\$junos-cos-excess-rate-high</b>—Variable for the excess rate that is specified for high-priority traffic on the logical interface. The variable is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li><li>• <a href="#">Managing Excess Bandwidth Distribution for Dynamic CoS on MIC and MPC Interfaces on page 142</a></li><li>• <a href="#">output-traffic-control-profile on page 613</a></li></ul>                                                                                                                                                                                                           |

## excess-rate-low (Dynamic Traffic Shaping)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>excess-rate-low ((percent <i>percentage</i>   \$junos-cos-excess-rate-low)   proportion <i>value</i>);</code>                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> <a href="#">traffic-control-profiles</a> <i>profile-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | For an MPC/MIC interface, determine the percentage of excess bandwidth for low-priority traffic to share.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Options</b>                  | <p><b><i>percentage</i></b>—Percentage of the excess bandwidth to share.<br/> <b>Range:</b> 0 through 100 percent</p> <p><b><i>value</i></b>—Proportion of the excess bandwidth to share.<br/> <b>Range:</b> 0 through 1000</p> <p><b>\$junos-cos-excess-rate-low</b>—Variable for the excess rate that is specified for low-priority traffic on the logical interface. The variable is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Managing Excess Bandwidth Distribution for Dynamic CoS on MIC and MPC Interfaces on page 142</a></li> <li>• <a href="#">output-traffic-control-profile on page 613</a></li> </ul>                                                                                                                                                                                                       |

## exclude (Dynamic MLD Interface)

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|                                 |                                                                                                                                                                                                                |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | exclude;                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>mld interface</b> <i>interface-name</i> <b>static group</b> <i>multicast-group-address</i> ]                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                 |
| <b>Description</b>              | Configure the group to operate in exclude mode on the dynamic interface. In exclude mode all sources except the address configured are accepted for the group. By default, the group operates in include mode. |
| <b>Required Privilege Level</b> | view-level—To view this statement in the configuration.<br>control-level—To add this statement to the configuration.                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li><li>• <a href="#">Enabling MLD Static Group Membership</a></li></ul>                                |

## fail-filter (Dynamic Profiles)

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|                                 |                                                                                                                                                                                                                                                                                              |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | fail-filter <i>filter-name</i> ;                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> interfaces demux0 unit <i>logical-unit-number</i> family <i>family</i> <b>rpf-check</b> ],<br>[edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i> <b>rpf-check</b> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3.                                                                                                                                                                                                                                               |
| <b>Description</b>              | Specify a filter that evaluates packets that fail a unicast RPF check. The filter determines what action to take with the failed packets. If the fail filter is not configured, the failed packets are silently discarded.                                                                   |
| <b>Options</b>                  | <i>filter-name</i> —Name of the filter that evaluates packets that fail the RPF check.                                                                                                                                                                                                       |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Unicast RPF</a></li><li>• <a href="#">Configuring a Fail Filter for Unicast RPF in Dynamic Profiles for Subscriber Interfaces on page 327</a></li></ul>                                                                      |



## family (Dynamic Firewalls)

```
Syntax family family {
 fast-update-filter filter-name {
 interface-specific;
 match-order [match-order];
 term term-name {
 from {
 match-conditions;
 }
 then {
 action;
 action-modifiers;
 }
 only-at-create;
 }
 }
 filter uid {
 enhanced-mode-override;
 interface-shared;
 interface-specific;
 term term-name {
 from {
 match-conditions;
 }
 then {
 action;
 action-modifiers;
 }
 }
 }
 }
```

**Hierarchy Level** [edit [dynamic-profiles](#) *profile-name* [firewall](#)]

**Release Information** Statement introduced in Junos OS Release 9.6.

**Description** Configure fast update filters or parameterized filters for a protocol family.

**Options** *family*—Protocol family:

- **inet**—Internet Protocol version 4 suite
- **inet6**—Internet Protocol version 6 suite

*uid*—You must assign a variable UID as the name of parameterized filters.

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 Fast Update Filters on page 310](#)

## family (Dynamic Standard Interface)

```
Syntax family family {
 access-concentrator name;
 address address;
 direct-connect;
 duplicate-protection;
 dynamic-profile profile-name;
 filter {
 adf {
 counter;
 input-precedence precedence;
 not-mandatory;
 output-precedence precedence;
 rule rule-value;
 }
 input filter-name {
 precedence precedence;
 }
 output filter-name {
 precedence precedence;
 }
 }
 mac-validate (loose | strict);
 max-sessions number;
 max-sessions-vsa-ignore;
 rpf-check {
 fail-filter filter-name;
 mode loose;
 }
 service {
 input {
 service-set service-set-name {
 service-filter filter-name;
 }
 post-service-filter filter-name;
 }
 output {
 service-set service-set-name {
 service-filter filter-name;
 }
 }
 }
 service-name-table table-name
 short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
 maximum-seconds>;
 unnumbered-address interface-name <preferred-source-address address>;
}
```

Hierarchy Level [edit [dynamic-profiles](#) *profile-name* [interfaces](#) *interface-name* [unit](#) *logical-unit-number*]

Release Information Statement introduced in Junos OS Release 9.2.  
Option **pppoe** introduced in Junos OS Release 11.2.

**Description** Configure protocol family information for the logical interface.



**NOTE:** Not all subordinate stanzas are available to every protocol family.

**Options** *family*—Protocol family:

- **inet**—IP version 4 suite
- **inet6**—IP version 6 suite
- **pppoe**—(MX Series routers with MPCs only) Point-to-Point Protocol over Ethernet
- **vpls**—Virtual private LAN service

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 Static Routing on Logical Systems*
- *Configuring the Protocol Family*

## fast-update-filter (Dynamic Firewalls)

|                                 |                                                                                                                                                                                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>fast-update-filter <i>filter-name</i> {   interface-specific;   match-order [<i>match-order</i>];   term <i>term-name</i> {     from {       match-conditions;     }     then {       action;       action-modifiers;     }     only-at-create;   } }</pre>                  |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> firewall <b>family</b> <i>family</i> ]                                                                                                                                                                                                 |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.6.                                                                                                                                                                                                                                     |
| <b>Description</b>              | Configure fast update firewall filters in a dynamic profile.                                                                                                                                                                                                                      |
| <b>Options</b>                  | <p><b><i>filter-name</i></b>—Name that identifies the filter. The name can contain letters, numbers, and hyphens (-) and can be up to 64 characters long. To include spaces in the name, enclose it in quotation marks (" ").</p> <p>The statements are explained separately.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Fast Update Filters on page 310</a></li> </ul>                                                                                                                                                                   |

## filter (Configuring)

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|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                   | <pre>filter <i>filter-name</i> {<br/>    accounting-profile <i>name</i>;<br/>    enhanced-mode;<br/>    interface-shared;<br/>    interface-specific;<br/>    physical-interface-filter;<br/>    term <i>term-name</i> {<br/>        ... term configuration ...<br/>    }<br/>}</pre>                                                                                                                                                                                                                                          |
| Hierarchy Level          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall family <i>family-name</i> ],<br>[edit firewall family <i>family-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> firewall family <i>family-name</i> ]                                                                                                                                                                                                                                                                                       |
| Release Information      | Statement introduced before Junos OS Release 7.4.<br>Logical systems support introduced in Junos OS Release 9.3.<br><b>physical-interface-filter</b> statement introduced in Junos OS Release 9.6.<br>Support at the [edit <a href="#">dynamic-profiles</a> ... <b>family</b> <i>family-name</i> ] hierarchy level introduced in Junos OS Release 11.4.<br>Support for the <b>interface-shared</b> > statement introduced in Junos OS Release 12.2.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches. |
| Description              | Configure firewall filters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Options                  | <p><b><i>filter-name</i></b>—Name that identifies the filter. This must be a non-reserved string of not more than 64 characters. To include spaces in the name, enclose it in quotation marks (" "). Firewall filter names are restricted from having the form <b>__.*__</b> (beginning and ending with underscores) or <b>__.*</b> (beginning with an underscore).</p> <p>The remaining statements are explained separately.</p>                                                                                              |
| Required Privilege Level | firewall—To view this statement in the configuration.<br>firewall-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                          |
| Related Documentation    | <ul style="list-style-type: none"><li>• <i>Guidelines for Configuring Firewall Filters</i></li><li>• <i>Guidelines for Applying Firewall Filters</i></li><li>• <i>Configuring Multifield Classifiers</i></li><li>• <i>Using Multifield Classifiers to Set PLP</i></li><li>• <i>simple-filter (Configuring)</i></li></ul>                                                                                                                                                                                                       |

## filter (Dynamic Firewalls)

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                   | <pre> filter {   adf {     counter;     input-precedence <i>precedence</i>;     not-mandatory;     output-precedence <i>precedence</i>;     rule <i>rule-value</i>;   }   input <i>filter-name</i> {     precedence <i>precedence</i>;     shared-name <i>filter-shared-name</i>;   }   output <i>filter-name</i> {     precedence <i>precedence</i>;     shared-name <i>filter-shared-name</i>;   } } </pre>                                                                 |
| Hierarchy Level          | <p>[edit <b>dynamic-profiles</b> <i>profile-name</i> <b>interfaces</b> <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> <b>family</b> <i>family</i>],</p> <p>[edit <b>dynamic-profiles</b> <i>profile-name</i> <b>interfaces</b> demux0 <b>unit</b> <i>logical-unit-number</i> <b>family</b> <i>family</i>],</p> <p>[edit <b>dynamic-profiles</b> <i>profile-name</i> <b>interfaces</b> pp0 <b>unit</b> "\$junos-interface-unit" <b>family</b> <i>family</i>]</p> |
| Release Information      | <p>Statement introduced in Junos OS Release 9.2.</p> <p>Support at the [edit <b>dynamic-profiles</b> <i>profile-name</i> <b>interfaces</b> pp0 <b>unit</b> "\$junos-interface-unit" <b>family</b> <i>family</i>] hierarchy level introduced in Junos OS Release 10.1.</p> <p><b>shared-name</b> statement added in Junos OS Release 12.2.</p>                                                                                                                                 |
| Description              | <p>Apply a dynamic filter to an interface. You can configure filters for either <b>family inet</b> or <b>family inet6</b>, and the filters can be classic filters, fast update filters, or (for the <b>adf</b> statement) Ascend-Data-Filters. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.</p>                                                                                                   |
| Options                  | <p><b>input <i>filter-name</i></b>—Name of one filter to evaluate when packets are received on the interface.</p> <p><b>output <i>filter-name</i></b>—Name of one filter to evaluate when packets are transmitted on the interface.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                             |
| Required Privilege Level | <p><b>interface</b>—To view this statement in the configuration.</p> <p><b>interface-control</b>—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                              |
| Related Documentation    | <ul style="list-style-type: none"> <li>• <a href="#">Firewall Filters Overview</a></li> <li>• <a href="#">Understanding Dynamic Firewall Filters on page 249</a></li> <li>• <a href="#">Classic Filters Overview on page 253</a></li> </ul>                                                                                                                                                                                                                                   |

- [Basic Classic Filter Syntax on page 256](#)

## filter (Dynamic Interface Unit)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>filter {<br/>  input <i>filter-name</i>;<br/>  output <i>filter-name</i>;<br/>}</pre>                                                                                                                                                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> ],<br>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> demux0 <a href="#">unit</a> <i>logical-unit-number</i> ],                                                                                                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b>              | Apply a dynamic filter to an interface, regardless of its family type.                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Options</b>                  | <p><b>input <i>filter-name</i></b>—Name of one filter to evaluate when packets are received on the interface.</p> <p><b>output <i>filter-name</i></b>—Name of one filter to evaluate when packets are transmitted on the interface.</p> <p>The remaining statement is explained separately.</p>                                                                                                                                           |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Firewall Filters</a></li><li>• <a href="#">Understanding Dynamic Firewall Filters on page 249</a></li><li>• <a href="#">Classic Filters Overview on page 253</a></li><li>• <a href="#">Basic Classic Filter Syntax on page 256</a></li><li>• <a href="#">Dynamically Attaching Statically Created Filters for Any Interface Type on page 268</a></li></ul> |



## filter-specific

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | filter-specific;                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall <a href="#">policer</a> <i>policer-name</i> ],<br>[edit firewall family inet prefix-action <i>name</i> ],<br>[edit firewall <a href="#">policer</a> <i>policer-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> firewall <a href="#">policer</a> <i>policer-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> firewall family inet prefix-action <i>name</i> ] |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Logical systems support introduced in Junos OS Release 9.3.<br>Support at the [edit <a href="#">dynamic-profiles</a> ... <a href="#">policer</a> <i>policer-name</i> ] hierarchy level introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.                                                                                                     |
| <b>Description</b>              | Set the prefix-specific action or policer to operate in <i>filter-specific</i> mode, meaning that a single policer and counter are shared by all filter terms that reference the prefix-specific action or policer. By default, the prefix-specific action or policer operates in <i>term-specific</i> mode, meaning that a separate policer and counter are used for each filter term that references the prefix-specific action or policer.                   |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Filter-Specific Policer Overview</i></li> <li>• <i>Prefix-Specific Counting and Policing Overview</i></li> <li>• <i>Filter-Specific Counter and Policer Set Overview</i></li> </ul>                                                                                                                                                                                                                                 |

## firewall (Dynamic Firewalls)

---

```
Syntax firewall {
 family family {
 fast-update-filter filter-name {
 interface-specific;
 match-order [match-order];
 term term-name {
 from {
 match-conditions;
 }
 then {
 action;
 action-modifiers;
 }
 only-at-create;
 }
 }
 }
 filter uid {
 enhanced-mode-override;
 interface-shared;
 interface-specific;
 term term-name {
 from {
 match-conditions;
 }
 then {
 action;
 action-modifiers;
 }
 }
 }
 hierarchical-policer uid {
 aggregate {
 if-exceeding {
 bandwidth-limit-limit bps;
 burst-size-limit bytes;
 }
 then {
 policer-action;
 }
 }
 premium {
 if-exceeding {
 bandwidth-limit bps;
 burst-size-limit bytes;
 }
 then {
 policer-action;
 }
 }
 }
 policer uid {
```

```

filter-specific;
if-exceeding {
 (bandwidth-limit bps | bandwidth-percent percentage);
 burst-size-limit bytes;
}
logical-bandwidth-policer;
logical-interface-policer;
physical-interface-policer;
then {
 policer-action;
}
}
three-color-policer uid {
 action {
 loss-priority high then discard;
 }
 logical-interface-policer;
 single-rate {
 (color-aware | color-blind);
 committed-burst-size bytes;
 committed-information-rate bps;
 excess-burst-size bytes;
 }
 two-rate {
 (color-aware | color-blind);
 committed-burst-size bytes;
 committed-information-rate bps;
 peak-burst-size bytes;
 peak-information-rate bps;
 }
}
}

```

**Hierarchy Level** [edit [dynamic-profiles](#) *profile-name*]

**Release Information** Statement introduced in Junos OS Release 9.6.  
The **filter**, **hierarchical-policer**, **policer**, and **three-color-policer** statements introduced in Junos OS Release 11.4.

**Description** Configure firewall filters and policers in a dynamic profile.

**Options** *uid*—You must assign a variable UID as the name of firewall filters and policers.  
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**

- [Methods for Regulating Traffic by Applying Hierarchical Policers on page 231](#)
- [Configuring Fast Update Filters on page 310](#)

## flow-tap-dtcp

---

|                                 |                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>flow-tap-dtcp {<br/>    ssh {<br/>        connection-limit <i>limit</i>;<br/>        rate-limit <i>limit</i>;<br/>    }<br/>}</pre>                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit system services]                                                                                                                                                                                                                                                                                                  |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 8.1.                                                                                                                                                                                                                                                                           |
| <b>Description</b>              | Configure Dynamic Tasking Control Protocol (DTCP) sessions to run over SSH in support of the flow-tap application. Note that the flow-tap feature is not supported on outbound, or egress, traffic. Only inbound, or ingress, traffic is supported.                                                                     |
| <b>Options</b>                  | <p><b>connection-limit <i>limit</i></b>—(Optional) Maximum number of connections allowed.<br/><b>Range:</b> 1 through 250<br/><b>Default:</b> 75</p> <p><b>rate-limit <i>limit</i></b>—(Optional) Maximum number of connection attempts allowed per minute.<br/><b>Range:</b> 1 through 250<br/><b>Default:</b> 150</p> |
| <b>Required Privilege Level</b> | flow-tap—To view this statement in the configuration.<br>flow-tap-control—To add this statement to the configuration.                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring DTCP-over-SSH Service for the Flow-Tap Application</a></li></ul>                                                                                                                                                                                        |

## forwarding-class (Dynamic Scheduler Maps)

---

|                                 |                                                                                                                                                                                                                                                 |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>forwarding-class <i>class-name</i>;</pre>                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> <a href="#">scheduler-maps</a> <i>map-name</i> ]                                                                                                    |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.3.                                                                                                                                                                                                   |
| <b>Description</b>              | Associate a scheduler with a scheduler map.                                                                                                                                                                                                     |
| <b>Options</b>                  | <b><i>class-name</i></b> —Name of the forwarding class.                                                                                                                                                                                         |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li><li>• <a href="#">Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13</a></li></ul> |

## forwarding-class (Subscriber Secure Policy)

---



|                                 |                                                                                                                                                                                                                                |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | forwarding-class <i>class-name</i> ;                                                                                                                                                                                           |
| <b>Hierarchy Level</b>          | [edit services <a href="#">radius-flow-tap</a> ]                                                                                                                                                                               |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4.                                                                                                                                                                                  |
| <b>Description</b>              | Specify forwarding class that is applied to mirrored packets sent to a mediation device.                                                                                                                                       |
| <b>Options</b>                  | <i>class-name</i> —Name of the forwarding class.                                                                                                                                                                               |
| <b>Required Privilege Level</b> | flow-tap—To view this statement in the configuration.<br>flow-tap-control—To add this statement to the configuration.                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Subscriber Secure Policy Overview on page 385</a></li><li>• <a href="#">Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390</a></li></ul> |

## fpc (MX Series 3D Universal Edge Routers)

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre> fpc slot-number {     inline-services {         flow-table-size {             ipv4-flow-table-size units;             ipv4-flow-table-size units;         }     }     pic number {         inline-services {             bandwidth (1g   10g);         }         port-mirror-instance port-mirroring-instance-name-pic-level;         tunnel-services {             bandwidth (1g   10g)         }     }     port-mirror-instance port-mirroring-instance-name-fpc-level; } </pre>                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>     | [edit chassis]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Release Information</b> | <p>Statement introduced in Junos OS Release 8.2.</p> <p>Option <b>port-mirror-instance</b> introduced in Junos OS Release 9.3.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b>         | <p>Configure properties for the DPC or MPC and corresponding Packet Forwarding Engines to create tunnel interfaces.</p> <p>(MX Series Virtual Chassis only) To configure properties for MPCs in a member router in an MX Series Virtual Chassis configuration, you must specify the router's Virtual Chassis member number <i>before</i> the <b>fpc</b> statement. Specify the member number in the form <b>member member-id</b>, where <i>member-id</i> is 0 or 1. If you do not specify the member number before the <b>fpc</b> statement, the commit operation fails and the software displays an error message indicating that the <b>fpc</b> statement must include the member number for routers in Virtual Chassis mode.</p> |
| <b>Options</b>             | <p><b>fpc slot-number</b>—Specify the slot number of the DPC.</p> <p><b>Range:</b> 0 through 11</p> <p><b>pic number</b>—Specify the number of the Packet Forwarding Engine. Each DPC includes four Packet Forwarding Engines.</p> <p><b>Range:</b> 0 through 4</p> <p><b>port-mirror-instance port-mirroring-instance-name-fpc-level</b>—Associate a port-mirroring instance with the DPC and its corresponding PICs. The port-mirroring instance is configured under the <b>[edit forwarding-options port-mirroring]</b> hierarchy level.</p> <p>The remaining statements are explained separately.</p>                                                                                                                           |

|                              |                                                                                                                                                                                          |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege</b>    | interface—To view this statement in the configuration.                                                                                                                                   |
| <b>Level</b>                 | interface-control—To add this statement to the configuration.                                                                                                                            |
| <b>Related Documentation</b> | <ul style="list-style-type: none"><li>• <i>Configuring Port-Mirroring Instances on MX Series 3D Universal Edge Routers</i></li><li>• <i>Enabling Inline Service Interfaces</i></li></ul> |

## frame-mode (Dynamic Traffic Shaping)

|                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                                                                                                                                                                                                                                                                                | frame-mode ( <a href="#">bytes</a>   <a href="#">\$junos-cos-byte-adjust</a>   frame-mode-bytes <i>frame-mode-bytes</i>   <a href="#">\$junos-cos-byte-adjust-frame</a> );                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Hierarchy Level                                                                                                                                                                                                                                                                       | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> <a href="#">traffic-control-profiles</a> <i>profile-name</i> ],<br>[edit <a href="#">class-of-service</a> <a href="#">traffic-control-profiles</a> <i>profile-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Release Information                                                                                                                                                                                                                                                                   | Statement introduced in Junos OS Release 10.2.<br>Variable <i>\$junos-cos-byte-adjust-frame</i> introduced in Junos OS Release 13.1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Description                                                                                                                                                                                                                                                                           | Configure the mode to shape downstream ATM traffic based as frames.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Default                                                                                                                                                                                                                                                                               | The default is <b>frame-mode</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Options                                                                                                                                                                                                                                                                               | <p><b>bytes</b>—Byte adjustment value for the <b>cell-mode</b> or <b>frame-mode</b> shaping options.</p> <p><b>\$junos-cos-byte-adjust</b>—Predefined variable for byte adjustment that is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> <p><b>frame-mode-bytes</b> <i>frame-mode-bytes</i>—Overhead bytes when in frame-mode. Traffic shaping is based on the number of bytes in the frame, without regard to cell encapsulation or padding overhead.</p> <p><b>\$junos-cos-byte-adjust-frame</b>—Predefined variable for frame mode shaping. This variable can not be used when the <b>overhead-accounting bytes bytes</b> option is configured.</p> |
| <div>  <p><b>BEST PRACTICE:</b> We recommend using the <b>frame-mode-bytes</b> <i>frame-mode-bytes</i> option rather than the <b>bytes</b> option.</p> </div> <p>Range: –120 through 124 bytes</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <div>  <p><b>NOTE:</b> If you specify a value for the <b>bytes bytes</b> option, you cannot specify a value for either the <b>frame-mode-bytes</b> option.</p> </div>                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Required Privilege Level                                                                                                                                                                                                                                                              | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Related Documentation                                                                                                                                                                                                                                                                 | <ul style="list-style-type: none"> <li>• <a href="#">CoS Adjustment Control Profiles Overview on page 189</a></li> <li>• <a href="#">Configuring CoS Adjustment Control Profiles on page 191</a></li> <li>• <a href="#">adjustment-control-profiles on page 491</a></li> <li>• <a href="#">Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 121</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                |



- [Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 119](#)
- *egress-shaping-overhead*
- [bytes on page 510](#)
- [cell-mode on page 512](#)

## from (Captive Portal Content Delivery)

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|                                 |                                                                                                                                                                                               |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> from {   application [junos-http, junos-https, junos-httpproxy];   destination-address address &lt;except&gt;;   destination-prefix-list list-name &lt;except&gt;; } </pre>             |
| <b>Hierarchy Level</b>          | [edit services captive-portal-content-delivery rule <i>rule-name</i> <b>term</b> <i>term-name</i> ]                                                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.4.                                                                                                                                                |
| <b>Description</b>              | Specify input conditions for a captive portal term.                                                                                                                                           |
| <b>Options</b>                  | The remaining statements are explained separately.                                                                                                                                            |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Redirecting HTTP Requests Overview on page 353</a></li> <li>• <i>Firewall Filter Match Conditions Based on Address Fields</i></li> </ul> |

## from (Subscriber Secure Policy)

---

|                                 |                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>from {<br/>  apply-groups <i>group-name</i>;<br/>  apply-groups-except <i>group-name</i>;<br/>  destination-address <i>address</i>;<br/>  destination-port <i>port-number</i>;<br/>  dscp <i>dscp-value</i>;<br/>  protocol <i>protocol</i>;<br/>  source-address <i>address</i>;<br/>  source-port <i>port-number</i>;<br/>}</pre> |
| <b>Hierarchy Level</b>          | [edit services <a href="#">radius-flow-tap</a> <i>policy-name</i> <a href="#">inet</a>   <a href="#">inet6</a> ]                                                                                                                                                                                                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3.                                                                                                                                                                                                                                                                                           |
| <b>Description</b>              | <p>Define the match criteria for the drop-policy rule.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                     |
| <b>Required Privilege Level</b> | <p>flow-tap—To view this statement in the configuration.</p> <p>flow-tap-control—To add this statement to the configuration.</p>                                                                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Subscriber Secure Policy Overview on page 385</a></li><li>• <a href="#">Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390</a></li></ul>                                                                                                           |

## group (Dynamic IGMP Interface)

**Syntax** For group configuration with a source, use the following syntax:

```
group ip-address {
 source ip-address;
}
```

For group configuration without a source, use the following syntax:

```
group group;
```

**Hierarchy Level** [edit dynamic-profiles *profile-name* protocols **igmp interface** *interface-name* **static**],

**Release Information** Statement introduced in Junos OS Release 9.2.

**Description** When configuring with a source address, configure the IGMP multicast group address that receives data on an interface and a source address for certain packets. For configuration without a source address, configure only the IGMP multicast group address that receives data on an interface.

**Options** *ip-address*—Group IP address.

*group*—Name of group.



**NOTE:** You must specify a unique address for each group.

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

**Related Documentation**

- [Dynamic IGMP Configuration Overview on page 343](#)
- [Configuring Dynamic DHCP Client Access to a Multicast Network on page 344](#)
- [Enabling IGMP Static Group Membership](#)

## group (Dynamic MLD Interface)

---

**Syntax**    `group multicast-group-address {  
              exclude;  
              group-count number;  
              group-increment increment;  
              source ip-address {  
                  source-count number;  
                  source-increment increment;  
              }  
          }`

**Hierarchy Level**    [edit dynamic-profiles *profile-name* protocols **mld** interface *interface-name* **static**]

**Release Information**    Statement introduced in Junos OS Release 10.1.

**Description**    The MLD multicast group address and (optionally) the source address for the multicast group being dynamically configured on an interface.

**Options**    *multicast-group-address*—Address of the group.



**NOTE:** You must specify a unique address for each group.

---

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**    • [Dynamic MLD Configuration Overview on page 349](#)  
                                  • [Enabling MLD Static Group Membership](#)

## group-count (Dynamic MLD Interface)

|                                 |                                                                                                                                                                                    |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>group-count <i>number</i>;</code>                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>mld interface</b> <i>interface-name</i> <b>static group</b> <i>multicast-group-address</i> ]                               |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                     |
| <b>Description</b>              | Configure the number of static groups to be created over the dynamic interface.                                                                                                    |
| <b>Options</b>                  | <i>number</i> —Number of static groups.<br><b>Default:</b> 1<br><b>Range:</b> 1 through 512                                                                                        |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li> <li>• <a href="#">Enabling MLD Static Group Membership</a></li> </ul> |

## group-increment (Dynamic MLD Interface)

|                                 |                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>group-increment <i>increment</i>;</code>                                                                                                                                           |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>mld interface</b> <i>interface-name</i> <b>static group</b> <i>multicast-group-address</i> <b>source</b> ]                       |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                           |
| <b>Description</b>              | Configure the number of times the address should be incremented for each static group created on a dynamic interface. The increment is specified in a format similar to an IPv6 address. |
| <b>Options</b>                  | <i>increment</i> —Number of times the address should be incremented.<br><b>Default:</b> ::1<br><b>Range:</b> ::1 through ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff:                        |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li> <li>• <a href="#">Enabling MLD Static Group Membership</a></li> </ul>       |

## group-limit (Dynamic IGMP Interface)

---

|                                 |                                                                                                                                                                                                                                                                                                                |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>group-limit <i>limit</i>;</code>                                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>igmp</b> interface <i>interface-name</i> ],                                                                                                                                                                                                            |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.4.                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | Configure a limit for the number of multicast groups (or [S,G] channels in IGMPv3) allowed on a dynamic logical interface. After this limit is reached, new reports will be ignored and all related flows are not flooded on the logical interface.                                                            |
| <b>Default</b>                  | By default, there is no limit to the number of multicast groups that can join the interface.                                                                                                                                                                                                                   |
| <b>Options</b>                  | <b>limit</b> —group limit value for the interface.<br><b>Range:</b> 1 through 32767                                                                                                                                                                                                                            |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li><li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li><li>• <i>Limiting the Number of IGMP Multicast Group Joins on Logical Interfaces</i></li></ul> |

## group-limit (Dynamic MLD Interface)

|                                 |                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>group-limit <i>limit</i>;</code>                                                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>mls</b> <b>interface</b> <i>interface-name</i> ]                                                                                                                                                                                                                     |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.4.                                                                                                                                                                                                                                                                               |
| <b>Description</b>              | Configure a limit for the number of multicast groups (or [S,G] channels in MLDv2) allowed on a dynamic logical interface. After this limit is reached, new reports will be ignored and all related flows are not flooded on the logical interface.                                                                           |
| <b>Default</b>                  | By default, there is no limit to the number of multicast groups that can join the interface.                                                                                                                                                                                                                                 |
| <b>Options</b>                  | <i>limit</i> —group limit value for the interface.<br><b>Range:</b> 1 through 32767                                                                                                                                                                                                                                          |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li> <li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li> <li>• <a href="#">Configuring the Number of MLD Multicast Group Joins on Logical Interfaces</a></li> </ul> |

## group-policy (Dynamic IGMP Interface)

|                                 |                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>group-policy <i>policy-name</i>;</code>                                                                                                                                                                                                                                                                   |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>igmp</b> <b>interface</b> <i>interface-name</i> ]                                                                                                                                                                                                       |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                                                                   |
| <b>Description</b>              | Compare the IGMPv2 or IGMPv3 group against the specified group policy, after receiving an IGMP report, and perform the action configured in that policy (for example, reject the report).                                                                                                                       |
| <b>Options</b>                  | <i>policy-name</i> —Name of the group policy.                                                                                                                                                                                                                                                                   |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li> <li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li> <li>• <a href="#">Filtering Unwanted IGMP Reports at the IGMP Interface Level</a></li> </ul> |

## group-policy (Dynamic MLD Interface)

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|                                 |                                                                                                                                                                                             |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>group-policy <i>policy-name</i>;</code>                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>mld interface</b> <i>interface-name</i> ]                                                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                              |
| <b>Description</b>              | Compare the MLDv1 or MLDv2 group against the specified group policy, after receiving an MLD report, and perform the action configured in that policy (for example, reject the report).      |
| <b>Options</b>                  | <i>policy-name</i> —Name of the group policy.                                                                                                                                               |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li><li>• <i>Filtering Unwanted MLD Reports at the MLD Interface Level</i></li></ul> |



## guaranteed-rate (Dynamic Traffic Shaping)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>guaranteed-rate (rate   \$junos-cos-guaranteed-rate) &lt;burst-size [ bytes   \$junos-cos-guaranteed-rate-burst]&gt;;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles profile-name</a> <a href="#">class-of-service traffic-control-profiles profile-name</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.<br>The <b>\$junos-cos-guaranteed-rate</b> variable introduced in Junos OS Release 9.4.<br>Option <b>burst-size</b> introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Description</b>              | Configure a guaranteed minimum rate for a logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Default</b>                  | If you do not include this statement and you do not include the <b>delay-buffer-rate</b> statement, the logical interface receives a minimal delay-buffer rate and minimal bandwidth equal to 2 MTU-sized packets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Options</b>                  | <p><b>rate</b>—Guaranteed rate in bits per second (bps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation <b>k</b> (1000), <b>m</b> (1,000,000), or <b>g</b> (1,000,000,000).<br/> <b>Range:</b> 1000 through 6,400,000,000,000 bps</p> <p><b>\$junos-cos-guaranteed-rate</b>—Junos predefined variable that is replaced with the guaranteed rate obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> <p><b>burst-size bytes</b>—(Optional) Maximum burst size, in bytes.<br/> <b>Range:</b> 0 through 1,000,000,000</p> <p><b>\$junos-cos-guaranteed-rate-burst</b>—(Optional) Variable for the burst-size that is specified for the guaranteed rate. Use this variable at the <a href="#">[edit dynamic-profiles profile-name class-of-service traffic-control-profile]</a> hierarchy level.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Configuring Traffic Scheduling and Shaping for Subscriber Access on page 11</a></li> <li>• <a href="#">output-traffic-control-profile on page 613</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## hierarchical-policer

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|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                   | <pre>hierarchical-policer <i>hierarchical-policer-name</i>   uid {<br/>  aggregate {<br/>    if-exceeding {<br/>      bandwidth-limit <i>bps</i>;<br/>      burst-size-limit <i>bytes</i>;<br/>    }<br/>    then {<br/>      discard;<br/>    }<br/>  }<br/>  premium {<br/>    if-exceeding {<br/>      bandwidth-limit <i>bps</i>;<br/>      burst-size-limit <i>bytes</i>;<br/>    }<br/>    then {<br/>      discard;<br/>    }<br/>  }<br/>}</pre>                                   |
| Hierarchy Level          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <b>firewall</b> ],<br>[edit <b>firewall</b> ]                                                                                                                                                                                                                                                                                                                                                                                   |
| Release Information      | Statement introduced in Junos OS Release 9.5.<br>Support at the [edit <b>dynamic-profiles ... firewall</b> ] hierarchy level introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                                                                                          |
| Description              | Specify a hierarchical policer on Enhanced Intelligent Queuing (IQE) PICs and SONET interfaces hosted on M120 and M320 edge routers with incoming Flexible PIC Concentrators (FPCs) as SFPC and outgoing FPCs as FFPC; on MPCs hosted on MX Series routers; on T320, T640, and T1600 core routers with Enhanced Intelligent Queuing (IQE) PICs; and on T4000 routers with Type 5 FPC and Enhanced Scaling Type 4 FPC.                                                                      |
| Options                  | <p><b><i>hierarchical-policer-name</i></b>—Name that identifies the policer. The name can contain letters, numbers, and hyphens (-), and can be up to 255 characters long. To include spaces in the name, enclose it in quotation marks (" ").</p> <p><b><i>uid</i></b>—When you configure a hierarchical policer at the [edit <b>dynamic-profiles</b>] hierarchy level, you must assign a variable UID as the policer name.</p> <p>The remaining statements are explained separately.</p> |
| Required Privilege Level | <b>firewall</b> —To view this statement in the configuration.<br><b>firewall-control</b> —To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                      |
| Related Documentation    | <ul style="list-style-type: none"><li><i>Hierarchical Policer Configuration Overview</i></li><li><i>Hierarchical Policers</i></li></ul>                                                                                                                                                                                                                                                                                                                                                    |

- [aggregate \(Hierarchical Policer\) on page 494](#)
- *bandwidth-limit (Hierarchical Policer)*
- [burst-size-limit \(Hierarchical Policer\) on page 507](#)
- [if-exceeding \(Hierarchical Policer\) on page 579](#)
- [premium \(Hierarchical Policer\) on page 629](#)

## hierarchical-scheduler (Subscriber Interfaces on MX Series Routers)

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|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre>hierarchical-scheduler {<br/>    implicit-hierarchy;<br/>    maximum-hierarchy-levels <i>number</i>;<br/>}</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Hierarchy Level</b>     | [edit interfaces <i>interface-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b> | <p>Statement introduced in Junos OS Release 10.1.</p> <p>Option <b>implicit-hierarchy</b> introduced in Junos OS Release 13.1.</p> <p>Support on GRE tunnel interfaces configured on physical interfaces on MICs or MPCs in MX Series routers added in Junos OS Release 13.3.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>         | <p>Configure hierarchical scheduling options on the interface.</p> <p>The statement is supported on the following interfaces:</p> <ul style="list-style-type: none"><li>• MIC and MPC interfaces in MX Series routers</li><li>• GRE tunnel interfaces configured on physical interfaces hosted on MIC or MPC line cards in MX Series routers</li></ul> <p>To enable hierarchical scheduling on MX Series routers, configure the <b>hierarchical-scheduler</b> statement at each member physical interface level of a particular aggregated Ethernet interface as well as at that aggregated Ethernet interface level. On other routing platforms, it is enough if you include this statement at the aggregated Ethernet interface level.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Options</b>             | <p><b>implicit-hierarchy</b>—Configure three-level hierarchical scheduling. When you include the <b>implicit-hierarchy</b> option, a hierarchical relationship is formed between the CoS scheduler nodes at level 1, level 2, and level 3. The <b>implicit-hierarchy</b> option is supported only on MPC/MIC subscriber interfaces and interface sets running over aggregated Ethernet on MX Series routers.</p> <p><b>maximum-hierarchy-levels <i>number</i></b>—Configure two-level hierarchical scheduling. Specify the maximum number of hierarchical scheduling levels allowed for node scaling. The only supported value is 2. The <b>maximum-hierarchy-levels</b> option is supported on MPC/MIC or EQ DPC subscriber interfaces and interface sets running over aggregated Ethernet on MX Series routers.</p> <ul style="list-style-type: none"><li>• If you include the <b>maximum-hierarchy-levels</b> option, interface sets are allowed only at level 3; they are not allowed at level 2. In this case, if you configure a level 2 interface set, you generate Packet Forwarding Engine errors.</li><li>• If you do not include the <b>maximum-hierarchy-levels</b> option, interface sets can be at either level 2 or level 3, depending on whether the member logical interfaces within the interface set have a traffic control profile. If any member logical interface has a traffic control profile, then the interface set is a level 2 CoS scheduler node. If no member logical interface has a traffic control profile, the interface set is at level 3.</li></ul> |

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | view-level—To view this statement in the configuration.<br>control-level—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Understanding Two-Level and Three-Level Hierarchical CoS for Subscriber Interfaces on page 25</a></li> <li>• <a href="#">Configuring Hierarchical CoS for a Subscriber Interface of Aggregated Ethernet Links on page 36</a></li> <li>• <a href="#">Configuring Hierarchical Schedulers for CoS</a></li> <li>• <a href="#">Configuring Hierarchical CoS on a Static PPPoE Subscriber Interface on page 37</a></li> <li>• <a href="#">Hierarchical CoS on MPLS Pseudowire Subscriber Interfaces Overview on page 65</a></li> </ul> |

## ieee-802.1 (Dynamic Classifiers)

|                                 |                                                                                                                                                                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | ieee-802.1 ( <i>classifier-name</i>   default) <b>vlan-tag</b> (inner   outer);                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> class-of-service interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> <b>classifiers</b> ]                                                                                                                                                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                                                                                                             |
| <b>Description</b>              | Apply an IEEE-802.1 classifier to a subscriber interface in a dynamic profile.                                                                                                                                                                                                                             |
| <b>Options</b>                  | <p><b>classifier-name</b>—Name of a <b>classifier</b> mapping configured at the [edit class-of-service classifier <b>ieee-802.1</b>] hierarchy level.</p> <p><b>default</b>—The default mapping.</p> <p>The remaining statement is explained separately.</p>                                               |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 226</a></li> <li>• <a href="#">classifiers (Definition)</a></li> </ul> |

## ieee-802.1 (Dynamic Rewrite Rules)

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|                                 |                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | ieee-802.1 ( <i>rewrite-name</i>   default) <b>vlan-tag</b> (outer   outer-and-inner);                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> class-of-service interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> <b>rewrite-rules</b> ]                                                                                                                                      |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                                                                                                  |
| <b>Description</b>              | Apply an IEEE-802.1 rewrite rule to a subscriber interface in a dynamic profile.                                                                                                                                                                                                                |
| <b>Options</b>                  | <p><b>rewrite-name</b>—Name of a <b>rewrite-rules</b> mapping configured at the [edit class-of-service <b>rewrite-rules</b> <b>ieee-802.1</b>] hierarchy level.</p> <p><b>default</b>—The default mapping.</p> <p>The remaining statement is explained separately.</p>                          |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li><li>• <a href="#">Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile on page 225</a></li><li>• <i>rewrite-rules</i></li></ul> |

## if-exceeding (Hierarchical Policer)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>if-exceeding {     bandwidth-limit <i>bps</i>;     burst-size-limit <i>bytes</i>; }</pre>                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles profile-name</a> firewall <a href="#">hierarchical-policer aggregate</a> ],<br>[edit <a href="#">dynamic-profiles profile-name</a> firewall <a href="#">hierarchical-policer premium</a> ],<br>[edit firewall <a href="#">hierarchical-policer aggregate</a> ],<br>[edit firewall <a href="#">hierarchical-policer premium</a> ]                                                                                                                              |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.5.<br>Support at the [edit <a href="#">dynamic-profiles ... aggregate</a> ] and [edit <a href="#">dynamic-profiles ... premium</a> ] hierarchy level introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                             |
| <b>Description</b>              | <p>For M40e, M120, and M320 (with FFPC and SFPC) edge routers and T320, T640, and T1600 core routers with Enhanced Intelligent Queuing (IQE) PICs, T4000 routers with Type 5 FPC and Enhanced Scaling Type 4 FPC, specify bandwidth and burst limits for a premium or aggregate component of a hierarchical policer.</p> <p>The remaining statements are explained separately.</p>                                                                                                               |
| <b>Required Privilege Level</b> | firewall—To view this statement in the configuration.<br>firewall-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Hierarchical Policer Configuration Overview</i></li> <li>• <i>Hierarchical Policers</i></li> <li>• <a href="#">aggregate (Hierarchical Policer) on page 494</a></li> <li>• <i>bandwidth-limit (Hierarchical Policer)</i></li> <li>• <a href="#">burst-size-limit (Hierarchical Policer) on page 507</a></li> <li>• <a href="#">hierarchical-policer on page 574</a></li> <li>• <a href="#">premium (Hierarchical Policer) on page 629</a></li> </ul> |

## if-exceeding (Policer)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>if-exceeding {<br/>    (bandwidth-limit <i>bps</i>   bandwidth-percent <i>number</i>);<br/>    burst-size-limit <i>bytes</i>;<br/>}</pre>                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall <a href="#">policer</a> <i>policer-name</i> ],<br>[edit firewall <a href="#">policer</a> <i>policer-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> firewall <a href="#">policer</a> <i>policer-name</i> ]                                                                                                                                                                                                                                                        |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Logical systems support introduced in Junos OS Release 9.3.<br>Support at the [edit <a href="#">dynamic-profiles ... policer</a> <i>policer-name</i> ] hierarchy level introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.                                                                                                                                                                                                           |
| <b>Description</b>              | Configure rate limits for a single-rate two-color policer.<br><br>The remaining statements are explained separately.                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Required Privilege Level</b> | firewall—To view this statement in the configuration.<br>firewall-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Two-Color Policer Configuration Overview</i></li><li>• <i>Hierarchical Policer Configuration Overview</i></li><li>• <i>Basic Single-Rate Two-Color Policers</i></li><li>• <i>Bandwidth Policers</i></li><li>• <i>Filter-Specific Counters and Policers</i></li><li>• <i>Prefix-Specific Counting and Policing Actions</i></li><li>• <i>Multifield Classification</i></li><li>• <i>Policer Overhead to Account for Rate Shaping in the Traffic Manager</i></li><li>• <i>Hierarchical Policers</i></li></ul> |



## igmp (Dynamic Profiles)


|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> igmp {   interface <i>interface-name</i> {     accounting;     disable;     group-limit <i>policy-name</i>;     group-policy;     immediate-leave;     no-accounting;     oif-map <i>map-name</i>;     passive &lt;allow-receive&gt; &lt;send-general-query&gt; &lt;send-group-query&gt;;     promiscuous-mode;     ssm-map <i>ssm-map-name</i>;     static {       group <i>group</i> {         source <i>source</i>;       }     }     version <i>version</i>;   } } </pre> |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols]                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>              | Enable IGMP on the router. IGMP must be enabled for the router to receive multicast packets.                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Default</b>                  | IGMP is disabled on the router. IGMP is automatically enabled on all broadcast interfaces when you configure Protocol Independent Multicast (PIM) or Distance Vector Multicast Routing Protocol (DVMRP).                                                                                                                                                                                                                                                                            |
| <b>Options</b>                  | The statements are explained separately.                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li> <li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li> <li>• <i>Understanding IGMP</i></li> <li>• <i>Enabling IGMP</i></li> </ul>                                                                                                                                                                                       |

## immediate-leave (Dynamic IGMP Interface)

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|                                 |                                                                                                                                                                                                                                                                                         |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | immediate-leave;                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>igmp interface</b> <i>interface-name</i> ],                                                                                                                                                                                     |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                                           |
| <b>Description</b>              | Enable the routing device to leave the multicast group immediately after the last host leaves the multicast group.                                                                                                                                                                      |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li><li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li><li>• <i>Specifying Immediate-Leave Host Removal for IGMP</i></li></ul> |

## immediate-leave (Dynamic MLD Interface)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>immediate-leave;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>mld interface</b> <i>interface-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>              | <p>The immediate leave setting is useful for minimizing the leave latency of MLD memberships. When this setting is enabled, the routing device leaves the multicast group immediately after the last host leaves the multicast group.</p> <p>The immediate-leave setting enables host tracking, meaning that the device keeps track of the hosts that send join messages. This allows MLD to determine when the last host sends a leave message for the multicast group.</p> <p>When the immediate leave setting is enabled, the device removes an interface from the forwarding-table entry without first sending MLD group-specific queries to the interface. The interface is pruned from the multicast tree for the multicast group specified in the MLD leave message. The immediate leave setting ensures optimal bandwidth management for hosts on a switched network, even when multiple multicast groups are being used simultaneously.</p> <p>When immediate leave is disabled and one host sends a leave group message, the routing device first sends a group query to determine if another receiver responds. If no receiver responds, the routing device removes all hosts on the interface from the multicast group. Immediate leave is disabled by default for both MLD version 1 and MLD version 2.</p> |
|                                 | <p> <b>NOTE:</b> Although host tracking is enabled for IGMPv2 and MLDv1 when you enable immediate leave, use immediate leave with these versions only when there is one host on the interface. The reason is that IGMPv2 and MLDv1 use a report suppression mechanism whereby only one host on an interface sends a group join report in response to a membership query. The other interested hosts suppress their reports. The purpose of this mechanism is to avoid a flood of reports for the same group. But it also interferes with host tracking, because the router only knows about the one interested host and does not know about the others.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li> <li>• <a href="#">Specifying Immediate-Leave Host Removal for MLD</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

## inet (Subscriber Secure Policy)

---

**Syntax**

```
inet {
 drop-policy rule-name {
 from {
 apply-groups group-name;
 apply-groups-except group-name;
 destination-address address;
 destination-port port-number;
 dscp dscp-value;
 protocol protocol;
 source-address address;
 source-port port-number;
 }
 }
}
```

**Hierarchy Level** [edit services [radius-flow-tap policy policy-name](#)]

**Release Information** Statement introduced in Junos OS Release 12.3.

**Description** Specify the inet family for the policy that is applied to mirrored packets sent to a mediation device.

The remaining statements are explained separately.

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

**Related Documentation**

- [Subscriber Secure Policy Overview on page 385](#)
- [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)

## inet-precedence (Dynamic Classifiers)

|                                 |                                                                                                                                                                                                                                                                                                            |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>inet-precedence (classifier-name   default);</code>                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> class-of-service interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> <b>classifiers</b> ]                                                                                                                                                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                                                                                                             |
| <b>Description</b>              | Apply a IPv4 precedence classifier to a subscriber interface in a dynamic profile.                                                                                                                                                                                                                         |
| <b>Options</b>                  | <p><b>classifier-name</b>—Name of a classifier mapping configured at the [edit class-of-service classifier <b>ieee-802.1</b>] hierarchy level.</p> <p><b>default</b>—The default mapping.</p>                                                                                                              |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 226</a></li> <li>• <a href="#">classifiers (Definition)</a></li> </ul> |

## inet-precedence (Dynamic Rewrite Rules)

|                                 |                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>inet-precedence (rewrite-name   default);</code>                                                                                                                                                                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> class-of-service interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> <b>rewrite-rules</b> ]                                                                                                                                                                                              |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                                                                                                                                                          |
| <b>Description</b>              | Apply a IPv4 precedence rewrite rule.                                                                                                                                                                                                                                                                                                                   |
| <b>Options</b>                  | <p><b>rewrite-name</b>—Name of a rewrite-rules mapping configured at the [edit class-of-service rewrite-rules <b>inet-precedence</b>] hierarchy level.</p> <p><b>default</b>—The default mapping. By default, IP precedence rewrite rules alter the first three bits on the type of service (ToS) byte while leaving the last three bits unchanged.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile on page 225</a></li> <li>• <a href="#">rewrite-rules</a></li> </ul>                                            |

## inet6 (Subscriber Secure Policy)

---

**Syntax**

```
inet6 {
 drop-policy rule-name {
 from {
 apply-groups group-name;
 apply-groups-except group-name;
 destination-address address;
 destination-port port-number;
 dscp dscp-value;
 protocol protocol;
 source-address address;
 source-port port-number;
 }
 }
}
```

**Hierarchy Level** [edit services [radius-flow-tap policy policy-name](#)]

**Release Information** Statement introduced in Junos OS Release 12.3.

**Description** Specify the inet6 family for the policy that is applied to mirrored packets sent to a mediation device.

The remaining statements are explained separately.

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

**Related Documentation**

- [Subscriber Secure Policy Overview on page 385](#)
- [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)

## input (Dynamic Service Sets)

|                                 |                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>input {   service-set <i>service-set-name</i> {     service-filter <i>filter-name</i>;   }   post-service-filter <i>filter-name</i>; }</pre>                                                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | <p>[edit <b>dynamic-profiles</b> <i>profile-name</i> <b>interfaces</b> <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> <b>family</b> <i>family</i> <b>service</b>],</p> <p>[edit <b>dynamic-profiles</b> <i>profile-name</i> <b>interfaces</b> pp0 <b>unit</b> "\$junos-interface-unit" <b>family</b> <i>family</i> <b>service</b>]</p> |
| <b>Release Information</b>      | <p>Statement introduced in Junos OS Release 9.5.</p> <p>Support at the [edit <b>dynamic-profiles</b> <i>profile-name</i> <b>interfaces</b> pp0 <b>unit</b> "\$junos-interface-unit" <b>family</b> <i>family</i> <b>service</b>] hierarchy level introduced in Junos OS Release 10.1.</p>                                                             |
| <b>Description</b>              | <p>Define the input service sets and filters to be applied to traffic by a dynamic profile. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.</p> <p>The remaining statements are explained separately.</p>                                                                   |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic Service Sets Overview on page 337</a></li> <li>• <a href="#">Associating Service Sets with Interfaces in a Dynamic Profile on page 337</a></li> </ul>                                                                                                                                   |

## interface (Dynamic IGMP)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>interface <i>interface-name</i> {<br/>    accounting;<br/>    disable;<br/>    group-policy;<br/>    immediate-leave<br/>    no-accounting;<br/>    oif-map;<br/>    passive;<br/>    promiscuous-mode;<br/>    ssm-map <i>ssm-map-name</i>;<br/>    static {<br/>        group <i>group</i> {<br/>            source <i>source</i>;<br/>        }<br/>    }<br/>    version <i>version</i>;<br/>}</pre> |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <a href="#">igmp</a> ]                                                                                                                                                                                                                                                                                                                                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | Enable IGMP on an interface and configure interface-specific properties.                                                                                                                                                                                                                                                                                                                                      |
| <b>Options</b>                  | <p><i>interface-name</i>—Variable for the interface. Specify the interface variable (\$junos-interface-name) to indicate that the dynamic profile chooses an interface for the accessing DHCP client.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                           |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li><li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li><li>• <a href="#">Enabling IGMP</a></li></ul>                                                                                                                                                 |



## interface (Dynamic Interface Sets)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> interface <i>interface-name</i> {     unit <i>logical unit number</i> {         advisory-options {             downstream-rate <i>rate</i>;             upstream-rate <i>rate</i>;         }     } } </pre>                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles profile-name interfaces interface-set interface-set-name</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>              | <p>Add a subscriber interface to a dynamic interface set.</p> <p>In a dynamic profile that defines an agent circuit identifier (ACI) interface set, observe the following guidelines when you use the <b>interface</b> statement:</p> <ul style="list-style-type: none"> <li>• Use the predefined dynamic interface variable <b>\$junos-interface-ifd-name</b> to represent the interface name. Do not use a specific interface name, such as <b>demux0</b>, when defining an ACI interface set.</li> <li>• Do not include the <b>unit logical-unit-number</b> statement.</li> </ul> |
| <b>Options</b>                  | <p><b>interface-name</b>—Either the specific name of the interface to include in the interface set, or the predefined dynamic interface variable <b>\$junos-interface-ifd-name</b>. The interface variable is dynamically replaced with the interface that the DHCP or PPPoE subscriber accesses when connecting to the router.</p> <p>The remaining statement is explained separately.</p>                                                                                                                                                                                          |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Defining Agent Circuit Identifier Interface Sets</a></li> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Configuring an Interface Set of Subscribers in a Dynamic Profile on page 204</a></li> <li>• <a href="#">Agent Circuit Identifier-Based Dynamic VLANs Components Overview</a></li> </ul>                                                                                                                                                           |

## interface (Dynamic MLD)

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|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                   | <pre>interface <i>interface-name</i> {<br/>    disable;<br/>    (accounting   no-accounting);<br/>    group-policy;<br/>    immediate-leave;<br/>    oif-map;<br/>    passive;<br/>    ssm-map <i>ssm-map-name</i>;<br/>    static {<br/>        group <i>mcast-group-address</i> {<br/>            exclude;<br/>            group-count <i>number</i>;<br/>            group-increment <i>increment</i>;<br/>            source <i>ip-address</i> {<br/>                source-count <i>number</i>;<br/>                source-increment <i>increment</i>;<br/>            }<br/>        }<br/>    }<br/>    version <i>version</i>;<br/>}</pre> |
| Hierarchy Level          | [edit dynamic-profiles <i>profile-name</i> protocols <a href="#">mld</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Release Information      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Description              | Enable MLD on a dynamic interface and configure interface-specific properties.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Options                  | <p><b><i>interface-name</i></b>—Variable for the interface. Specify the interface variable (<code>\$junos-interface-name</code>) to indicate that the dynamic profile chooses an interface for the accessing client.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                                                                                                                                                                |
| Required Privilege Level | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Related Documentation    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li><li>• <a href="#">Enabling MLD</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## interface (Dynamic Routing Options)

|                                 |                                                                                                                                                                                                                    |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | interface <i>interface-names</i> {<br>no-qos-adjust;<br>}                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> routing-options multicast],<br>[edit dynamic-profiles <i>profile-name</i> routing-instances <i>routing-instance-name</i> routing-options multicast]                     |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.6.                                                                                                                                                                      |
| <b>Description</b>              | Define the maximum bandwidth for a dynamic interface on which you want to apply bandwidth management.                                                                                                              |
| <b>Options</b>                  | <i>interface-name</i> —Names of the physical or logical interface. For details about specifying interfaces, see <i>Types of Interfaces Overview</i> .<br><br>The remaining statements are explained separately.    |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Dynamic Access Routes for Subscriber Management</i></li> <li>• <i>Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management</i></li> </ul> |

## interface-set (Dynamic CoS)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>interface-set <i>interface-set-name</i> {<br/>    <b>interface</b> <i>interface-name</i> {<br/>        <b>unit</b> <i>logical-unit-number</i>;<br/>    }<br/>}</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | [edit <b>dynamic-profiles</b> <i>profile-name</i> <b>interfaces</b> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b>              | For MX Series routers with enhanced queuing DPCs or MPC/MIC modules, configure an interface set for dynamic CoS.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Options</b>                  | <p><b>interface-set</b> <i>interface-set-name</i>—Name of the scheduler to be configured or one of the following Junos OS predefined variables:</p> <ul style="list-style-type: none"><li>• \$junos-interface-set-name—Predefined variable that, when used, is replaced with the interface-set obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</li><li>• \$junos-svlan-interface-set-name—Locally generated interface set name for use by dual-tagged VLAN interfaces based on the outer tag of the dual-tagged VLAN. The format of the generated variable is <i>physical_interface_name - outer_VLAN_tag</i>.</li><li>• \$junos-tagged-vlan-interface-set-name—Locally generated interface set name used for grouping logical interfaces stacked over logical stacked VLAN demux interfaces for either a 1:1 (dual-tagged; individual client) VLAN or N:1 (single tagged; service) VLAN. The format of the generated variable differs with VLAN type. For dual-tagged (client) VLANs, the format of the generated variable is <i>physical_interface_name - outer_VLAN_tag - inner_VLAN_tag</i>. For single tagged (service) VLAN, the format of the generated variable is <i>physical_interface_name - VLAN_tag</i>.</li></ul> <p>The remaining statements are explained separately.</p> |
| <b>Required Privilege Level</b> | <p><b>interface</b>—To view this statement in the configuration.</p> <p><b>interface-control</b>—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">CoS for Interface Sets of Subscribers Overview on page 201</a></li><li>• <a href="#">Configuring an Interface Set of Subscribers in a Dynamic Profile on page 204</a></li><li>• <a href="#">Example: Configuring a Dynamic Service VLAN Interface Set of Subscribers in a Dynamic Profile on page 217</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## interface-shared

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|                                 |                                                                                                                                                                                                                                                           |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | interface-shared;                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit firewall family <i>family-name</i> <b>filter</b> <i>filter-name</i> ],<br>[edit <b>dynamic-profiles</b> <i>profile-name</i> firewall family <i>family-name</i> <b>filter</b> <i>filter-name</i> ]                                                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.2.                                                                                                                                                                                                            |
| <b>Description</b>              | Set the interface-shared attribute for a firewall filter.                                                                                                                                                                                                 |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Understanding Dynamic Firewall Filters on page 249</a></li> <li>• <a href="#">Classic Filters Overview on page 253</a></li> <li>• <a href="#">Basic Classic Filter Syntax on page 256</a></li> </ul> |

## interface-specific (Dynamic Firewalls)

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|                                 |                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | interface-specific;                                                                                                     |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> firewall family <i>family</i> <b>fast-update-filter</b> <i>filter-name</i> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.6.                                                                           |
| <b>Description</b>              | Configure interface-specific names for firewall counters that are based on fast update filters.                         |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration. |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Fast Update Filters on page 310</a></li> </ul>         |

## interfaces (Dynamic CoS Definition)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> interfaces {   interface-name {     unit logical-unit-number {       classifiers {         dscp (classifier-name   default);         dscp-ipv6 (classifier-name   default);         ieee-802.1 (classifier-name   default) vlan-tag (inner   outer)         inet-precedence (classifier-name   default);       }       output-traffic-control-profile (profile-name   \$junos-cos-traffic-control-profile);       rewrite-rules {         dscp (rewrite-name   default);         dscp-ipv6 (rewrite-name   default);         ieee-802.1 (rewrite-name   default) vlan-tag (outer   outer-and-inner);         inet-precedence (rewrite-name   default);       }     }   } } </pre> |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>              | Configure interface-specific CoS properties for incoming packets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Options</b>                  | <p><b>interface-name</b>—Either the specific name of the interface you want to assign to the dynamic profile or the interface variable (\$junos-interface-ifd-name). The interface variable is dynamically replaced with the interface the client accesses when connecting to the router.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                                                                                                                                 |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li><a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li><a href="#">Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile on page 223</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                    |

## interfaces (Static and Dynamic Subscribers)

```

Syntax interfaces {
 interface-name {
 unit logical-unit-number {
 auto-configure {
 agent-circuit-identifier {
 dynamic-profile profile-name;
 }
 }
 }
 family family {
 access-concentrator name;
 address address;
 direct-connect;
 duplicate-protection;
 dynamic-profile profile-name;
 filter {
 adf {
 counter;
 input-precedence precedence;
 not-mandatory;
 output-precedence precedence;
 rule rule-value;
 }
 input filter-name (
 precedence precedence;
 shared-name filter-shared-name;
)
 output filter-name {
 precedence precedence; shared-name filter-shared-name;
 }
 }
 max-sessions number;
 max-sessions-vs-a-ignore;
 rpf-check {
 mode loose;
 }
 service {
 input {
 service-set service-set-name {
 service-filter filter-name;
 }
 post-service-filter filter-name;
 }
 output {
 service-set service-set-name {
 service-filter filter-name;
 }
 }
 }
 service-name-table table-name
 short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
 maximum-seconds>;
 unnumbered-address interface-name <preferred-source-address address>;
 }
 }
 }

```

```

}
filter {
 input filter-name;
 shared-name filter-shared-name;
 output filter-name;
 shared-name filter-shared-name;
}
ppp-options {
 chap;
 pap;
}
proxy-arp;
vlan-id;
vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
}
vlan-tagging;
}
interface-set interface-set-name {
 interface interface-name {
 unit logical unit number {
 advisory-options {
 downstream-rate rate;
 upstream-rate rate;
 }
 }
 }
}
pppoe-underlying-options {
 max-sessions number;
}
}
demux0 {
 unit logical-unit-number {
 demux-options {
 underlying-interface interface-name
 }
 family family {
 access-concentrator name;
 address address;
 direct-connect;
 duplicate-protection;
 dynamic-profile profile-name;
 demux-source {
 source-prefix;
 }
 filter {
 input filter-name {
 precedence precedence;
 shared-name filter-shared-name;
 }
 output filter-name {
 precedence precedence;
 shared-name filter-shared-name;
 }
 }
 }
 mac-validate (loose | strict);
 max-sessions number;
 }
}

```



```

max-sessions-vsa-ignore;
rpf-check {
 fail-filter filter-name;
 mode loose;
}
service-name-table table-name
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
 maximum-seconds>;
unnumbered-address interface-name <preferred-source-address address>;
}
filter {
 input filter-name;
 output filter-name;
}
vlan-id number;
vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
}
}
pp0 {
 unit logical-unit-number {
 keepalives interval seconds;
 no-keepalives;
 pppoe-options {
 underlying-interface interface-name;
 server;
 }
 ppp-options {
 authentication [authentication-protocols];
 chap {
 challenge-length minimum minimum-length maximum maximum-length;
 }
 pap;
 }
 }
 family inet {
 unnumbered-address interface-name;
 address address;
 service {
 input {
 service-set service-set-name {
 service-filter filter-name;
 }
 post-service-filter filter-name;
 }
 output {
 service-set service-set-name {
 service-filter filter-name;
 }
 }
 }
 }
 filter {
 input filter-name {
 precedence precedence;
 shared-name filter-shared-name;
 }
 output filter-name {
 precedence precedence;

```

```

 shared-name filter-shared-name;
 }
}
}
}
}

```

**Hierarchy Level** [edit **dynamic-profiles** *profile-name*]

**Release Information** Statement introduced in Junos OS Release 9.2.

**Description** Define interfaces for dynamic profiles.

**Options** *interface-name*—The interface variable (**\$junos-interface-ifd-name**). The interface variable is dynamically replaced with the interface the DHCP client accesses when connecting to the router.



**NOTE:** Though we do not recommend it, you can also enter the specific name of the interface you want to assign to the dynamic profile.

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 Static Subscriber Interfaces in Dynamic Profiles*
- *Configuring Dynamic Subscriber Interfaces Using IP Demux Interfaces in Dynamic Profiles*
- *Configuring Dynamic PPPoE Subscriber Interfaces Using Dynamic Profiles*
- *Configuring Dynamic VLANs Based on Agent Circuit Identifier Information*
- *DHCP Subscriber Interface Overview*
- *Relationship Between Subscribers and Interfaces in an Access Network*
- *Configuring Subscribers over Static Interfaces*
- *Demultiplexing Interface Overview*

## interfaces (Subscriber Secure Policy)

|                                 |                                                                                                                                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>interfaces <i>interface-name</i>;</code>                                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | [edit services <a href="#">radius-flow-tap</a> ]                                                                                                                                                                                  |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4.                                                                                                                                                                                     |
| <b>Description</b>              | Specify tunnel interfaces that are used to send mirrored packets to a mediation device.                                                                                                                                           |
| <b>Options</b>                  | <i>interface-name</i> —Name of the interface.                                                                                                                                                                                     |
| <b>Required Privilege Level</b> | flow-tap—To view this statement in the configuration.<br>flow-tap-control—To add this statement to the configuration.                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Subscriber Secure Policy Overview on page 385</a></li> <li>• <a href="#">Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390</a></li> </ul> |

## logical-bandwidth-policer


|                                 |                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>logical-bandwidth-policer;</code>                                                                                                                                                                                                                                                                                                 |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall <a href="#">policer</a> <i>policer-name</i> ],<br>[edit firewall <a href="#">policer</a> <i>policer-name</i> ],<br>[edit logical-systems <i>logical-system-name</i> firewall <a href="#">policer</a> <i>policer-name</i> ]                                          |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 8.2.<br>Logical systems support introduced in Junos OS Release 9.3.<br>Support at the [edit <a href="#">dynamic-profiles ... policer</a> <i>policer-name</i> ] hierarchy level introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches. |
| <b>Description</b>              | For a policer with a bandwidth limit configured as a percentage (using the <a href="#">bandwidth-percent</a> statement), specify that the percentage be based on the shaping rate defined on the logical interface, rather than on the media rate of the physical interface.                                                            |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Bandwidth Policers</i></li> <li>• <i>Configuring Logical Bandwidth Policers</i></li> <li>• <a href="#">bandwidth-percent on page 504</a> statement</li> <li>• <i>interface-specific</i> statement</li> </ul>                                                                                |

## logical-interface-fpc-redundancy (Aggregated Ethernet Subscriber Interfaces)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | logical-interface-fpc-redundancy;                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit interfaces <i>aenumber</i> aggregated-ether-options]                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.2.<br>Statement introduced in Junos OS Release 13.2R2 for EX Series switches.                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | <p>Provide module redundancy for demux subscribers on aggregated Ethernet bundles configured with targeted distribution. Backup links for a subscriber are chosen on a different EQ DPC or MPC from the primary link, based on the link with the fewest number of subscribers among the links on different modules. If all links are on a single module when this is configured, backup links are not provisioned.</p> <p>By default, link redundancy is provided for the aggregated Ethernet bundle.</p> |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Link and Module Redundancy for Demux Subscribers in an Aggregated Ethernet Interface on page 150</a></li><li>• <i>Configuring Module Redundancy for a Virtual Chassis</i></li></ul>                                                                                                                                                                                                                                                       |

## logical-interface-policer

|                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                                                                                                                                                                             | logical-interface-policer;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Hierarchy Level</b>                                                                                                                                                                                                                                                                                                                                                    | <p>[edit <b>dynamic-profiles</b> <i>profile-name</i> firewall <b>policer</b> <i>policer-name</i>],</p> <p>[edit <b>dynamic-profiles</b> <i>profile-name</i> firewall <b>three-color-policer</b> <i>name</i>],</p> <p>[edit firewall atm-policer <i>atm-policer-name</i>]</p> <p>[edit firewall <b>policer</b> <i>policer-name</i>],</p> <p>[edit firewall policer <i>policer-template-name</i>],</p> <p>[edit firewall <b>three-color-policer</b> <i>policer-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> firewall <b>policer</b> <i>policer-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> firewall <b>three-color-policer</b> <i>name</i>]</p> |
| <b>Release Information</b>                                                                                                                                                                                                                                                                                                                                                | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Support at the [edit firewall <b>three-color-policer</b> <i>policer-name</i>] hierarchy level introduced in Junos OS Release 8.2.</p> <p>Logical systems support introduced in Junos OS Release 9.3.</p> <p>Support at the [edit <b>dynamic-profiles</b> ... <b>policer</b> <i>policer-name</i>] and [edit <b>dynamic-profiles</b> ... <b>three-color-policer</b> <i>name</i>] hierarchy levels introduced in Junos OS Release 11.4.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>                                                                                                        |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                        | Configure a logical interface policer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <div>  <p><b>NOTE:</b> Starting in Junos OS Release 12.2R2, on T Series Core Routers only, you can configure an MPLS LSP policer for a specific LSP to be shared across different protocol family types. You must include the logical-interface-policer statement to do so.</p> </div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Required Privilege Level</b>                                                                                                                                                                                                                                                                                                                                           | <p>firewall—To view this statement in the configuration.</p> <p>firewall-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>• <i>Two-Color and Three-Color Logical Interface Policers</i></li> <li>• <i>Traffic Policer Types</i></li> <li>• <i>Configuring Tricolor Marking Policers</i></li> <li>• <a href="#">action on page 489</a></li> <li>• <i>Configuring Gigabit Ethernet Two-Color and Tricolor Policers</i></li> <li>• <i>action</i></li> </ul>                                                                                                                                                                                                                                                                                                                      |

## login

```
Syntax login {
 announcement text;
 class class-name {
 allow-commands "regular-expression";
 allow-configuration-regexps "regular expression 1" "regular expression 2";
 configuration-breadcrumbs;
 deny-commands "regular-expression";
 (deny-configuration | deny-configuration-regexps) "regular expression 1" "regular
 expression 2 ";
 idle-timeout minutes;
 login-script filename;
 login-tip;
 permissions [permissions];
 }
 message text;
 password {
 change-type (set-transitions | character-set);
 format (md5 | sha1 | des);
 maximum-length length;
 minimum-changes number;
 minimum-length length;
 }
 retry-options {
 backoff-threshold number;
 backoff-factor seconds;
 minimum-time seconds;
 tries-before-disconnect number;
 }
 user username {
 full-name complete-name;
 uid uid-value;
 class class-name;
 authentication authentication;
 (encrypted-password "password" | plain-text-password);
 ssh-rsa "public-key";
 ssh-dsa "public-key";
 }
}
```

**Hierarchy Level** [edit system]

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

**Description** Configure user access to the router or switch.



**NOTE:** The remaining statements are explained separately.

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

**Related Documentation**

- [Defining Junos OS Login Classes](#)

## loss-priority (Dynamic Schedulers)

**Syntax** loss-priority (any | low | medium-low | medium-high | high);

**Hierarchy Level** [edit [dynamic-profiles](#) *profile-name* [class-of-service schedulers](#) *scheduler-name* [drop-profile-map](#)]

**Release Information** Statement introduced in Junos OS Release 9.3.

**Description** Specify a loss priority to which to apply a drop profile in a dynamic profile. The drop profile map sets the drop profile for a specific PLP and protocol type. The inputs for the map are the PLP designation and the protocol type. The output is the drop profile.

**Options** **any**—The drop profile applies to packets with any PLP.

**high**—The drop profile applies to packets with high PLP.

**medium-high**—The drop profile applies to packets with medium-high PLP.

**medium-low**—The drop profile applies to packets with medium-low PLP.

**low**—The drop profile applies to packets with low PLP.

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

**Related Documentation**

- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
- [Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13](#)

## loss-priority high then discard (Three-Color Policer)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | loss-priority high then discard;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall <a href="#">three-color-policer</a> <i>name</i> <a href="#">action</a> ],<br>[edit firewall <a href="#">three-color-policer</a> <i>policer-name</i> <a href="#">action</a> ],<br>[edit logical-systems <i>logical-system-name</i> firewall <a href="#">three-color-policer</a> <i>policer-name</i> <a href="#">action</a> ]                                                                                                                                                                                      |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 8.2.<br>Logical systems support introduced in Junos OS Release 9.3.<br>Support at the [edit <a href="#">dynamic-profiles ... action</a> ] hierarchy level introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.                                                                                                                                                                                                                                                               |
| <b>Description</b>              | <p>For packets with high loss priority, discard the packets. The loss priority setting is implicit and is not configurable. Include this statement if you do not want the local router to forward packets that have high packet loss priority.</p> <p>For single-rate three-color policers, the Junos OS assigns high loss priority to packets that exceed the committed information rate and the excess burst size.</p> <p>For two-rate three-color policers, the Junos OS assigns high loss priority to packets that exceed the peak information rate and the peak burst size.</p> |
| <b>Required Privilege Level</b> | firewall—To view this statement in the configuration.<br>firewall-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Three-Color Policer Configuration Overview</i></li><li>• <i>Basic Single-Rate Three-Color Policers</i></li><li>• <i>Basic Two-Rate Three-Color Policers</i></li><li>• <i>Two-Color and Three-Color Logical Interface Policers</i></li><li>• <i>Two-Color and Three-Color Physical Interface Policers</i></li><li>• <i>Two-Color and Three-Color Policers at Layer 2</i></li><li>• <a href="#">action on page 489</a></li></ul>                                                                                                            |



## match-direction (Captive Portal Content Delivery)

|                                 |                                                                                                                                                                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | match-direction (input   output   input-output);                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit services captive-portal-content-delivery <b>rule (Captive Portal Content Delivery)</b> <i>rule-name</i> ]                                                                                                              |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.4.                                                                                                                                                                               |
| <b>Description</b>              | Specify the direction in which the rule match is applied.                                                                                                                                                                    |
| <b>Options</b>                  | <p><b>input</b>—Apply the rule match on the input side of the interface.</p> <p><b>output</b>—Apply the rule match on the output side of the interface.</p> <p><b>input-output</b>—Apply the rule match bidirectionally.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Redirecting HTTP Requests Overview on page 353</a></li> </ul>                                                                                                           |

## max-queues-per-interface

|                                 |                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | max-queues-per-interface (8   4);                                                                                                                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | <p>[edit chassis fpc <i>slot-number</i> pic <i>pic-number</i>],</p> <p>[edit chassis lcc <i>number</i> fpc <i>slot-number</i> pic <i>pic-number</i>] (Routing Matrix)</p>                                                                                                                                                                                                                 |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Support for TX Matrix and TX Matrix Plus added in Junos OS Release 9.6.</p> <p>On MIC or MPC interfaces on MX Series routers, configure eight egress queues.</p>                                                                                                                                                              |
| <b>Description</b>              | On IQ, MPC, and DPC interfaces on M120, T320, T640, T1600, TX Matrix, and TX Matrix Plus routers, or on MIC or MPC interfaces on MX Series routers, configure eight egress queues.                                                                                                                                                                                                        |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                        |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring the Junos OS to Support Eight Queues on IQ Interfaces for T Series and M320 Routers</i></li> <li>• <i>Configuring Up to 16 Forwarding Classes</i></li> <li>• <i>Enabling Eight Queues on ATM Interfaces</i></li> <li>• <a href="#">Configuring the Maximum Number of Queues for Trio MPC/MIC Interfaces on page 98</a></li> </ul> |

## match-order (Dynamic Firewalls)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>match-order [<i>match-order</i>];</code>                                                                                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | <code>[edit dynamic-profiles <i>profile-name</i> firewall family <i>family</i> fast-update-filter <i>filter-name</i>]</code>                                                                                                                                                                                                                                                          |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.6.                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b>              | Specify the match conditions and the order in which the conditions are examined. Enclose a string of multiple conditions in brackets. The router examines only the conditions you specify, and examines them in the specified order.                                                                                                                                                  |
| <b>Options</b>                  | <p><b><i>match-order</i></b>—One or more of the following conditions. “<a href="#">Fast Update Filter Match Conditions</a>” on page 314 describes the match conditions.</p> <ul style="list-style-type: none"><li>• destination-address</li><li>• destination-port</li><li>• dscp (IPv4 only)</li><li>• protocol (IPv4 only)</li><li>• source-address</li><li>• source-port</li></ul> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Fast Update Filters on page 310</a></li><li>• <a href="#">Configuring the Match Order for Fast Update Filters on page 313</a></li><li>• <a href="#">Fast Update Filter Match Conditions on page 314</a></li></ul>                                                                                                     |

## mld (Dynamic Profiles)

```

Syntax mld {
 interface interface-name {
 disable;
 (accounting | no-accounting);
 group-policy;
 immediate-leave;
 oif-map;
 passive;
 ssm-map ssm-map-name;
 static {
 group multicast-group-address {
 exclude;
 group-count number;
 group-increment increment;
 source ip-address {
 source-count number;
 source-increment increment;
 }
 }
 }
 version version;
 }
 }

```

**Hierarchy Level** [edit dynamic-profiles *profile-name* protocols]

**Release Information** Statement introduced in Junos OS Release 10.1.

**Description** Configure interface-specific MLD values on dynamic interfaces.

**Options** The 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**

- *Enabling MLD*

## multicast (Dynamic Routing Options)

---

**Syntax**    multicast {  
              interface *interface-name* {  
                  no-qos-adjust;  
              }  
          }

**Hierarchy Level**    [edit dynamic-profiles *profile-name* **routing-options**],  
                          [edit dynamic-profiles *profile-name* routing-instances *routing-instance-name* **routing-options**]



**NOTE:** You cannot apply a scope policy to a specific routing instance. That is, all scoping policies are applied to all routing instances. However, the **scope** statement does apply individually to a specific routing instance.

**Release Information**    Statement introduced in Junos OS Release 9.6.

**Description**            Dynamically configure interface-specific multicast routing options properties.  
  
                          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 the Multicast Forwarding Cache*  
                                  • *Example: Configuring a Multicast Flow Map*  
                                  • *Example: Configuring Source-Specific Multicast Groups with Any-Source Override*

## multicast-interception (Subscriber Secure Policy)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | multicast-interception;                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit services <a href="#">radius-flow-tap</a> ]                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Description</b>              | <p>Enables subscriber secure policy to mirror IPv4 multicast traffic sent to subscribers. It enables the mirroring of multicast traffic for all subscribers on the chassis.</p> <p>Mirroring of multicast traffic is supported only for subscribers in the default logical system.</p>                                                                                                                                                             |
| <b>Required Privilege Level</b> | <p>flow-tap—To view this statement in the configuration.</p> <p>flow-tap-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Subscriber Secure Policy Overview on page 385</a></li> <li>• <a href="#">Subscriber Secure Policy Support for IPv4 Multicast Traffic on page 403</a></li> <li>• <a href="#">Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390</a></li> <li>• <a href="#">Configuring DTCP-Initiated Subscriber Secure Policy Mirroring Overview on page 406</a></li> </ul> |

## no-accounting

---

|                                 |                                                                                                                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | no-accounting;                                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <a href="#">igmp</a> <a href="#">interface</a> <i>interface-name</i> ]                                                                                                                                                              |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                                            |
| <b>Description</b>              | Disable the collection of IGMP join and leave event statistics on a per-interface basis.                                                                                                                                                                                                 |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li> <li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li> <li>• <a href="#">Recording IGMP Join and Leave Events</a></li> </ul> |

## no-qos-adjust (Dynamic Routing Options)

---

|                                 |                                                                                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | no-qos-adjust;                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> routing-options <b>multicast interface</b> <i>interface-name</i> ]                                                                     |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.6.                                                                                                                                     |
| <b>Description</b>              | Disable hierarchical bandwidth adjustment for all dynamically created subscriber interfaces that are identified by their MLD or IGMP request from a specific multicast interface. |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Example: Configuring Multicast with Subscriber VLANs</i></li></ul>                                                                     |

## oif-map (Dynamic IGMP Interface)

---

|                                 |                                                                                                                                                                                                                                                                                             |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | oif-map <i>map-name</i> ;                                                                                                                                                                                                                                                                   |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>igmp interface</b> <i>interface-name</i> ]                                                                                                                                                                                          |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.6.                                                                                                                                                                                                                                               |
| <b>Description</b>              | Associates an OIF map to the IGMP interface using a dynamic profile. The OIF map is a routing policy statement that can contain multiple terms.                                                                                                                                             |
| <b>Options</b>                  | <i>map-name</i> —Name of the OIF map.                                                                                                                                                                                                                                                       |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li><li>• <i>Example: Configuring Multicast with Subscriber VLANs</i></li><li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li></ul> |

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## oif-map (Dynamic MLD Interface)

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|                                 |                                                                                                                                                                                        |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>oif-map <i>map-name</i>;</code>                                                                                                                                                  |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>mld interface</b> <i>interface-name</i> ]                                                                                      |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                         |
| <b>Description</b>              | Associate an outgoing interface (OIF) map to a dynamic MLD logical interface. The OIF map is a routing policy statement that can contain multiple terms.                               |
| <b>Options</b>                  | <i>map-name</i> —Name of the OIF map.                                                                                                                                                  |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li><li>• <i>Example: Configuring Multicast with Subscriber VLANs</i></li></ul> |

## output (Dynamic Service Sets)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>output {<br/>    service-set <i>service-set-name</i> {<br/>        service-filter <i>filter-name</i>;<br/>    }<br/>}</pre>                                                                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> <a href="#">family</a> <i>family</i> <a href="#">service</a> ],<br>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> <i>pp0</i> <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>family</i> <a href="#">service</a> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.5.<br>Support of the [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> <i>pp0</i> <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>family</i> <a href="#">service</a> ] hierarchy level introduced in Junos OS Release 10.1.                                                                                                           |
| <b>Description</b>              | <p>Define the output service sets and filters to be applied to traffic by a dynamic profile. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.</p> <p>The remaining statement is explained separately.</p>                                                                                                                                                            |
| <b>Options</b>                  | <i>service-set-name</i> —Name of the service set.                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Required Privilege Level</b> | <i>interface</i> —To view this statement in the configuration.<br><i>interface-control</i> —To add this statement to the configuration.                                                                                                                                                                                                                                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic Service Sets Overview on page 337</a></li><li>• <a href="#">Associating Service Sets with Interfaces in a Dynamic Profile on page 337</a></li></ul>                                                                                                                                                                                                                              |



## output-traffic-control-profile (Dynamic CoS Definition)


|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>output-traffic-control-profile (<i>profile-name</i>   <code>\$junos-cos-traffic-control-profile</code>);</code>                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> <a href="#">interfaces</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> ]                                                                                                                                                                                                                                                                 |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.<br>Variable <code>\$junos-cos-traffic-control-profile</code> introduced in Junos OS Release 11.2.                                                                                                                                                                                                                                                                                                                |
| <b>Description</b>              | Apply an output traffic scheduling and shaping profile to the logical interface.                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Options</b>                  | <p><b><i>profile-name</i></b>—Name of the traffic-control profile to be applied to this interface</p> <p><b><code>\$junos-cos-traffic-control-profile</code></b>—Variable for the traffic-control profile that is specified for the logical interface. The variable is replaced with the traffic-control profile when the subscriber is authenticated at login.</p>                                                                                            |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile on page 223</a></li> <li>• <a href="#">Using the CLI to Modify Traffic-Control Profiles That Are Currently Applied to Subscribers</a></li> <li>• <a href="#">traffic-control-profiles on page 676</a></li> </ul> |

## overhead-accounting (Dynamic Traffic Shaping)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>overhead-accounting {<br/>  <b>bytes</b> bytes;<br/>  <b>cell-mode</b> cell-mode-bytes <i>cell-mode-bytes</i>;<br/>  <b>frame-mode</b> frame-mode-bytes <i>frame-mode-bytes</i>;<br/>}</pre>                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit <b>dynamic-profiles</b> <i>profile-name</i> <b>class-of-service</b> <b>traffic-control-profiles</b> <i>profile-name</i> ]                                                                                                                                                                                                                                                                              |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.2.                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b>              | Configure the mode to shape downstream ATM traffic based on either frames or cells.                                                                                                                                                                                                                                                                                                                          |
| <b>Default</b>                  | The default is <b>frame-mode</b> .                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Options</b>                  | The remaining statements are explained separately.                                                                                                                                                                                                                                                                                                                                                           |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">CoS Adjustment Control Profiles Overview on page 189</a></li><li>• <a href="#">Configuring Dynamic Shaping Parameters to Account for Overhead in Downstream Traffic Rates on page 121</a></li><li>• <a href="#">Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 119</a></li><li>• <i>egress-shaping-overhead</i></li></ul> |

## passive (Dynamic IGMP Interface)

|                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                                                                                                                                                                                   | <code>passive &lt;allow-receive&gt; &lt;send-general-query&gt; &lt;send-group-query&gt;;</code>                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>                                                                                                                                                                                                                                                                                                                                                          | [edit dynamic-profiles <i>profile-name</i> protocols <b>igmp</b> <b>interface</b> <i>interface-name</i> ]                                                                                                                                                                                                                             |
| <b>Release Information</b>                                                                                                                                                                                                                                                                                                                                                      | Statement introduced in Junos OS Release 9.6.<br><b>allow-receive</b> , <b>send-general-query</b> , and <b>send-group-query</b> options were introduced in Junos OS Release 10.0.                                                                                                                                                     |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                              | Dynamically specify that IGMP run on the interface and either not send and receive control traffic or selectively send and receive control traffic such as IGMP reports, queries, and leaves.                                                                                                                                         |
| <div>  <p><b>NOTE:</b> You can selectively activate up to two out of the three available options for the <b>passive</b> statement while keeping the other functions passive (inactive). Activating all three options would be equivalent to not using the <b>passive</b> statement.</p> </div> |                                                                                                                                                                                                                                                                                                                                       |
| <b>Options</b>                                                                                                                                                                                                                                                                                                                                                                  | <p><b>allow-receive</b>—(Optional) Enables IGMP to receive control traffic on the interface.</p> <p><b>send-general-query</b>—(Optional) Enables IGMP to send general queries on the interface.</p> <p><b>send-group-query</b>—(Optional) Enables IGMP to send group-specific and group-source-specific queries on the interface.</p> |
| <b>Required Privilege Level</b>                                                                                                                                                                                                                                                                                                                                                 | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                        |
| <b>Related Documentation</b>                                                                                                                                                                                                                                                                                                                                                    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li> <li>• <a href="#">Example: Configuring Multicast with Subscriber VLANs</a></li> <li>• <a href="#">Configuring IGMP</a></li> </ul>                                                                                       |

## passive (Dynamic MLD Interface)

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|                            |                                                                                                                                                                                 |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <code>passive &lt;allow-receive&gt; &lt;send-general-query&gt; &lt;send-group-query&gt;;</code>                                                                                 |
| <b>Hierarchy Level</b>     | [edit dynamic-profiles <i>profile-name</i> protocols <b>mld interface</b> <i>interface-name</i> ]                                                                               |
| <b>Release Information</b> | Statement introduced in Junos OS Release 10.1.                                                                                                                                  |
| <b>Description</b>         | Specify that MLD run on the interface and either not send and receive control traffic or selectively send and receive control traffic such as MLD reports, queries, and leaves. |




**NOTE:** You can selectively activate up to two out of the three available options for the **passive** statement while keeping the other functions passive (inactive). Activating all three options would be equivalent to not using the **passive** statement.

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|                                 |                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Options</b>                  | <p><b>allow-receive</b>—(Optional) Enables MLD to receive control traffic on the interface.</p> <p><b>send-general-query</b>—(Optional) Enables MLD to send general queries on the interface.</p> <p><b>send-group-query</b>—(Optional) Enables MLD to send group-specific and group-source-specific queries on the interface.</p> |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li><li>• <a href="#">Example: Configuring Multicast with Subscriber VLANs</a></li></ul>                                                                                                                                    |

## peak-burst-size

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <code>peak-burst-size bytes;</code>                                                                                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall <a href="#">three-color-policer</a> <i>name</i> <b>two-rate</b> ],<br>[edit firewall <a href="#">three-color-policer</a> <i>policer-name</i> <b>two-rate</b> ]                                                                                                                              |
| <b>Release Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Statement introduced in Junos OS Release 7.4.<br>Support at the [edit <a href="#">dynamic-profiles</a> ... <b>two-rate</b> ] hierarchy level introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.                                                                                                    |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | For a two-rate three-color policer, configure the peak burst size (PBS) as a number of bytes. The PBS defines the maximum number of bytes of unused peak bandwidth capacity that can be accumulated. The accumulated bandwidth allows for moderate periods of bursting traffic that exceeds the peak information rate (PIR) and the committed burst size (CBS). |
| <div>  <b>NOTE:</b> When you include the <code>peak-burst-size</code> statement in the configuration, you must also include the <code>committed-burst-size</code> and <code>peak-information-rate</code> statements at the same hierarchy level. </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                 |
| <p>Two-rate three-color policers use a <i>dual-rate dual token bucket algorithm</i> to measure traffic against two rate limits.</p> <ul style="list-style-type: none"> <li>• A traffic flow is categorized green if it conforms to both the committed information rate (CIR) and the CBS-bounded accumulation of available committed bandwidth capacity.</li> <li>• A traffic flow is categorized yellow if exceeds the CIR and CBS but conforms to the PIR. Packets in a yellow flow are marked with <b>medium-high</b> packet loss priority (PLP) and then passed through the interface.</li> <li>• A traffic flow is categorized red if exceeds the PIR and the PBS-bounded accumulation of available peak bandwidth capacity. Packets in a red traffic flow are marked with <b>high</b> PLP and then either passed through the interface or optionally discarded.</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Options</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>bytes</b> —Number of bytes. You can specify a value in bytes either as a complete decimal number or as a decimal number followed by the abbreviation <b>k</b> (1000), <b>m</b> (1,000,000), or <b>g</b> (1,000,000,000).<br><b>Range:</b> 1500 through 100,000,000,000 bytes                                                                                 |
| <b>Required Privilege Level</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | firewall—To view this statement in the configuration.<br>firewall-control—To add this statement to the configuration.                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>• <i>Three-Color Policer Configuration Overview</i></li> <li>• <i>Policer Bandwidth and Burst-Size Limits</i></li> </ul>                                                                                                                                                                                                 |

- *Policer Color-Marking and Actions*
- *Dual Token Bucket Algorithms*
- *Determining Proper Burst Size for Traffic Policers*
- [committed-burst-size on page 518](#)
- [committed-information-rate on page 520](#)
- [excess-burst-size on page 542](#)
- [peak-information-rate on page 619](#)

## peak-information-rate

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <code>peak-information-rate bps;</code>                                                                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | [edit <code>dynamic-profiles profile-name</code> firewall <code>three-color-policer name two-rate</code> ],<br>[edit firewall <code>three-color-policer policer-name two-rate</code> ]                                                                                                                                                            |
| <b>Release Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Statement introduced in Junos OS Release 7.4.<br>Support at the [edit <code>dynamic-profiles ... two-rate</code> ] hierarchy level introduced in Junos OS Release 11.4.<br>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.                                                                                                |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | For a two-rate three-color policer, configure the peak information rate (PIR) as a number of bits per second. The PIR is the maximum rate for traffic arriving at or departing from the interface under peak line conditions. Traffic that exceeds the committed information rate (CIR) and the committed burst size (CBS) is metered to the PIR. |
| <div>  <p><b>NOTE:</b> When you include the <code>peak-information-rate</code> statement in the configuration, you must also include the <code>committed-information-rate</code> and <code>peak-burst-size</code> statements at the same hierarchy level.</p> </div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                   |
| <p>Two-rate three-color policers use a <i>dual-rate dual token bucket algorithm</i> to measure traffic against two rate limits.</p> <ul style="list-style-type: none"> <li>• A traffic flow is categorized green if it conforms to both the CIR and the CBS-bounded accumulation of available committed bandwidth capacity.</li> <li>• A traffic flow is categorized yellow if exceeds the CIR and CBS but conforms to the PIR. Packets in a yellow flow are marked with <b>medium-high</b> packet loss priority (PLP) and then passed through the interface.</li> <li>• A traffic flow is categorized red if exceeds the PIR and the PBS-bounded accumulation of available peak bandwidth capacity. Packets in a red traffic flow are marked with <b>high</b> PLP and then either passed through the interface or optionally discarded.</li> </ul> |                                                                                                                                                                                                                                                                                                                                                   |
| <b>Options</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <p><b>bps</b>—Number of bits per second. You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation <b>k</b> (1000), <b>m</b> (1,000,000), or <b>g</b> (1,000,000,000).</p> <p><b>Range:</b> 1500 through 100,000,000,000 bps</p>                                         |
| <b>Required Privilege Level</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <p>firewall—To view this statement in the configuration.</p> <p>firewall-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                  |
| <b>Related Documentation</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>• <i>Three-Color Policer Configuration Overview</i></li> <li>• <i>Policer Bandwidth and Burst-Size Limits</i></li> <li>• <i>Policer Color-Marking and Actions</i></li> </ul>                                                                                                                               |

- *Dual Token Bucket Algorithms*
- *Determining Proper Burst Size for Traffic Policers*
- [committed-burst-size on page 518](#)
- [committed-information-rate on page 520](#)
- [excess-burst-size on page 542](#)
- [peak-burst-size on page 617](#)

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## permissions

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|                                 |                                                                                                                                         |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>permissions [ <i>permissions</i> ];</code>                                                                                        |
| <b>Hierarchy Level</b>          | [edit system login <a href="#">class</a> ]                                                                                              |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 9.0 for EX Series switches.               |
| <b>Description</b>              | Configure the login access privileges to be provided on the router or switch.                                                           |
| <b>Options</b>                  | <i>permissions</i> —Privilege type. For a list of permission flag types, see <i>Understanding Junos OS Access Privilege Levels</i> .    |
| <b>Required Privilege Level</b> | admin—To view this statement in the configuration.<br>admin-control—To add this statement to the configuration.                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring Access Privilege Levels</i></li><li>• <a href="#">user on page 685</a></li></ul> |



## physical-interface-policer

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | physical-interface-policer;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Hierarchy Level</b>          | <p>[edit <b>dynamic-profiles</b> <i>profile-name</i> firewall <b>policer</b> <i>policer-name</i>],<br/> [edit firewall <b>policer</b> <i>policer-name</i>],<br/> [edit firewall <b>three-color-policer</b> <i>policer-name</i>],<br/> [edit logical-system <i>logical-system-name</i> firewall <b>policer</b> <i>policer-name</i>],<br/> [edit logical-system <i>logical-system-name</i> <b>three-color-policer</b> <i>policer-name</i>],<br/> [edit routing-instances <i>routing-instance-name</i> firewall <b>policer</b> <i>policer-name</i>],<br/> [edit routing-instances <i>routing-instance-name</i> firewall <b>three-color-policer</b> <i>policer-name</i>],<br/> [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> firewall <b>policer</b> <i>policer-name</i>],<br/> [edit logical-systems <i>logical-system-name</i> routing-instances <i>routing-instance-name</i> firewall <b>three-color-policer</b> <i>policer-name</i>]</p> |
| <b>Release Information</b>      | <p>Statement introduced in Junos OS Release 9.6.</p> <p>Support at the [edit <b>dynamic-profiles</b> ... <b>policer</b> <i>policer-name</i>] hierarchy level introduced in Junos Release OS 11.4.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>              | <p>Configure an aggregate policer for a physical interface.</p> <p>A physical interface policer can be a two-color or three-color policer. When you apply physical interface policer, to different protocol families on the same logical interface, the protocol families share the same policer instance. This means that rate limiting is performed aggregately for the protocol families for which the policer is applied. This feature enables you to use a single policer instance to perform aggregate policing for different protocol families on the same physical interface. If you want a policer instance to be associated with a protocol family, the corresponding physical interface filter needs to be applied to that protocol family. The policer is not automatically applied to all protocol families configured on the physical interface.</p> <p>In contrast, with logical interface policers there are multiple separate policer instances.</p>                      |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Two-Color and Three-Color Physical Interface Policers</i></li> <li>• <i>physical-interface-filter</i></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

## policer (Configuring)

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre> policer <i>policer-name</i>   <i>uid</i> {     filter-specific;     if-exceeding {         bandwidth-limit <i>bps</i>;         bandwidth-percent <i>number</i>;         burst-size-limit <i>bytes</i>;     }     logical-bandwidth-policer;     logical-interface-policer;     physical-interface-policer;     shared-bandwidth-policer;     then {         <i>policer-action</i>;     } } </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>     | <p>[edit <b>dynamic-profiles</b> <i>profile-name</i> <b>firewall</b>],<br/> [edit <b>firewall</b>],<br/> [edit <b>logical-systems</b> <i>logical-system-name</i> <b>firewall</b>]</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b> | <p>Statement introduced before Junos OS Release 7.4.</p> <p>The <b>out-of-profile</b> policer action added in Junos OS Release 8.1.</p> <p>The <b>logical-bandwidth-policer</b> statement added in Junos OS Release 8.2.</p> <p>Logical systems support introduced in Junos OS Release 9.3.</p> <p>The <b>physical-interface-policer</b> statement introduced in Junos OS Release 9.6.</p> <p>The <b>shared-bandwidth-policer</b> statement added in Junos OS Release 11.2.</p> <p>Support at the [edit <b>dynamic-profiles</b> ... <b>firewall</b>] hierarchy level introduced in Junos OS Release 11.4.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>                                                                                                                                                                                                         |
| <b>Description</b>         | <p>Configure policer rate limits and actions. When included at the [edit <b>firewall</b>] hierarchy level, the <b>policer</b> statement creates a template, and you do not have to configure a policer individually for every firewall filter or interface. To activate a policer, you must include the <b>policer-action</b> modifier in the <b>then</b> statement in a firewall filter term or on an interface.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Options</b>             | <p><b><i>policer-action</i></b>—One or more actions to take:</p> <ul style="list-style-type: none"> <li>• <b>discard</b>—Discard traffic that exceeds the rate limits.</li> <li>• <b>forwarding-class</b> <i>class-name</i>—Specify the particular forwarding class.</li> <li>• <b>loss-priority</b>—Set the packet loss priority (PLP) to <b>low</b>, <b>medium-low</b>, <b>medium-high</b>, or <b>high</b>.</li> </ul> <p><b><i>policer-name</i></b>—Name that identifies the policer. The name can contain letters, numbers, and hyphens (-), and can be up to 255 characters long. To include spaces in the name, enclose it in quotation marks (" "). Policer names cannot begin with an underscore in the form <b>_*</b>.</p> <p><b><i>uid</i></b>—When you configure a policer at the [edit <b>dynamic-profiles</b>] hierarchy level, you must assign a variable UID as the policer name.</p> |

**then**—Actions to take on matching packets.

The remaining statements are explained separately.

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

|                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Related Documentation</b> | <ul style="list-style-type: none"><li>• <i>Bandwidth Policer Overview</i></li><li>• <i>Configuring Firewall Filters and Policers for VPLS</i></li><li>• <i>Configuring Multifield Classifiers</i></li><li>• <i>Logical Interface (Aggregate) Policer Overview</i></li><li>• <i>Physical Interface Policer Overview</i></li><li>• <i>Statement Hierarchy for Configuring Policers</i></li><li>• <i>Single-Rate Two-Color Policer Overview</i></li><li>• <i>Using Multifield Classifiers to Set PLP</i></li><li>• <a href="#">filter (Configuring) on page 554</a></li><li>• <i>priority (Schedulers)</i></li></ul> |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## policy (Subscriber Secure Policy)

```
Syntax policy policy-name {
 inet {
 drop-policy rule-name {
 from {
 apply-groups group-name;
 apply-groups-except group-name;
 destination-address address;
 destination-port port-number;
 dscp dscp-value;
 protocol protocol;
 source-address address;
 source-port port-number;
 }
 }
 }
 inet6 {
 drop-policy rule-name {
 from {
 apply-groups group-name;
 apply-groups-except group-name;
 destination-address address;
 destination-port port-number;
 dscp dscp-value;
 protocol protocol;
 source-address address;
 source-port port-number;
 }
 }
 }
 }
```

**Hierarchy Level** [edit services [radius-flow-tap](#)]

**Release Information** Statement introduced in Junos OS Release 12.3.

**Description** Specify the policy that is applied to mirrored packets sent to a mediation device.

**Options** *policy-name*—Name of the policy from which to drop traffic.

The remaining statements are explained separately.

**Required Privilege** flow-tap—To view this statement in the configuration.

**Level** flow-tap-control—To add this statement to the configuration.

**Related Documentation**

- [Subscriber Secure Policy Overview on page 385](#)
- [Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390](#)

## policy-options (Dynamic Profiles)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> policy-options {   prefix-list <i>uid</i> {     <i>ip-addresses</i>;     dynamic-db;   } } </pre>                                                                                                                                                                                                                                                                                                                     |
| <b>Hierarchy Level</b>          | [edit <b>dynamic-profiles</b> <i>profile-name</i> ]                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Release Information</b>      | Statement introduced before Junos OS Release 11.4.                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b>              | <p>Define a list of IPv4 or IPv6 address prefixes for use in a dynamic firewall filter or in an HTTP redirect configuration.</p> <p>You can configure up to 85,325 prefixes in each prefix list. To configure more than 85,325 prefixes, configure multiple prefix lists and apply them to multiple firewall filter terms.</p>                                                                                              |
| <b>Options</b>                  | <p><b><i>uid</i></b>—Unique identifier of the prefix list. You must assign a UID as the prefix list name.</p> <p><b><i>ip-addresses</i></b>—List of IPv4 or IPv6 address prefixes, one IP address per line in the configuration.</p> <p><b><i>dynamic-db</i></b>—Specify that the routing policy and policy objects reference policies configured in the dynamic database at the [edit <b>dynamic</b>] hierarchy level.</p> |
| <b>Required Privilege Level</b> | <p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li><i>Example: Using Routing Policy in an ISP Network</i></li> </ul>                                                                                                                                                                                                                                                                                                                    |

## post-service-filter (Dynamic Service Sets)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>post-service-filter <i>filter-name</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [ <a href="#">edit dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> <a href="#">family</a> <i>family</i> <a href="#">service input</a> ],<br>[ <a href="#">edit dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> <code>pp0</code> <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>family</i> <a href="#">service input</a> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.5.<br>Support at the [ <a href="#">edit dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> <code>pp0</code> <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>family</i> <a href="#">service input</a> ] hierarchy level introduced in Junos OS Release 10.1.                                                                                                                  |
| <b>Description</b>              | Define the filter to be applied to traffic after service processing. The filter is applied only if a service set is configured and selected. You can configure a postservice filter on the input side of the interface only. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.                                                                                                            |
| <b>Options</b>                  | <i>filter-name</i> —Identifier for the post-service filter.                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Required Privilege Level</b> | <code>interface</code> —To view this statement in the configuration.<br><code>interface-control</code> —To add this statement to the configuration.                                                                                                                                                                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic Service Sets Overview on page 337</a></li><li>• <a href="#">Associating Service Sets with Interfaces in a Dynamic Profile on page 337</a></li></ul>                                                                                                                                                                                                                                                  |

## pppoe-tags (Adjustment Control Profiles)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>pppoe-tags {   priority <i>priority</i>;   algorithm <i>algorithm</i>; }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Hierarchy Level</b>          | [edit class-of-service <a href="#">adjustment-control-profiles</a> <i>profile-name</i> <a href="#">application</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 13.1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>              | Configure the shaping rate adjustment controls for the Point-to-Point Protocol over Ethernet (PPPoE) Tags application.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Options</b>                  | <p><b><i>priority</i></b>—Priority of the Point to Point Protocol over Ethernet IA Tags application in the adjustment control profile.</p> <p><b>Range:</b> 1 through 10; 1 being the highest priority.</p> <p><b>Default:</b> 2</p> <p><b><i>algorithm</i></b>—Rate adjustment algorithm used by the Point to Point Protocol over Ethernet (PPPoE) IA Tags application.</p> <p><b>Values:</b></p> <ul style="list-style-type: none"> <li>adjust-never—Do not perform rate adjustments.</li> <li>adjust-always—Adjust the shaping rate unconditionally.</li> <li>adjust-less—Adjust the shaping rate if it is less than the configured value.</li> <li>adjust-less-or-equal—Adjust the shaping rate if it is less than or equal to the configured value.</li> <li>adjust-greater—Adjust the shaping rate if it is greater than the configured value.</li> <li>adjust-greater-or-equal—Adjust the shaping rate if it is greater than or equal to the configured value.</li> </ul> <p><b>Default:</b> adjust-less</p> |
| <b>Required Privilege Level</b> | <p>interfaces—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">CoS Adjustment Control Profiles Overview on page 189</a></li> <li>• <a href="#">Configuring CoS Adjustment Control Profiles on page 191</a></li> <li>• <a href="#">Verifying the CoS Adjustment Control Profile Configuration on page 191</a></li> <li>• <a href="#">adjustment-control-profiles on page 491</a></li> <li>• <a href="#">application (Adjustment Control Profiles) on page 496</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## precedence

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>precedence <i>precedence</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | <p>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> <a href="#">family</a> <i>family</i> <a href="#">filter</a> input <i>filter-name</i>],</p> <p>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> <a href="#">family</a> <i>family</i> <a href="#">filter</a> output <i>filter-name</i>],</p> <p>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> demux0 <a href="#">unit</a> <i>logical-unit-number</i> <a href="#">family</a> <i>family</i> <a href="#">filter</a> input <i>filter-name</i>],</p> <p>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> demux0 <a href="#">unit</a> <i>logical-unit-number</i> <a href="#">family</a> <i>family</i> <a href="#">filter</a> output <i>filter-name</i>],</p> <p>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> pp0 <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>family</i> <a href="#">filter</a> input <i>filter-name</i>],</p> <p>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> pp0 <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>family</i> <a href="#">filter</a> output <i>filter-name</i>]</p> |
| <b>Release Information</b>      | <p>Statement introduced in Junos OS Release 9.3.</p> <p>The [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> pp0 <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>inet</i> <a href="#">filter</a> input <i>filter-name</i>] hierarchy level and [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> pp0 <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>inet</i> <a href="#">filter</a> output <i>filter-name</i>] hierarchy level introduced in Junos OS Release 10.1.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Description</b>              | Apply a precedence to a dynamic filter. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Options</b>                  | <p><b><i>precedence</i></b>—Precedence value for the filter. The lower the precedence value, the higher the precedence.</p> <p><b>Range:</b> 0 through 250</p> <p><b>Default:</b> 0</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Firewall Filters Overview</a></li> <li>• <a href="#">Understanding Dynamic Firewall Filters on page 249</a></li> <li>• <a href="#">Classic Filters Overview on page 253</a></li> <li>• <a href="#">Fast Update Filters Overview on page 306</a></li> <li>• <a href="#">Basic Classic Filter Syntax on page 256</a></li> <li>• <a href="#">Basic Fast Update Filter Syntax on page 309</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |



## premium (Hierarchical Policer)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> premium {     if-exceeding {         bandwidth-limit <i>bandwidth</i>;         burst-size-limit <i>burst</i>;     }     then {         discard;     } } </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles profile-name</a> firewall <a href="#">hierarchical-policer</a> ],<br>[edit firewall hierarchical-policer]                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.5.<br>Support at the [edit <a href="#">dynamic-profiles ... hierarchical-policer name</a> ] hierarchy level introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b>              | On M40e, M120, and M320 edge routers with FPC input as FFPC and FPC output as SFPC, and on MX Series, T320, T640, and T1600 edge routers with Enhanced Intelligent Queuing (IQE) PICs, T4000 routers with Type 5 FPC and Enhanced Scaling Type 4 FPC, specify a premium level for a hierarchical policer.                                                                                                                                                                                                                                                                                            |
| <b>Options</b>                  | Options are described separately.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Required Privilege Level</b> | firewall—To view this statement in the configuration.<br>firewall-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Applying Policers</i></li> <li>• <i>Guidelines for Applying Traffic Policers</i></li> <li>• <i>Hierarchical Policer Configuration Overview</i></li> <li>• <i>Hierarchical Policers</i></li> <li>• <a href="#">aggregate (Hierarchical Policer) on page 494</a></li> <li>• <i>bandwidth-limit (Hierarchical Policer)</i></li> <li>• <a href="#">burst-size-limit (Hierarchical Policer) on page 507</a></li> <li>• <a href="#">hierarchical-policer on page 574</a></li> <li>• <a href="#">if-exceeding (Hierarchical Policer) on page 579</a></li> </ul> |

## priority (Dynamic Schedulers)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>priority (priority-level   \$junos-cos-scheduler-priority);</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> <a href="#">schedulers</a> <i>scheduler-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.3.<br>The <code>\$junos-cos-scheduler-priority</code> predefined variable introduced in Junos OS Release 9.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Description</b>              | Specify packet-scheduling priority value in a dynamic profile.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Options</b>                  | <p><i>priority-level</i>—one of the following packet-scheduling priority values:</p> <ul style="list-style-type: none"><li>• <b>low</b>—Scheduler has low priority.</li><li>• <b>medium-low</b>—Scheduler has medium-low priority.</li><li>• <b>medium-high</b>—Scheduler has medium-high priority.</li><li>• <b>high</b>—Scheduler has high priority. Assigning high priority to a queue prevents the queue from being underserved.</li><li>• <b>strict-high</b>—Scheduler has strictly high priority. Configure a <b>high</b> priority queue with unlimited transmission bandwidth available to it. As long as it has traffic to send, the <b>strict-high</b> priority queue receives precedence over <b>low</b>, <b>medium-low</b>, and <b>medium-high</b> priority queues, but not <b>high</b> priority queues. You can configure <b>strict-high</b> priority on only one queue per interface.</li></ul> <p><code>\$junos-cos-scheduler-priority</code>—Junos predefined variable that is replaced with the packet-scheduling priority value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> |
| <b>Required Privilege Level</b> | <code>interface</code> —To view this statement in the configuration.<br><code>interface-control</code> —To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li><li>• <a href="#">Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13</a></li><li>• <a href="#">Dynamic Variables Overview</a></li><li>• <a href="#">scheduler (Dynamic Scheduler Maps) on page 647</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## profile (Access)

```

Syntax profile profile-name {
 accounting {
 address-change-immediate-update
 accounting-stop-on-access-deny;
 accounting-stop-on-failure;
 ancp-speed-change-immediate-update;
 coa-immediate-update;
 coa-no-override service-class-attribute;
 duplication;
 duplication-vrf {
 access-profile-name profile-name;
 vrf-name vrf-name;
 }
 immediate-update;
 order [accounting-method];
 send-acct-status-on-config-change;
 statistics (time | volume-time);
 update-interval minutes;
 wait-for-acct-on-ack;
 }
 authentication-order [authentication-methods];
 client client-name {
 chap-secret chap-secret;
 group-profile profile-name;
 ike {
 allowed-proxy-pair {
 remote remote-proxy-address local local-proxy-address;
 }
 pre-shared-key (ascii-text character-string | hexadecimal hexadecimal-digits);
 ike-policy policy-name;
 interface-id string-value;
 }
 l2tp {
 aaa-access-profile profile-name;
 interface-id interface-id;
 lcp-renegotiation;
 local-chap;
 maximum-sessions-per-tunnel number;
 multilink {
 drop-timeout milliseconds;
 fragment-threshold bytes;
 }
 ppp-authentication (chap | pap);
 ppp-profile profile-name;
 shared-secret shared-secret;
 }
 pap-password pap-password;
 ppp {
 cell-overhead;
 encapsulation-overhead bytes;
 framed-ip-address ip-address;
 framed-pool framed-pool;
 }
 }
 }

```

```
 idle-timeout seconds;
 interface-id interface-id;
 keepalive seconds;
 primary-dns primary-dns;
 primary-wins primary-wins;
 secondary-dns secondary-dns;
 secondary-wins secondary-wins;
 }
 user-group-profile profile-name;
}
domain-name-server;
domain-name-server-inet;
domain-name-server-inet6;
preauthentication-order preauthentication-method;
provisioning-order (gx-plus | jsrc);
radius {
 accounting-server [ip-address];
 attributes {
 exclude {
 ...
 }
 ignore {
 framed-ip-netmask;
 input-filter;
 logical-system::routing-instance;
 output-filter;
 }
 }
}
authentication-server [ip-address];
options {
 accounting-session-id-format (decimal | description);
 calling-station-id-delimiter delimiter-character;
 calling-station-id-format {
 agent-circuit-id;
 agent-remote-id;
 interface-description;
 nas-identifier;
 }
 client-accounting-algorithm (direct | round-robin);
 client-authentication-algorithm (direct | round-robin);
 coa-dynamic-variable-validation;
 ethernet-port-type-virtual;
 interface-description-format {
 exclude-adapter;
 exclude-sub-interface;
 }
 juniper-dsl-attributes;
 nas-identifier identifier-value;
 nas-port-extended-format {
 adapter-width width;
 ae-width width;
 port-width width;
 slot-width width;
 stacked-vlan-width width;
 vlan-width width;
 atm {
```

```

 adapter-width width;
 port-width width;
 slot-width width;
 vci-width width;
 vpi-width width;
 }
}
nas-port-id-delimiter delimiter-character;
nas-port-id-format {
 agent-circuit-id;
 agent-remote-id;
 interface-description;
 nas-identifier;
}
nas-port-type {
 ethernet {
 port-type;
 }
}
revert-interval interval;
vlan-nas-port-stacked-format;
}
preauthentication-server ip-address;
}
radius-server server-address {
 accounting-port port-number;
 accounting-retry number;
 accounting-timeout seconds;
 port port-number;
 retry attempts;
 routing-instance routing-instance-name;
 secret password;
 max-outstanding-requests value;
 source-address source-address;
 timeout seconds;
}
service {
 accounting-order (activation-protocol | radius);
}
session-options {
 client-idle-timeout minutes;
 client-session-timeout minutes;
}
}

```

**Hierarchy Level** [edit access]

**Release Information** Statement introduced before Junos OS Release 7.4.

**Description** Configure PPP CHAP, or a profile and its subscriber access, L2TP, or PPP properties.

**Options** *profile-name*—Name of the profile.

For CHAP, the name serves as the mapping between peer identifiers and CHAP secret keys. This entity is queried for the secret key whenever a CHAP challenge or response is received.

The remaining statements are explained separately.

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

**Related Documentation**

- [Configuring the PPP Authentication Protocol](#)
- [Configuring Access Profiles for L2TP or PPP Parameters](#)
- [Configuring L2TP Properties for a Client-Specific Profile](#)
- [Configuring an L2TP LNS with Inline Service Interfaces](#)
- [Configuring PPP Properties for a Client-Specific Profile](#)
- [Configuring Service Accounting with JSRC](#)
- [AAA Service Framework Overview](#)
- [show network-access aaa statistics](#)
- [clear network-access aaa statistics](#)

---

## promiscuous-mode (Protocols IGMP)

---

**Syntax** promiscuous-mode;

**Hierarchy Level** [edit dynamic-profiles *profile-name* protocols [igmp interface interface-name](#)],  
[edit logical-systems *logical-system-name* protocols igmp interface *interface-name*],  
[edit protocols igmp interface *interface-name*]

**Release Information** Statement introduced in Junos OS Release 8.3.  
Statement introduced in Junos OS Release 9.0 for EX Series switches.  
Statement introduced in Junos OS Release 9.2 for dynamic profiles.  
Statement introduced in Junos OS Release 12.1 for the QFX Series.  
Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

**Description** Specify that the interface accepts IGMP reports from hosts on any subnetwork. Note that when enabling promiscuous-mode, all routing devices on the ethernet segment must be configured with the promiscuous mode statement. Otherwise, only the interface configured with lowest IPv4 address acts as the querier for IGMP for this Ethernet segment.

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

**Related Documentation**

- [Configuring Dynamic DHCP Client Access to a Multicast Network on page 344](#)
- [Accepting IGMP Messages from Remote Subnetworks](#)

## protocol (Dynamic Schedulers)

|                            |                                                                                                                                                                 |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <code>protocol (any   non-tcp   tcp);</code>                                                                                                                    |
| <b>Hierarchy Level</b>     | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service schedulers</a> <i>scheduler-name</i> <a href="#">drop-profile-map</a> ] |
| <b>Release Information</b> | Statement introduced in Junos OS Release 9.3.                                                                                                                   |
| <b>Description</b>         | Specify the protocol type for the specified scheduler in a dynamic profile.                                                                                     |
| <b>Options</b>             | <p><b>any</b>—Accept any protocol type.</p> <p><b>non-tcp</b>—Accept any protocol type other than TCP/IP.</p> <p><b>tcp</b>—Accept only TCP/IP protocol.</p>    |



**NOTE:** Protocol types **non-tcp** and **tcp** are not supported on MX Series routers.

|                                 |                                                                                                                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13</a></li> </ul> |

## protocol (Subscriber Secure Policy)

|                                 |                                                                                                                                                                                                                                                                                                          |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>protocol <i>protocol</i>;</code>                                                                                                                                                                                                                                                                   |
| <b>Hierarchy Level</b>          | [edit services <a href="#">radius-flow-tap policy</a> <i>policy-name</i> <a href="#">inet drop-policy</a> <i>rule-name</i> <a href="#">from</a> ],<br>[edit services <a href="#">radius-flow-tap policy</a> <i>policy-name</i> <a href="#">inet6 drop-policy</a> <i>rule-name</i> <a href="#">from</a> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3.                                                                                                                                                                                                                                                           |
| <b>Description</b>              | Specify the match IP protocol type for the radius-flow-tap policy.                                                                                                                                                                                                                                       |
| <b>Options</b>                  | <b><i>protocol</i></b> —Protocol for the IPv4 or IPv6 address for the radius-flow-tap policy.                                                                                                                                                                                                            |
| <b>Required Privilege Level</b> | <p>flow-tap—To view this statement in the configuration.</p> <p>flow-tap-control—To add this statement to the configuration.</p>                                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Subscriber Secure Policy Overview on page 385</a></li> <li>• <a href="#">Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390</a></li> </ul>                                                                        |

## radius (Access Profile)

---

```
Syntax radius {
 accounting-server [ip-address];
 attributes {
 exclude
 ...
 }
 ignore {
 framed-ip-netmask;
 input-filter;
 logical-system-routing-instance;
 output-filter;
 }
 }
 authentication-server [ip-address];
 options {
 accounting-session-id-format (decimal | description);
 calling-station-id-delimiter delimiter-character;
 calling-station-id-format {
 agent-circuit-id;
 agent-remote-id;
 interface-description;
 nas-identifier;
 }
 client-accounting-algorithm (direct | round-robin);
 client-authentication-algorithm (direct | round-robin);
 coa-dynamic-variable-validation;
 ethernet-port-type-virtual;
 interface-description-format {
 exclude-adapter;
 exclude-sub-interface;
 }
 ip-address-change-notify message;
 juniper-dsl-attributes;
 nas-identifier identifier-value;
 nas-port-extended-format {
 adapter-width width;
 ae-width width;
 port-width width;
 slot-width width;
 stacked-vlan-width width;
 vlan-width width;
 atm {
 adapter-width width;
 port-width width;
 slot-width width;
 vci-width width;
 vpi-width width;
 }
 }
 nas-port-id-delimiter delimiter-character;
 nas-port-id-format {
 agent-circuit-id;
```



```

 agent-remote-id;
 interface-description;
 nas-identifier;
 }
 nas-port-type {
 ethernet {
 port-type;
 }
 }
 revert-interval interval;
 vlan-nas-port-stacked-format;
}
preauthentication-server ip-address;
}

```

**Hierarchy Level** [edit access [profile](#) *profile-name*]

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

**Description** Configure the RADIUS parameters that the router uses for AAA authentication and accounting for subscribers.

The remaining statements are explained separately.

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

**Related Documentation**

- *Configuring RADIUS Server Parameters for Subscriber Access*
- *RADIUS Server Options for Subscriber Access*

## radius-coa (Adjustment Control Profiles)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>radius-coa {<br/>    priority <i>priority</i>;<br/>    algorithm <i>algorithm</i>;<br/>}</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>          | [edit class-of-service <a href="#">adjustment-control-profiles</a> <i>profile-name</i> <a href="#">application</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 13.1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Description</b>              | Configure the shaping rate adjustment controls for the RADIUS CoA application.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Options</b>                  | <p><b><i>priority</i></b>—Priority of the RADIUS CoA application in the adjustment control profile.<br/><b>Range:</b> 1 through 10; 1 being the highest priority.<br/><b>Default:</b> 1</p> <p><b><i>algorithm</i></b>—Rate adjustment algorithm used by the RADIUS CoA application.<br/><b>Values:</b></p> <ul style="list-style-type: none"><li>• <b>adjust-never</b>—Do not perform rate adjustments.</li><li>• <b>adjust-always</b>—Adjust the shaping rate unconditionally.</li><li>• <b>adjust-less</b>—Adjust the shaping rate if it is less than the configured value.</li><li>• <b>adjust-less-or-equal</b>—Adjust the shaping rate if it is less than or equal to the configured value.</li><li>• <b>adjust-greater</b>—Adjust the shaping rate if it is greater than the configured value.</li><li>• <b>adjust-greater-or-equal</b>—Adjust the shaping rate if it is greater than or equal to the configured value.</li></ul> <p><b>Default:</b> adjust-always</p> |
| <b>Required Privilege Level</b> | <p>interfaces—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">CoS Adjustment Control Profiles Overview on page 189</a></li><li>• <a href="#">Configuring CoS Adjustment Control Profiles on page 191</a></li><li>• <a href="#">Verifying the CoS Adjustment Control Profile Configuration on page 191</a></li><li>• <a href="#">adjustment-control-profiles on page 491</a></li><li>• <a href="#">application (Adjustment Control Profiles) on page 496</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## radius-flow-tap

```
Syntax radius-flow-tap {
 forwarding-class class-name;
 interfaces interface-name;
 multicast-interception;
 policy policy-name {
 inet {
 drop-policy rule-name {
 from {
 apply-groups group-name;
 apply-groups-except group-name;
 destination-address address;
 destination-port port-number;
 dscp dscp-value;
 protocol protocol;
 source-address address;
 source-port port-number;
 }
 }
 }
 inet6 {
 drop-policy rule-name {
 from {
 apply-groups group-name;
 apply-groups-except group-name;
 destination-address address;
 destination-port port-number;
 dscp dscp-value;
 protocol protocol;
 source-address address;
 source-port port-number;
 }
 }
 }
 }
 source-ipv4-address ipv4-address;
}
```

**Hierarchy Level** [edit services]

**Release Information** Statement introduced in Junos OS Release 9.4.

**Description** Assign parameters that are used with subscriber secure policy mirroring.

The remaining statements are explained separately.

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

**Related Documentation**

- [Subscriber Secure Policy Overview on page 385](#)
- [Configuring Support for Subscriber Secure Policy Mirroring on page 387](#)

## radius-server

---

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                   | <pre>radius-server server-address {<br/>    accounting-port <i>port-number</i>;<br/>    accounting-retry <i>number</i>;<br/>    accounting-timeout <i>seconds</i>;<br/>    port <i>port-number</i>;<br/>    retry <i>attempts</i>;<br/>    routing-instance <i>routing-instance-name</i>;<br/>    secret <i>password</i>;<br/>    max-outstanding-requests <i>value</i>;<br/>    source-address <i>source-address</i>;<br/>    timeout <i>seconds</i>;<br/>}</pre> |
| Hierarchy Level          | [edit access],<br>[edit access <b>profile</b> <i>profile-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                |
| Release Information      | Statement introduced before Junos OS Release 7.4.<br>Statement introduced in Junos OS Release 9.0 for EX Series switches.                                                                                                                                                                                                                                                                                                                                          |
| Description              | <p>Configure RADIUS for subscriber access management, L2TP, or PPP.</p> <p>To configure multiple RADIUS servers, include multiple <b>radius-server</b> statements. The servers are tried in order and in a round-robin fashion until a valid response is received from one of the servers or until all the configured retry limits are reached.</p>                                                                                                                |
| Options                  | <p><b>server-address</b>—Address of the RADIUS authentication server.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                                                                                                                                |
| Required Privilege Level | system—To view this statement in the configuration.<br>system-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                  |
| Related Documentation    | <ul style="list-style-type: none"><li>• <i>Configuring RADIUS Authentication for L2TP</i></li><li>• <i>Configuring the PPP Authentication Protocol</i></li><li>• <i>Configuring RADIUS Authentication</i></li><li>• <i>Configuring Authentication and Accounting Parameters for Subscriber Access</i></li><li>• <i>show network-access aaa statistics</i></li><li>• <i>clear network-access aaa statistics</i></li></ul>                                           |

## rate-limit

|                                 |                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>rate-limit <i>limit</i>;</code>                                                                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | <code>[edit system services finger],</code><br><code>[edit system services ftp],</code><br><code>[edit system services netconf ssh],</code><br><code>[edit system services ssh],</code><br><code>[edit system services telnet],</code><br><code>[edit system services xnm-clear-text],</code><br><code>[edit system services xnm-ssl]</code> |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>                                                |
| <b>Description</b>              | Configure the maximum number of connections attempts per protocol (either IPv6 or IPv4) on an access service.                                                                                                                                                                                                                                |
| <b>Default</b>                  | 150 connections                                                                                                                                                                                                                                                                                                                              |
| <b>Options</b>                  | <p><b>rate-limit <i>limit</i></b>—(Optional) Maximum number of connection attempts allowed per minute, per IP protocol (either IPv4 or IPv6).</p> <p><b>Range:</b> 1 through 250</p> <p><b>Default:</b> 150</p>                                                                                                                              |
| <b>Required Privilege Level</b> | <p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li><i>Configuring clear-text or SSL Service for Junos XML Protocol Client Applications</i></li> </ul>                                                                                                                                                                                                    |

## rebalance-periodic (Aggregated Ethernet Subscriber Interfaces)

---

|                                 |                                                                                                                                                                     |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | rebalance-periodic time <i>hour:minute</i> <interval <i>hours</i> >                                                                                                 |
| <b>Hierarchy Level</b>          | [edit interfaces ae <i>number</i> aggregated-ether-options]                                                                                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.2.                                                                                                                      |
| <b>Description</b>              | Configure periodic rebalancing of distribution of subscribers on an aggregated Ethernet bundle.                                                                     |
| <b>Options</b>                  | <i>hour:minute</i> —Time at which the rebalancing occurs, in military time.<br><i>hours</i> —Interval at which the rebalancing occurs, in hours. Default: 24 hours. |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Periodic Rebalancing of Subscribers in an Aggregated Ethernet Interface on page 151</a></li></ul>   |

## rewrite-rules (Dynamic CoS Interfaces)

|                                 |                                                                                                                                                                                                                                                        |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>rewrite-rules {   dscp (rewrite-name   default);   dscp-ipv6 (rewrite-name   default);   ieee-802.1 (rewrite-name   default) vlan-tag (outer   outer-and-inner);   inet-precedence (rewrite-name   default); }</pre>                              |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> class-of-service interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> ]                                                                                                                  |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                                                         |
| <b>Description</b>              | Associate a rewrite-rules configuration or default mapping with a specific interface in a dynamic profile.                                                                                                                                             |
| <b>Options</b>                  | <p><b>rewrite-name</b>—Name of a <b>rewrite-rules</b> mapping configured at the [edit class-of-service <b>rewrite-rules</b>] hierarchy level.</p> <p><b>default</b>—The default mapping.</p> <p>The remaining statements are explained separately.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <i>rewrite-rules</i></li> </ul>                                                                             |

## routing-options (Dynamic Profiles)

```
Syntax routing-options {
 access {
 route prefix {
 metric route-cost;
 next-hop next-hop;
 preference route-distance;
 tag route-tag;
 }
 }
 access-internal {
 route subscriber-ip-address {
 qualified-next-hop underlying-interface {
 mac-address address;
 }
 }
 }
 multicast {
 interface interface-name {
 no-qos-adjust;
 }
 }
 rib routing-table-name {
 access {
 route prefix {
 metric route-cost;
 next-hop next-hop;
 preference route-distance;
 tag route-tag;
 }
 }
 access-internal {
 route subscriber-ip-address {
 qualified-next-hop underlying-interface {
 mac-address address;
 }
 }
 }
 }
 }
```

**Hierarchy Level** [edit [dynamic-profiles profile-name](#)],  
[edit dynamic-profiles *profile-name* routing-instances \$junos-routing-instance]

**Release Information** Statement introduced in Junos OS Release 9.6.  
Support at the [edit [dynamic-profiles profile-name](#) routing-instances \$junos-routing-instance] hierarchy level introduced in Junos OS Release 10.1.

**Description** Configure protocol-independent routing properties in a dynamic profile.

The remaining statements are explained separately.



|                                 |                                                                                                                                                                                                                    |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Dynamic Access Routes for Subscriber Management</i></li> <li>• <i>Configuring Dynamic Access-Internal Routes for DHCP Subscriber Management</i></li> </ul> |

## rpf-check (Dynamic Profiles)

|                                 |                                                                                                                                                                                                                  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>rpf-check {   fail-filter filter-name;   mode loose; }</pre>                                                                                                                                                |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>family</b> <i>family</i> ]                                                                        |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.6.                                                                                                                                                                    |
| <b>Description</b>              | <p>Check whether traffic is arriving on an expected path. You can include this statement with the <b>inet</b> protocol family only.</p> <p>The remaining statements are explained separately.</p>                |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Configuring Unicast RPF</i></li> <li>• <a href="#">Configuring Unicast RPF and Fail Filters in Dynamic Profiles for Subscriber Interfaces on page 326</a></li> </ul> |

## rule (Captive Portal Content Delivery)

---

**Syntax**     `rule rule-name {  
                  match-direction (input | output | input-output);  
                  term term-name {  
                    from {  
                      application [junos-http, junos-https, junos-httpproxy];  
                      destination-address address <except>;  
                      destination-prefix-list list-name <except>;  
                    }  
                    then {  
                      accept;  
                      redirect <url>;  
                      rewrite <destination-address address> <destination-port port-number>;  
                      syslog;  
                    }  
                  }  
                }`

**Hierarchy Level**     [edit services [captive-portal-content-delivery \(Captive Portal Content Delivery\)](#)]

**Release Information**     Statement introduced in Junos OS Release 10.4.

**Description**     Specify the rule the router uses when applying this service.

**Options**     *rule-name*—Identifier for the collection of terms that constitute this rule.

                  The remaining statements are explained separately.

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

**Related Documentation**     • [Redirecting HTTP Requests Overview on page 353](#)

## rule-set (Captive Portal Content Delivery)

|                                 |                                                                                                                                                                                                                                             |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>rule-set <i>rule-set-name</i> {<br/>    [rule <i>rule-name</i>];<br/>}</code>                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit services <a href="#">captive-portal-content-delivery</a> (Captive Portal Content Delivery)]                                                                                                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.4.                                                                                                                                                                                              |
| <b>Description</b>              | Define a set of captive portal content delivery rules that the router uses when applying this service.                                                                                                                                      |
| <b>Options</b>                  | <p><b><i>rule-set-name</i></b>—Identifier for the collection of rules that constitute this rule set.</p> <p><b><i>rule rule-name</i></b>—Name of a rule defined at the [edit services captive-portal-content-delivery] hierarchy level.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Redirecting HTTP Requests Overview on page 353</a></li> </ul>                                                                                                                          |

## scheduler (Dynamic Scheduler Maps)

|                                 |                                                                                                                                                                                                                                                                                                          |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>scheduler <i>scheduler-name</i>;</code>                                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles profile-name class-of-service scheduler-maps map-name forwarding-class class-name</a> ]                                                                                                                                                                               |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                                                            |
| <b>Description</b>              | Associate a scheduler with a scheduler map in a dynamic profile.                                                                                                                                                                                                                                         |
| <b>Options</b>                  | <b><i>scheduler-name</i></b> —Either the specific name of the scheduler configuration block or the scheduler variable ( <code>\$junos-cos-scheduler</code> ).                                                                                                                                            |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13</a></li> <li>• <a href="#">Dynamic Variables Overview</a></li> </ul> |

## **scheduler-map (Dynamic Traffic Shaping)**

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|                                 |                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>scheduler-map (map-name);</code>                                                                                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles profile-name class-of-service traffic-control-profiles profile-name</a> ]                                                                                                                                                                                                                                         |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.3.<br>The <code>\$junos-cos-scheduler-map</code> variable introduced in Junos OS Release 9.4.                                                                                                                                                                                                             |
| <b>Description</b>              | Associate a scheduler map name with a traffic-control profile in a dynamic profile.<br><br>The scheduler map can be defined dynamically (at the <a href="#">[edit dynamic-profiles profile-name class-of-service scheduler-maps]</a> hierarchy level) or statically (at the <a href="#">[edit class-of-service scheduler-maps]</a> hierarchy level). |
| <b>Options</b>                  | <b>map-name</b> —Name of the scheduler map or the Junos predefined variable ( <code>\$junos-cos-scheduler-map</code> ). When you specify the variable, the scheduler-map name is obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.                                        |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li><li>• <a href="#">Configuring Traffic Scheduling and Shaping for Subscriber Access on page 11</a></li><li>• <a href="#">output-traffic-control-profile on page 613</a></li></ul>                                  |

## scheduler-maps (Dynamic CoS Definition)

|                                 |                                                                                                                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> scheduler-maps {   map-name {     forwarding-class class-name scheduler scheduler-name;   } } </pre>                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> ]                                                                                                                                                      |
| <b>Release Information</b>      | <p>Statement introduced in Junos OS Release 9.3.</p> <p>Support at the [edit <a href="#">dynamic-profiles</a> <i>profile-name</i>] hierarchy level introduced in Junos OS Release 9.3.</p>                                                         |
| <b>Description</b>              | Specify a scheduler map name in a dynamic profile and associate it with the scheduler configuration and forwarding class.                                                                                                                          |
| <b>Options</b>                  | <p><b>map-name</b>—Name of the scheduler map.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                        |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13</a></li> </ul> |

## schedulers (Dynamic CoS Definition)

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                   | <pre> schedulers {   scheduler-name {     adjust-minimum rate;     adjust-percent percentage;     buffer-size (percent percentage   remainder   temporal microseconds         \$junos-cos-scheduler-bs);     drop-profile-map loss-priority (any   low   medium-low   medium-high   high) protocol       (any   non-tcp   tcp) drop-profile (profile-name   predefined-variable);     excess-priority (low   high   \$junos-cos-scheduler-excess-priority   none);     excess-rate (percent percentage   percent \$junos-cos-scheduler-excess-rate);     priority (priority-level   \$junos-cos-scheduler-priority);     shaping-rate (rate   predefined-variable) &lt;burst-size bytes&gt;;     transmit-rate (rate   percent percentage   remainder   percent percentage       \$junos-cos-scheduler-tx) &lt;exact   rate-limit&gt;;   } } </pre> |
| Hierarchy Level          | [edit <a href="#">dynamic-profiles profile-name class-of-service</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Release Information      | <p>Statement introduced in Junos OS Release 9.3.</p> <p>The <code>\$junos-cos-scheduler</code> predefined variable introduced in Junos OS Release 9.4.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Description              | Specify scheduler name and parameter values in a dynamic profile.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Options                  | <p><b>scheduler-name</b>—Name of the scheduler to be configured or the Junos OS predefined variable (<code>\$junos-cos-scheduler</code>). The predefined variable is replaced with the scheduler name obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Required Privilege Level | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Related Documentation    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13</a></li> <li>• <a href="#">scheduler on page 647</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

## service (Dynamic Service Sets)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> service {   input {     service-set <i>service-set-name</i> {       service-filter <i>filter-name</i>;     }     post-service-filter <i>filter-name</i>;   }   output {     service-set <i>service-set-name</i> {       service-filter <i>filter-name</i>;     }   } } </pre>                                                                                                            |
| <b>Hierarchy Level</b>          | <p>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> <a href="#">family</a> <i>family</i>],</p> <p>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> pp0 <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>family</i>]</p> |
| <b>Release Information</b>      | <p>Statement introduced in Junos OS Release 9.5.</p> <p>Support at the [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> pp0 <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>family</i>] hierarchy level introduced in Junos OS Release 10.1.</p>                                                                                  |
| <b>Description</b>              | <p>Define the service sets and filters to be applied to an interface. This statement is not supported for <a href="#">family inet6</a>.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                          |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic Service Sets Overview on page 337</a></li> <li>• <a href="#">Associating Service Sets with Interfaces in a Dynamic Profile on page 337</a></li> </ul>                                                                                                                                                                             |

## service-filter (Dynamic Service Sets)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>service-filter <i>filter-name</i>;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>          | <code>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> <a href="#">family</a> <i>family</i> <a href="#">service input</a> <a href="#">service-set</a> <i>service-set-name</i>],</code><br><code>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> <a href="#">family</a> <i>family</i> <a href="#">service output</a> <a href="#">service-set</a> <i>service-set-name</i>],</code><br><code>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> pp0 <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>family</i> <a href="#">service input</a> <a href="#">service-set</a> <i>service-set-name</i>],</code><br><code>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> pp0 <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>family</i> <a href="#">service output</a> <a href="#">service-set</a> <i>service-set-name</i>]</code> |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.5.<br>Support at the <code>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> pp0 <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>family</i> <a href="#">service input</a> <a href="#">service-set</a> <i>service-set-name</i>]</code> and <code>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> pp0 <a href="#">unit</a> "\$junos-interface-unit" <a href="#">family</a> <i>family</i> <a href="#">service output</a> <a href="#">service-set</a> <i>service-set-name</i>]</code> hierarchy levels introduced in Junos OS Release 10.1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Description</b>              | Define the filter to be applied to traffic before it is accepted for service processing. Configuration of a service filter is optional; if you include the <b>service-set</b> statement without a <b>service-filter</b> definition, the router software assumes that the match condition is true and selects the service set for processing automatically. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Options</b>                  | <i>filter-name</i> —Identifies the filter to be applied in service processing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Required Privilege Level</b> | <code>interface</code> —To view this statement in the configuration.<br><code>interface-control</code> —To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic Service Sets Overview on page 337</a></li><li>• <a href="#">Associating Service Sets with Interfaces in a Dynamic Profile on page 337</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



## service-set (Dynamic Service Sets)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>service-set <i>service-set-name</i> {<br/>    <i>service-filter filter-name</i>;<br/>}</code>                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit <i>dynamic-profiles profile-name interfaces interface-name unit logical-unit-number family family service input</i> ],<br>[edit <i>dynamic-profiles profile-name interfaces interface-name unit logical-unit-number family family service output</i> ],<br>[edit <i>dynamic-profiles profile-name interfaces pp0 unit "\$junos-interface-unit" family family service input</i> ],<br>[edit <i>dynamic-profiles profile-name interfaces pp0 unit "\$junos-interface-unit" family family service output</i> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.5.<br>Support at the [edit <i>dynamic-profiles profile-name interfaces pp0 unit "\$junos-interface-unit" family family service input</i> ] and [edit <i>dynamic-profiles profile-name interfaces pp0 unit "\$junos-interface-unit" family family service output</i> ] hierarchy levels introduced in Junos OS Release 10.1.                                                                                                                                            |
| <b>Description</b>              | Define one or more service sets in a dynamic profile. Service sets are applied to an interface. If you define multiple service sets, the router software evaluates the filters in the order in which they appear in the configuration. Only the Internet Protocol version 4 (IPv4) protocol family is currently supported for dynamic PPPoE logical interfaces.                                                                                                                                                   |
| <b>Options</b>                  | <i>service-set-name</i> —Name of the service set.<br><br>The remaining statement is explained separately.                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic Service Sets Overview on page 337</a></li> <li>• <a href="#">Associating Service Sets with Interfaces in a Dynamic Profile on page 337</a></li> </ul>                                                                                                                                                                                                                                                                                                |

## services (Captive Portal Content Delivery)

```
Syntax services {
 ...
 captive-portal-content-delivery {
 rule rule-name {
 match-direction (input | output | input-output);
 term term-name {
 from {
 application [junos-http, junos-https, junos-httpproxy];
 destination-address address <except>;
 destination-prefix-list list-name <except>;
 }
 then {
 accept;
 redirect <url>;
 rewrite <destination-address address> <destination-port port-number>;
 syslog;
 }
 }
 }
 rule-set rule-set-name {
 [rule rule-name];
 }
 }
 ...
}
```

**Hierarchy Level** [edit]

**Release Information** Statement introduced in Junos OS Release 10.4.

**Description** Define the captive portal and content delivery set of the rules statements to be applied to traffic.

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

**Related Documentation**

- [Redirecting HTTP Requests Overview on page 353](#)

## shaping-rate (Dynamic Traffic Shaping and Scheduling)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>shaping-rate (rate   predefined-variable) &lt;burst-size bytes   \$junos-cos-shaping-rate-burst&gt;;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles profile-name class-of-service traffic-control-profiles profile-name</a> ],<br>[edit <a href="#">dynamic-profiles profile-name class-of-service schedulers scheduler-name</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.<br>The <b>\$junos-cos-shaping-rate</b> variable for traffic-control profiles introduced in Junos OS Release 9.4.<br>The <b>\$junos-cos-scheduler-shaping-rate</b> variable for schedulers introduced in Junos OS Release 10.2.<br>Option <b>burst-size</b> introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b>              | Configure a shaping rate for a logical interface or a scheduler. The sum of the shaping rates for all logical interfaces on the physical interface can exceed the physical interface bandwidth. This practice is known as oversubscription of the peak information rate (PIR).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Options</b>                  | <p><b>rate</b>—Peak rate in bits per second (bps). You can specify the value as a complete decimal number or as a decimal number followed by the abbreviation <b>k</b> (1000), <b>m</b> (1,000,000), or <b>g</b> (1,000,000,000).<br/> <b>Range:</b> 1000 through 160,000,000,000 bps</p> <p><b>predefined-variable</b>—One of the following Junos predefined variables. The variable is replaced with a value obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> <ul style="list-style-type: none"> <li>• <b>\$junos-cos-shaping-rate</b>—Variable for the shaping rate that is specified for the logical interface. Use this variable at the [edit <a href="#">dynamic-profiles profile-name class-of-service traffic-control-profiles profile-name</a>] hierarchy level.</li> <li>• <b>\$junos-cos-scheduler-shaping-rate</b>—Variable for the shaping rate that is specified for a scheduler. Use this variable at the [edit <a href="#">dynamic-profiles profile-name class-of-service schedulers scheduler-name</a>] hierarchy level.</li> </ul> <p><b>burst-size bytes</b>—(Optional) Maximum burst size, in bytes.<br/> <b>Range:</b> 0 through 1,000,000,000</p> <p><b>\$junos-cos-shaping-rate-burst</b>—(Optional) Variable for the burst-size that is specified for the shaping rate. Use this variable at the [edit <a href="#">dynamic-profiles profile-name class-of-service traffic-control-profile</a>] hierarchy level.</p> |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Configuring Traffic Scheduling and Shaping for Subscriber Access on page 11</a></li> <li>• <a href="#">output-traffic-control-profile on page 613</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

## shared-name

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|                                 |                                                                                                                                                                                                                                                                                                                             |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>shared-name <i>filter-shared-name</i>;</code>                                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | <code>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">interfaces</a> <i>interface-name</i> <a href="#">unit</a> <i>logical-unit-number</i> <a href="#">family</a> <i>family-name</i> <a href="#">filter</a> [input   output] <i>filter-name</i>]</code>                                              |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.2.                                                                                                                                                                                                                                                                              |
| <b>Description</b>              | Apply a filter shared name to a dynamic filter.                                                                                                                                                                                                                                                                             |
| <b>Options</b>                  | <i>filter-shared-name</i> — Name of the specific shared filter or \$junos-interface-set-name.                                                                                                                                                                                                                               |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Firewall Filters</a></li><li>• <a href="#">Understanding Dynamic Firewall Filters on page 249</a></li><li>• <a href="#">Classic Filters Overview on page 253</a></li><li>• <a href="#">Basic Classic Filter Syntax on page 256</a></li></ul> |

## single-rate

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>single-rate {   (color-aware   color-blind);   committed-information-rate <i>bps</i>;   committed-burst-size <i>bytes</i>;   excess-burst-size <i>bytes</i>; }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | <pre>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall <a href="#">three-color-policer</a> <i>name</i>], [edit firewall <a href="#">three-color-policer</a> <i>policer-name</i>], [edit logical-systems <i>logical-system-name</i> firewall <a href="#">three-color-policer</a> <i>policer-name</i>]</pre>                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Logical systems support introduced in Junos OS Release 9.3.</p> <p>Support at the <code>[edit dynamic-profiles ... <a href="#">three-color-policer</a> <i>name</i>]</code> hierarchy level introduced in Junos OS Release 11.4.</p>                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>              | <p>Configure a single-rate three-color policer in which marking is based on the committed information rate (CIR), committed burst size (CBS), and excess burst size (EBS).</p> <p>Packets that conform to the CIR or the CBS are assigned low loss priority (green). Packets that exceed the CIR and the CBS but are within the EBS are assigned medium-high loss priority (yellow). Packets that exceed the EBS are assigned high loss priority (red).</p> <p>Green and yellow packets are always forwarded; this action is not configurable. You can configure red packets to be discarded. By default, red packets are forwarded.</p> <p>The remaining statements are explained separately.</p> |
| <b>Required Privilege Level</b> | <pre>firewall—To view this statement in the configuration. firewall-control—To add this statement to the configuration.</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Three-Color Policer Configuration Overview</a></li> <li>• <a href="#">color-aware on page 516</a></li> <li>• <a href="#">color-blind on page 517</a></li> <li>• <a href="#">two-rate on page 679</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                               |

## source (Dynamic IGMP Interface)

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|                                 |                                                                                                                                                                                                                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>source source;</code>                                                                                                                                                                                                                                                           |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>igmp interface interface-name static</b> ]                                                                                                                                                                                    |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                                         |
| <b>Description</b>              | Specify the IP version 4 (IPv4) unicast address to send data on an interface.                                                                                                                                                                                                         |
| <b>Options</b>                  | <b>source</b> —IPv4 unicast address.                                                                                                                                                                                                                                                  |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li><li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li><li>• <a href="#">Enabling IGMP Static Group Membership</a></li></ul> |

## source (Dynamic MLD Interface)

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|                                 |                                                                                                                                                                                 |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>source ip-address {<br/>    <b>source-count</b> number;<br/>    <b>source-increment</b> increment;<br/>}</code>                                                           |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>mld interface interface-name static group multicast-group-address</b> ]                                                 |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                  |
| <b>Description</b>              | IP version 6 (IPv6) unicast source address for the multicast group being configured on a dynamic interface.                                                                     |
| <b>Options</b>                  | <b>ip-address</b> —One or more IPv6 unicast addresses.                                                                                                                          |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li><li>• <a href="#">Enabling MLD Static Group Membership</a></li></ul> |

## source-address (Subscriber Secure Policy)

|                                 |                                                                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>source-address <i>address</i>;</code>                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | [edit services <a href="#">radius-flow-tap policy <i>policy-name</i> inet drop-policy <i>rule-name</i> from</a> ],<br>[edit services <a href="#">radius-flow-tap policy <i>policy-name</i> inet6 drop-policy <i>rule-name</i> from</a> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3.                                                                                                                                                                                           |
| <b>Description</b>              | Specify source IP address or prefix value from which to inherit configuration data for radius-flow-tap policy rule mapping.                                                                                                              |
| <b>Options</b>                  | <b><i>address</i></b> — IPv4 or IPv6 address for the radius-flow-tap policy.                                                                                                                                                             |
| <b>Required Privilege Level</b> | <b>flow-tap</b> —To view this statement in the configuration.<br><b>flow-tap-control</b> —To add this statement to the configuration.                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Subscriber Secure Policy Overview on page 385</a></li> <li>• <a href="#">Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390</a></li> </ul>        |

## source-count (Dynamic MLD Interface)

|                                 |                                                                                                                                                                                    |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>source-count <i>number</i>;</code>                                                                                                                                           |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <a href="#">mld interface <i>interface-name</i> static group multicast-group-address <i>source</i></a> ]                      |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                     |
| <b>Description</b>              | Configure the number of multicast source addresses that should be accepted for each static group created on dynamic interfaces.                                                    |
| <b>Options</b>                  | <b><i>number</i></b> —Number of source addresses.<br><b>Default:</b> 1<br><b>Range:</b> 1 through 1024                                                                             |
| <b>Required Privilege Level</b> | <b>routing</b> —To view this statement in the configuration.<br><b>routing-control</b> —To add this statement to the configuration.                                                |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li> <li>• <a href="#">Enabling MLD Static Group Membership</a></li> </ul> |

## source-increment (Dynamic MLD Interface)

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|                                 |                                                                                                                                                                                            |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | source-increment <i>increment</i> ;                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit dynamic-profile <i>profile-name</i> protocols <b>mld interface</b> <i>interface-name</i> <b>static group</b> <i>multicast-group-address</i> <b>source</b> ]                          |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                             |
| <b>Description</b>              | Configure the number of times the address should be incremented for each static group created on the dynamic interface. The increment is specified in a format similar to an IPv6 address. |
| <b>Options</b>                  | <b>increment</b> —Number of times the source address should be incremented.<br><b>Default:</b> ::1<br><b>Range:</b> ::1 through ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff;                   |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                        |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li><li>• <a href="#">Enabling MLD Static Group Membership</a></li></ul>            |

## source-ipv4-address

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|                                 |                                                                                                                                                                                                                                |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | source-ipv4-address <i>ipv4-address</i> ;                                                                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit services <b>radius-flow-tap</b> ]                                                                                                                                                                                        |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.4.                                                                                                                                                                                  |
| <b>Description</b>              | Specify the source IP address used in the IP header that is prepended to mirrored packets sent to a mediation device.                                                                                                          |
| <b>Options</b>                  | <b>ipv4-address</b> —IPv4 address.                                                                                                                                                                                             |
| <b>Required Privilege Level</b> | flow-tap—To view this statement in the configuration.<br>flow-tap-control—To add this statement to the configuration.                                                                                                          |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Subscriber Secure Policy Overview on page 385</a></li><li>• <a href="#">Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390</a></li></ul> |



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## source-port (Subscriber Secure Policy)

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|                                 |                                                                                                                                                                                                                                          |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>source-port <i>port-number</i>;</code>                                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit services <a href="#">radius-flow-tap policy <i>policy-name</i> inet drop-policy <i>rule-name</i> from</a> ],<br>[edit services <a href="#">radius-flow-tap policy <i>policy-name</i> inet6 drop-policy <i>rule-name</i> from</a> ] |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3.                                                                                                                                                                                           |
| <b>Description</b>              | Specify the match source port for the radius-flow-tap policy.                                                                                                                                                                            |
| <b>Options</b>                  | <i>port-number</i> — Number of the IPv4 or IPv6 source port for the radius-flow-tap policy.                                                                                                                                              |
| <b>Required Privilege Level</b> | flow-tap—To view this statement in the configuration.<br>flow-tap-control—To add this statement to the configuration.                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Subscriber Secure Policy Overview on page 385</a></li><li>• <a href="#">Configuring RADIUS-Initiated Subscriber Secure Policy Mirroring Overview on page 390</a></li></ul>           |

## ssh

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>ssh {<br/>  ciphers [ <i>cipher-1 cipher-2 cipher-3 ...</i>];<br/>  client-alive-count-max <i>seconds</i>;<br/>  client-alive-interval <i>seconds</i>;<br/>  connection-limit <i>limit</i>;<br/>  hostkey-algorithm &lt;<i>algorithm</i> no-<i>algorithm</i>&gt;;<br/>  key-exchange &lt;<i>algorithm</i>&gt;;<br/>  macs &lt;<i>algorithm</i>&gt;;<br/>  max-sessions-per-connection &lt;<i>number</i>&gt;;<br/>  no-passwords;<br/>  no-tcp-forwarding;<br/>  protocol-version [<i>v1 v2</i>];<br/>  rate-limit <i>limit</i>;<br/>  root-login (<i>allow</i>   <i>deny</i>   <i>deny-password</i>);<br/>}</pre> |
| <b>Hierarchy Level</b>          | [edit system services]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Statement introduced in Junos OS Release 11.1 for the QFX Series.</p> <p><b>client-alive-interval</b> and <b>client-alive-max-count</b> statements introduced in Junos OS Release 12.2.</p> <p><b>no-passwords</b> statement introduced in Junos OS Release 13.3.</p> <p>Statement introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>                                                                                                                          |
| <b>Description</b>              | <p>Allow SSH requests from remote systems to the local router or switch.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Required Privilege Level</b> | <p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Configuring SSH Service for Remote Access to the Router or Switch</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## ssm-map (Dynamic IGMP Interface)

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|                                 |                                                                                                                                                                                                                                                                                               |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>ssm-map <i>ssm-map-name</i>;</code>                                                                                                                                                                                                                                                     |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>igmp</b> <b>interface</b> <i>interface-name</i> ]                                                                                                                                                                                     |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                                                 |
| <b>Description</b>              | Apply an SSM map to an IGMP interface.                                                                                                                                                                                                                                                        |
| <b>Options</b>                  | <i>ssm-map-name</i> —Name of SSM map.                                                                                                                                                                                                                                                         |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li> <li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li> <li>• <a href="#">Source-Specific Multicast Groups Overview</a></li> </ul> |

## ssm-map (Dynamic MLD Interface)

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|                                 |                                                                                                                                                                                |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>ssm-map <i>ssm-map-name</i>;</code>                                                                                                                                      |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>mld</b> <b>interface</b> <i>interface-name</i> ]                                                                       |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                 |
| <b>Description</b>              | Apply an SSM map to a dynamic MLD interface.                                                                                                                                   |
| <b>Options</b>                  | <i>ssm-map-name</i> —Name of SSM map.                                                                                                                                          |
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li> <li>• <a href="#">Example: Configuring SSM Mapping</a></li> </ul> |

## static (Dynamic IGMP Interface)

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|                                 |                                                                                                                                                                                                                                                                                       |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>static {<br/>    group group;<br/>    group group {<br/>        source source;<br/>    }<br/>}</pre>                                                                                                                                                                             |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>igmp interface</b> <i>interface-name</i> ]                                                                                                                                                                                    |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                                         |
| <b>Description</b>              | Test multicast forwarding on an interface without a receiver host.                                                                                                                                                                                                                    |
| <b>Options</b>                  | The remaining statements are explained separately.                                                                                                                                                                                                                                    |
| <b>Required Privilege Level</b> | routing and trace—To view this statement in the configuration.<br>routing-control and trace-control—To add this statement to the configuration.                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li><li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li><li>• <a href="#">Enabling IGMP Static Group Membership</a></li></ul> |

## static (Dynamic MLD Interface)

|                                 |                                                                                                                                                                                                                            |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>static {   group multicast-group-address {     exclude;     group-count number;     group-increment increment;     source ip-address {       source-count number;       source-increment increment;     }   } }</pre> |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>mld interface</b> <i>interface-name</i> ]                                                                                                                          |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                             |
| <b>Description</b>              | <p>Test multicast forwarding on an interface.</p> <p>The remaining statements are explained separately.</p>                                                                                                                |
| <b>Required Privilege Level</b> | <p>routing and trace—To view this statement in the configuration.</p> <p>routing-control and trace-control—To add this statement to the configuration.</p>                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li> <li>• <a href="#">Enabling MLD Static Group Membership</a></li> </ul>                                         |

## targeted-distribution (Dynamic Demux Interfaces over Aggregated Ethernet)

|                                 |                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | targeted-distribution;                                                                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit <b>dynamic-profiles</b> <i>profile-name</i> interfaces demux0 unit <i>logical-unit-number</i> ]                                                                                                                                                                                                                          |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.3.                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | Configure egress data for a dynamic logical interface to be sent across a single member link in an aggregated Ethernet bundle. A backup link is provisioned with CoS scheduling resources in the event that the primary assigned link goes down. The aggregated Ethernet interface must be configured without link protection. |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring the Distribution Type for Demux Subscribers on Aggregated Ethernet Interfaces on page 149</a></li> </ul>                                                                                                                                                      |

## targeted-distribution (Static Interfaces over Aggregated Ethernet)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | targeted-distribution;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | [edit interfaces demux0 unit <i>logical-unit-number</i> ],<br>[edit interfaces pp0 unit <i>logical-unit-number</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.2.<br>Statement introduced in Junos OS Release 13.2R2 for EX Series switches.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>              | Configure egress data for a logical interface to be sent across a single member link in an aggregated Ethernet bundle. A backup link is provisioned with CoS scheduling resources in the event that the primary assigned link goes down. The aggregated Ethernet interface must be configured without link protection.                                                                                                                                                                                                                                                                                                              |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">CoS for PPPoE Subscriber Interfaces Overview on page 9</a></li><li>• <a href="#">Configuring the Distribution Type for PPPoE Subscribers on Aggregated Ethernet Interfaces on page 161</a></li><li>• <a href="#">Verifying the Distribution of PPPoE Subscribers in an Aggregated Ethernet Interface on page 162</a></li><li>• <i>Targeted Traffic Distribution on Aggregated Ethernet Interfaces in a Virtual Chassis</i></li><li>• <i>Configuring Module Redundancy for a Virtual Chassis</i></li><li>• <i>Configuring Chassis Redundancy for a Virtual Chassis</i></li></ul> |

## term (Captive Portal Content Delivery)

**Syntax**    `term term-name{`  
               `from {`  
                   `application [junos-http, junos-https, junos-httpproxy];`  
                   `destination-address address <except>;`  
                   `destination-prefix-list list-name <except>;`  
               `}`  
               `then {`  
                   `accept;`  
                   `redirect <url>;`  
                   `rewrite <destination-address address> <destination-port port-number>;`  
                   `syslog;`  
               `}`  
               `}`

**Hierarchy Level**    `[edit services captive-portal-content-delivery rule rule-name]`

**Release Information**    Statement introduced in Junos OS Release 10.4.

**Description**    Define the term match and action properties for the captive portal content delivery rule.

**Options**    *term-name*—Identifier for the term.

The remaining statements are explained separately.

**Required Privilege**    interface—To view this statement in the configuration.

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

**Related Documentation**    • [Redirecting HTTP Requests Overview on page 353](#)

## term (Dynamic Profiles)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>term <i>term-name</i> {<br/>    from {<br/>        <i>match-conditions</i>;<br/>    }<br/>    then {<br/>        <i>action</i>;<br/>        <i>action-modifiers</i>;<br/>    }<br/>    only-at-create;<br/>}</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall family <i>family-name</i> <a href="#">fast-update-filter</a> <i>filter-name</i> ],<br>[edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall family <i>family-name</i> <a href="#">filter</a> <i>filter-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.6.<br>Support at the [edit <a href="#">dynamic-profiles</a> ... <a href="#">filter</a> <i>filter-name</i> ] hierarchy level introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b>              | Define terms for fast update filters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Options</b>                  | <p><b>action</b>—(Optional) An action to take if conditions match. If you do not specify an action, the packets that match the conditions in the <b>from</b> statement are accepted.</p> <p><b>action-modifiers</b>—(Optional) One or more actions to perform on a packet.</p> <p><b>from</b>—(Optional) Match packet fields to values. If not included, all packets are considered to match and the actions and action modifiers in the <b>then</b> statement are taken.</p> <p><b>match-conditions</b>—One or more conditions to make a match.</p> <p><b>only-at-create</b>—(Optional) Specify that the term is added only when the fast update filter is first created. No subsequent changes can be made to the term in the filter. Use this option only for terms that do not include subscriber-specific data in their match conditions, such as common or default terms (for example, counting the default drop packets).</p> <p><b>term-name</b>—Name that identifies the term. The name can contain letters, numbers, and hyphens (-), and can be up to 64 characters long. To include spaces in the name, enclose it in quotation marks (" ").</p> <p><b>then</b>—(Optional) Actions to take on matching packets. If not included and a packet matches all the conditions in the <b>from</b> statement, the packet is accepted.</p> |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Configuring Fast Update Filters on page 310</a></li><li>• <a href="#">Configuring Terms for Fast Update Filters on page 315</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |



- [Fast Update Filter Match Conditions on page 314](#)
- [Fast Update Filter Actions and Action Modifiers on page 315](#)

## then (Captive Portal Content Delivery)

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|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>then {   accept;   redirect &lt;url&gt;;   rewrite &lt;destination-address address&gt; &lt;destination-port port-number&gt;;   syslog; }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit services captive-portal-content-delivery rule <i>rule-name</i> <b>term</b> <i>term-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Description</b>              | Define the term actions and any optional action modifiers for the captive portal content delivery rule.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Options</b>                  | <p><b>action</b>—Actions to accept, redirect, or rewrite packets and all subsequent packets in flows that match the rules.</p> <ul style="list-style-type: none"><li>• <b>accept</b>—Accept the packets and all subsequent packets in flows that match the rules.</li><li>• <b>redirect</b>—Redirect the packet and all subsequent packets in flows that match the rules. You can optionally configure the following action modifier:<ul style="list-style-type: none"><li>• <b>url</b>—(Optional) URL destination for the redirected packet. The URL must begin with <b>http://</b> or <b>https://</b>.</li></ul></li><li>• <b>rewrite</b>— Rewrite the packet and all subsequent packets in flows that match the rules. You can optionally configure one or both of the following action modifiers:<ul style="list-style-type: none"><li>• <b>destination-address address</b>—(Optional) Destination address for the rewritten packet.</li><li>• <b>destination-port port-number</b>—(Optional) Destination port for the rewritten packet.</li></ul></li><li>• <b>syslog</b>— Log information about the packet to a system log file.</li></ul> <p><b>action-modifiers (Optional)</b>—Additional actions to accept, redirect, or rewrite packets and all subsequent packets in flows that match the rules.</p> <ul style="list-style-type: none"><li>• <b>destination-address</b>—(Optional) Destination address of the rewrite packet.</li><li>• <b>destination-port</b> —(Optional) Destination address and destination port of the rewrite packet.</li><li>• <b>url</b>—(Optional) URL of the redirect packet.</li></ul> |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

- Related Documentation**
- [Redirecting HTTP Requests Overview on page 353](#)
  - *Firewall Filter Match Conditions Based on Address Fields*

## three-color-policer (Configuring)

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|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                   | <pre>three-color-policer <i>policer-name</i>   <i>uid</i> {<br/>    action {<br/>        loss-priority high then discard;<br/>    }<br/>    filter-specific;<br/>    logical-interface-policer;<br/>    physical-interface-policer;<br/>    shared-bandwidth-policer;<br/>    single-rate {<br/>        (color-aware   color-blind);<br/>        committed-burst-size <i>bytes</i>;<br/>        committed-information-rate <i>bps</i>;<br/>        excess-burst-size <i>bytes</i>;<br/>    }<br/>    two-rate {<br/>        (color-aware   color-blind);<br/>        committed-burst-size <i>bytes</i>;<br/>        committed-information-rate <i>bps</i>;<br/>        peak-burst-size <i>bytes</i>;<br/>        peak-information-rate <i>bps</i>;<br/>    }<br/>}</pre> |
| Hierarchy Level          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> firewall],<br>[edit firewall],<br>[edit logical-systems <i>logical-system-name</i> firewall]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Release Information      | Statement introduced before Junos OS Release 7.4.<br>The <b>action</b> and <b>single-rate</b> statements added in Junos OS Release 8.2.<br>Logical systems support introduced in Junos OS Release 9.3.<br>Support at the [edit <b>dynamic-profiles</b> ... <b>firewall</b> ] hierarchy level introduced in Junos OS Release 11.4.                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Description              | Configure a three-color policer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Options                  | <p><b><i>policer-name</i></b>—Name of the three-color policer. Reference this name when you apply the policer to an interface.</p> <p><b><i>uid</i></b>—When you configure a policer at the [edit <b>dynamic-profiles</b>] hierarchy level, you must assign a variable UID as the policer name.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                                                                                                                                                                                                            |
| Required Privilege Level | firewall—To view this statement in the configuration.<br>firewall-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Related Documentation    | <ul style="list-style-type: none"><li>• <i>Statement Hierarchy for Configuring Policers</i></li><li>• <i>Configuring Tricolor Marking Policers</i></li><li>• <i>Three-Color Policer Configuration Guidelines</i></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

- *Basic Single-Rate Three-Color Policers*
- *Basic Two-Rate Three-Color Policers*
- *Two-Color and Three-Color Logical Interface Policers*
- *Two-Color and Three-Color Physical Interface Policers*
- *Two-Color and Three-Color Policers at Layer 2*

## traceoptions (Captive Portal Content Delivery)

|                            |                                                                                                                                                                                                                                                                                                                    |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <pre> traceoptions {     file <i>filename</i> &lt;files <i>number</i>&gt; &lt;match <i>regular-expression</i>&gt; &lt;size <i>size</i>&gt; &lt;world-readable       no-world-readable&gt;;     flag <i>flag</i>;     no-remote-trace; } </pre>                                                                     |
| <b>Hierarchy Level</b>     | [edit services <a href="#">captive-portal-content-delivery (Captive Portal Content Delivery)</a> ]                                                                                                                                                                                                                 |
| <b>Release Information</b> | Statement introduced in Junos OS Release 10.4.                                                                                                                                                                                                                                                                     |
| <b>Description</b>         | Define tracing operations for captive-portal-content-delivery processes.                                                                                                                                                                                                                                           |
| <b>Options</b>             | <p><b>file <i>filename</i></b>—Name of the file to receive the output of the tracing operation. Enclose the name within quotation marks. All files are placed in the directory <b>/var/log</b>. Ensure that filenames are unique for each logical system or routing instance in which Mobile IP is configured.</p> |



**NOTE:** Global messages (common to all logical systems and routing instances) are always saved in **/var/log/mipd**. Messages that are specific to a logical system or routing instance are never saved in **/var/log/mipd**. If you do not configure a trace filename for a logical system or routing instance, then nothing is traced for that entity.

**size *size***—(Optional) Maximum size of each trace file, in kilobytes (KB), megabytes (MB), or gigabytes (GB). If you specify a maximum file size, you also must specify a maximum number of trace files with the **files** option.

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

**Range:** 10 KB through 1 GB

**Default:** 128 KB

**files *number***—(Optional) Maximum number of trace files. When a trace file named **trace-file** reaches its maximum size, it is renamed **trace-file.0**, then **trace-file.1**, and so on, until the maximum number of trace files is reached. Then the oldest trace file is overwritten. If you specify a maximum number of files, you also must specify a maximum file size with the **size** option.

**Range:** 2 through 1000

**Default:** 3 files

**flag *flag***—Tracing operation to perform. To specify more than one tracing operation, include multiple **flag** statements. You can include the following flags:

- **all**—Trace all operations.
- **clicommand**—Trace CLI command operations.

- **configuration**—Trace home agent state machine operations.
- **general**—Trace general operations.
- **gres**—Trace graceful routing switchover operations.
- **ipc**—Trace Inter-Process Communication (IPC) messages between the PIC and the Routing Engine.
- **rtsock**—Trace routing socket operations.
- **rules**—Trace rules operations.
- **ssets**—Trace service sets operations.
- **statistics**—Trace statistics operations.

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

**Related Documentation**    • [Redirecting HTTP Requests Overview on page 353](#)

## traffic-control-profiles (Dynamic CoS Definition)

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|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                   | <pre>traffic-control-profiles <i>profile-name</i> {<br/>    adjust-minimum <i>rate</i>;<br/>    delay-buffer-rate (percent <i>percentage</i>   <i>rate</i>);<br/>    excess-rate (percent <i>percentage</i>   proportion <i>value</i>   percent \$junos-cos-excess-rate);<br/>    excess-rate-high (percent <i>percentage</i>   proportion <i>value</i>);<br/>    excess-rate-low (percent <i>percentage</i>   proportion <i>value</i>);<br/>    guaranteed-rate (percent <i>percentage</i>   <i>rate</i>) &lt;burst-size <i>bytes</i>&gt;;<br/>    overhead-accounting (frame-mode   cell-mode) &lt;bytes <i>byte-value</i>&gt;;<br/>    scheduler-map <i>map-name</i>;<br/>    shaping-rate (percent <i>percentage</i>   <i>rate</i>   <i>predefined-variable</i>) &lt;burst-size <i>bytes</i>&gt;;<br/>}</pre> |
| Hierarchy Level          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Release Information      | Statement introduced in Junos OS Release 9.2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Description              | Configure traffic shaping and scheduling profiles.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Options                  | <p><b><i>profile-name</i></b>—Name of the traffic-control profile.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Required Privilege Level | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Related Documentation    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li><li>• <a href="#">Configuring Traffic Scheduling and Shaping for Subscriber Access on page 11</a></li><li>• <a href="#">Using the CLI to Modify Traffic-Control Profiles That Are Currently Applied to Subscribers</a></li><li>• <a href="#">output-traffic-control-profile on page 613</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                          |



## transmit-rate (Dynamic Schedulers)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>transmit-rate (rate   percent <i>percentage</i>   remainder   percent <i>percentage</i> \$junos-cos-scheduler-tx) &lt;exact   rate-limit&gt;;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> <a href="#">schedulers</a> <i>scheduler-name</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 9.3.<br>The <code>\$junos-cos-scheduler-tx</code> predefined variable introduced in Junos OS Release 9.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Description</b>              | Specify the transmit rate or percentage for a scheduler in a dynamic profile.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Default</b>                  | If you do not include this statement, the default scheduler transmission rate and buffer size percentages for queues 0 through 7 are 95, 0, 0, 5, 0, 0, 0, and 0 percent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Options</b>                  | <p><b>rate</b>—Transmission rate, in bps. You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation <b>k</b> (1000), <b>m</b> (1,000,000), or <b>g</b> (1,000,000,000).<br/> <b>Range:</b> 3200 through 6,400,000,000,000 bps</p> <p><b>percent <i>percentage</i></b>—Percentage of transmission capacity. A percentage of zero drops all packets in the queue.<br/> <b>Range:</b> 0 through 100 percent</p> <p><b>remainder</b>—Use remaining rate available.</p> <p><b>\$junos-cos-scheduler-tx</b>—Junos predefined variable that is replaced with the transmission rate obtained from the RADIUS server when a subscriber authenticates over the interface to which the dynamic profile is attached.</p> <p><b>exact</b>—(Optional) Enforce the exact transmission rate. Under sustained congestion, a rate-controlled queue that goes into negative credit fills up and eventually drops packets. Make sure this value never exceeds the rate-controlled amount.</p> <p><b>rate-limit</b>—(Optional) Limit the transmission rate to the rate-controlled amount during congestion. In contrast to the <b>exact</b> option, when there is no congestion, the scheduler with the <b>rate-limit</b> option shares unused bandwidth above the rate-controlled amount.</p> |
| <b>Required Privilege Level</b> | <p><b>interface</b>—To view this statement in the configuration.</p> <p><b>interface-control</b>—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Configuring Schedulers in a Dynamic Profile for Subscriber Access on page 13</a></li> <li>• <a href="#">scheduler on page 647</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## tunnel-services (Chassis)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>tunnel-services {   bandwidth (1g   10g   20g   40g);   tunnel-only; }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Hierarchy Level</b>          | [edit chassis fpc <i>slot-number</i> pic <i>number</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 8.2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b>              | <p>For MX Series 3D Universal Edge Routers, configure the amount of bandwidth for tunnel services.</p> <p>For M7i, M10i, M120, M320, T Series and TX Matrix routers with IQ2 PICs and IQ2E PICs, configure support for per unit scheduling for GRE tunnels. You can specify the IQ2 and IQ2E PICs to work exclusively in tunnel mode or as a regular PIC. The default setting uses IQ2 and IQ2E PICs as a regular PIC. If you do not configure the <b>tunnel-only</b> option, the IQ2 and IQ2E PICs operate as regular PICs. For M7i, M10i, M120, M320, T Series and TX Matrix routers with IQ2 PICs and IQ2E PICs, you can use the <b>tunnel-only</b> option to specify that an IQ2 or IQ2E PIC work in tunnel mode only.</p> |
|                                 | <p> <b>NOTE:</b> Bandwidth rates of 20 gigabits per second and 40 gigabits per second require use of an MX Series router with the 100-Gigabit Ethernet Modular Port Concentrator (MPC) and the 100-Gigabit CFP MIC.</p>                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Options</b>                  | <p><b>tunnel-only</b> (Optional)—For M7i, M10i, M120, M320, T Series and TX Matrix routers with IQ2 PICs and IQ2E PICs, specify that an IQ2 or IQ2E PIC work in tunnel mode only.</p> <p>The remaining statements are explained separately.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Example: Configuring Tunnel Interfaces on a Gigabit Ethernet 40-Port DPC</i></li> <li>• <i>Example: Configuring Tunnel Interfaces on a 10-Gigabit Ethernet 4-Port DPC</i></li> <li>• <i>Example: Configuring Tunnel Interfaces on the MPC3E</i></li> <li>• <a href="#">bandwidth (Tunnel Services) on page 501</a></li> <li>• <i>[edit chassis] Hierarchy Level</i></li> <li>• <i>Configuring Layer 3 Tunnel Services Interfaces on an MX Series Router with a DPC</i></li> </ul>                                                                                                                                                                                                  |

## two-rate

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre>two-rate {   (color-aware   color-blind);   committed-information-rate <i>bps</i>;   committed-burst-size <i>bytes</i>;   peak-information-rate <i>bps</i>;   peak-burst-size <i>bytes</i>; }</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | <pre>[edit dynamic-profiles <i>profile-name</i> firewall three-color-policer <i>name</i>], [edit firewall three-color-policer <i>policer-name</i>], [edit logical-systems <i>logical-system-name</i> firewall three-color-policer <i>policer-name</i>]</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Logical systems support introduced in Junos OS Release 9.3.</p> <p>Support at the <code>[edit dynamic-profiles ... three-color-policer <i>name</i>]</code> hierarchy levels introduced in Junos OS Release 11.4.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b>              | <p>Configure a two-rate three-color policer in which marking is based on the committed information rate (CIR), committed burst size (CBS), peak information rate (PIR), and peak burst size (PBS).</p> <p>Packets that conform to the CIR or the CBS are assigned low loss priority (green). Packets that exceed the CIR and the CBS but are within the PIR or the PBS are assigned medium-high loss priority (yellow). Packets that exceed the PIR and the PBS are assigned high loss priority (red).</p> <p>Green and yellow packets are always forwarded; this action is not configurable. You can configure red packets to be discarded. By default, red packets are forwarded.</p> <p>The remaining statements are explained separately.</p> |
| <b>Required Privilege Level</b> | <p>firewall—To view this statement in the configuration.</p> <p>firewall-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>Three-Color Policer Configuration Overview</i></li> <li>• <a href="#">color-aware on page 516</a></li> <li>• <a href="#">color-blind on page 517</a></li> <li>• <a href="#">single-rate on page 657</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

## uid (Dynamic Profiles)

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|                                 |                                                                                                                                                                                               |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | uid;                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> variables <i>variable-name</i> ]                                                                                                   |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.4.                                                                                                                                                |
| <b>Description</b>              | Configure a unique ID for parameterized filters in a dynamic profile created for services. The values that the system uses for these variables are applied when the subscriber authenticates. |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <i>Dynamic Variables Overview</i></li></ul>                                                                                                           |

## uid-reference

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|                                 |                                                                                                                                                                                                                                                                    |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | uid-reference;                                                                                                                                                                                                                                                     |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> variables <i>variable-name</i> ]                                                                                                                                                                        |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 11.4.                                                                                                                                                                                                                     |
| <b>Description</b>              | When you configure a unique ID (UID) variable, include this statement to specify that the value for the UID is supplied by RADIUS when the subscriber authenticates.                                                                                               |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Unique Identifiers for Firewall Variables on page 272</a></li><li>• <a href="#">Configuring Unique Identifiers for Parameterized Filters on page 274</a></li><li>• <i>Dynamic Variables Overview</i></li></ul> |

## unit (Dynamic Profiles Standard Interface)

```

Syntax unit logical-unit-number {
 auto-configure {
 agent-circuit-identifier {
 dynamic-profile profile-name;
 }
 }
 dial-options {
 ipsec-interface-id name;
 l2tp-interface-id name;
 (shared | dedicated);
 }
 encapsulation (atm-ccc-cell-relay | atm-ccc-vc-mux | atm-cisco-nlpid | atm-tcc-vc-mux
 | atm-mlppp-llc | atm-nlpid | atm-ppp-llc | atm-ppp-vc-mux | atm-snap | atm-tcc-snap
 | atm-vc-mux | ether-over-atm-llc | ether-vpls-over-atm-llc | ether-vpls-over-fr |
 ether-vpls-over-ppp | ethernet | frame-relay-ccc | frame-relay-ppp | frame-relay-tcc |
 frame-relay-ether-type | frame-relay-ether-type-tcc | multilink-frame-relay-end-to-end
 | multilink-ppp | ppp-over-ether | ppp-over-ether-over-atm-llc | vlan-bridge | vlan-ccc |
 vlan-vci-ccc | vlan-tcc | vlan-vpls);
 family family {
 access-concentrator name;
 address address;
 direct-connect;
 duplicate-protection;
 dynamic-profile profile-name;
 filter {
 adf {
 counter;
 input-precedence precedence;
 not-mandatory;
 output-precedence precedence;
 rule rule-value;
 }
 input filter-name (
 precedence precedence;
)
 output filter-name {
 precedence precedence;
 }
 }
 max-sessions number;
 max-sessions-vsa-ignore;
 rpf-check {
 fail-filter filter-name;
 mode loose;
 }
 service {
 input {
 service-set service-set-name {
 service-filter filter-name;
 }
 }
 post-service-filter filter-name;
 }
 }
 }

```

```
input-vlan-map {
 inner-tag-protocol-id tpid;
 inner-vlan-id number;
 (push | swap);
 tag-protocol-id tpid;
 vlan-id number;
}
output {
 service-set service-set-name {
 service-filter filter-name;
 }
}
output-vlan-map {
 inner-tag-protocol-id tpid;
 inner-vlan-id number;
 (pop | swap);
 tag-protocol-id tpid;
 vlan-id number;
}
}
service-name-table table-name
short-cycle-protection <lockout-time-min minimum-seconds lockout-time-max
 maximum-seconds>;
unnumbered-address interface-name <preferred-source-address address>;
filter {
 input filter-name;
 output filter-name;
}
keepalives {
 interval seconds;
}
ppp-options {
 chap;
 pap;
}
vlan-id number;
vlan-tags outer [tpid].vlan-id [inner [tpid].vlan-id];
}
}
```

**Hierarchy Level** [edit [dynamic-profiles](#) *profile-name* [interfaces](#) *interface-name*]

**Release Information** Statement introduced in Junos OS Release 9.2.

**Description** Configure a logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

**Options** *logical-unit-number*—The specific unit number of the interface you want to assign to the dynamic profile, or one of the following Junos OS predefined variables:

- **\$junos-underlying-interface-unit**—For static VLANs, the unit number variable. The static unit number variable is dynamically replaced with the client unit number when the client session begins. The client unit number is specified by the DHCP when it accesses the subscriber network.
- **\$junos-interface-unit**—The unit number variable on a dynamic underlying VLAN interface for which you want to enable the creation of dynamic VLAN subscriber interfaces based on agent circuit identifier information.

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 Dynamic Underlying VLAN Interfaces to Use Agent Circuit Identifier Information*
- *Configuring Static Underlying VLAN Interfaces to Use Agent Circuit Identifier Information*
- *Agent Circuit Identifier-Based Dynamic VLANs Components Overview*

## unit (Dynamic Traffic Shaping)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> unit logical-unit-number {     classifiers {         type (classifier-name   default);     }     output-traffic-control-profile (profile-name   \$junos-cos-traffic-control-profile);     rewrite-rules {         dscp (rewrite-name   default);         dscp-ipv6 (rewrite-name   default);         ieee-802.1 (rewrite-name   default) vlan-tag (outer   outer-and-inner);         inet-precedence (rewrite-name   default);     } } </pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Hierarchy Level</b>          | <p>[edit <b>dynamic-profiles</b> <i>profile-name</i> <b>class-of-service</b> <b>interfaces</b> <i>interface-name</i>],<br/> [edit <b>dynamic-profiles</b> <i>profile-name</i> <b>interfaces</b> <b>interface-set</b> <i>interface-set-name</i> <b>interface</b> <i>interface-name</i>]</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Release Information</b>      | <p>Statement introduced in Junos OS Release 9.2.</p> <p>Support at the [edit <b>dynamic-profiles</b> <i>profile-name</i> <b>class-of-service</b> <b>interfaces</b> <b>interface-set</b> <i>interface-set-name</i>] hierarchy level introduced in Junos OS Release 10.4.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b>              | <p>Configure a logical interface on the physical device. You must configure a logical interface to be able to use the physical device.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Options</b>                  | <p><b>logical-unit-number</b>—One of the following options:</p> <ul style="list-style-type: none"> <li>• <b>\$junos-underlying-interface-unit</b>—For static VLANs, the unit number variable. The static unit number variable is dynamically replaced with the client unit number when the client session begins. The client unit number is specified by the DHCP when it accesses the subscriber network.</li> <li>• <b>\$junos-interface-unit</b>—For dynamic demux and dynamic PPPoE interfaces, the unit number variable. The static unit number variable is dynamically replaced with the client unit number when the client session begins. The client unit number is specified by the DHCP or PPP when it accesses the subscriber network.</li> <li>• <b>value</b>—Specific unit number of the interface you want to assign to the dynamic-profile</li> </ul> <p><b>Range:</b> 0 through 16385. For demux and PPPoE interfaces, the unit numbers can range from 0 through 1,073,741,823.</p> <p>The remaining statements are explained separately. The <b>classifiers</b>, <b>output-traffic-control-profile</b>, and <b>rewrite-rules</b> statements are not supported for interface sets.</p> |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |



- Related Documentation**
- [Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4](#)
  - [Applying Traffic Shaping and Scheduling to a Subscriber Interface in a Dynamic Profile on page 223](#)
  - [Configuring an Interface Set of Subscribers in a Dynamic Profile on page 204](#)

## user (Access)

|                                 |                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <pre> user <i>username</i> {   authentication {     class <i>class-name</i>;     (encrypted-password "<i>password</i>"   plain-text-password);     full-name <i>complete-name</i>;     load-key-file <i>URL filename</i>;     ssh-dsa "<i>public-key</i>" &lt;from <i>hostname</i>&gt;;     ssh-rsa "<i>public-key</i>" &lt;from <i>hostname</i>&gt;;     uid <i>uid-value</i>;   } } </pre> |
| <b>Hierarchy Level</b>          | [edit system <a href="#">login</a> ]                                                                                                                                                                                                                                                                                                                                                         |
| <b>Release Information</b>      | <p>Statement introduced before Junos OS Release 7.4.</p> <p>Statement introduced in Junos OS Release 9.0 for EX Series switches.</p>                                                                                                                                                                                                                                                         |
| <b>Description</b>              | Configure access permission for individual users.                                                                                                                                                                                                                                                                                                                                            |
| <b>Options</b>                  | The remaining statements are explained separately.                                                                                                                                                                                                                                                                                                                                           |
| <b>Required Privilege Level</b> | <p>admin—To view this statement in the configuration.</p> <p>admin-control—To add this statement to the configuration.</p>                                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Configuring Junos OS User Accounts</a></li> <li>• <a href="#">class on page 513</a></li> </ul>                                                                                                                                                                                                                                          |

## vendor-specific-tags (Dynamic Traffic Shaping)

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | vendor-specific-tags actual-data-rate-downstream;<br>vendor-specific-tags access-loop-encapsulation;                                                                                                                                                                                                                                                                                                                                                            |
| <b>Hierarchy Level</b>          | [edit <a href="#">dynamic-profiles</a> <i>profile-name</i> <a href="#">class-of-service</a> <a href="#">dynamic-class-of-service-options</a> ]                                                                                                                                                                                                                                                                                                                  |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 12.1.                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b>              | Set the shaping-rate and overhead-accounting class-of-service attributes based on Vendor-Specific Point-to-Point Protocol over Ethernet (PPPoE) Tags [TR-101].                                                                                                                                                                                                                                                                                                  |
| <b>Options</b>                  | <p>vendor-specific-tags can be set to one or both of the following:</p> <ul style="list-style-type: none"><li>• <b>access-loop-encapsulation</b>—Set the overhead-accounting class-of-service attribute based on access line parameters in PPPoE discovery packets on dynamic subscriber interfaces.</li><li>• <b>actual-data-rate-downstream</b>—Set the shaping-rate class-of-service attribute based on the actual-data-rate-downstream attribute.</li></ul> |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                                                                                                                                                                                         |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Setting Shaping Rate and Overhead Accounting Based on PPPoE Vendor-Specific Tags on page 129</a></li><li>• <a href="#">Configuring the Shaping Rate and Overhead Accounting Based on PPPoE Vendor-Specific Tags on Dynamic Subscriber Interfaces on page 131</a></li><li>• <a href="#">Bandwidth Management for Downstream Traffic in Edge Networks Overview on page 119</a></li></ul>                      |

## version (Dynamic IGMP Interface)

|                            |                                                                                                                  |
|----------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>              | <code>version version;</code>                                                                                    |
| <b>Hierarchy Level</b>     | [edit dynamic-profiles <i>profile-name</i> protocols <b>igmpinterface</b> <i>interface-name</i> ]                |
| <b>Release Information</b> | Statement introduced in Junos OS Release 9.2.                                                                    |
| <b>Description</b>         | Specify the version of IGMP.                                                                                     |
| <b>Options</b>             | <p><b>version</b>—IGMP version number.</p> <p><b>Range:</b> 1, 2, or 3</p> <p><b>Default:</b> IGMP version 2</p> |



**NOTE:** Routers running different versions of IGMP negotiate the lowest common version of IGMP that is supported by hosts on their subnet and operate in that version.

If you have already configured the router to use IGMP version 1 and then configure it to use IGMP version 2, the router continues to use IGMP version 1 for up to 6 minutes and then uses IGMP version 2.

|                                 |                                                                                                                                                                                                                                                                               |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Required Privilege Level</b> | routing—To view this statement in the configuration.<br>routing-control—To add this statement to the configuration.                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Dynamic IGMP Configuration Overview on page 343</a></li> <li>• <a href="#">Configuring Dynamic DHCP Client Access to a Multicast Network on page 344</a></li> <li>• <a href="#">Changing the IGMP Version</a></li> </ul> |

## version (Dynamic MLD Interface)

---

|                                 |                                                                                                                                                             |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>version version;</code>                                                                                                                               |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> protocols <b>mld interface</b> <i>interface-name</i> ]                                                           |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                              |
| <b>Description</b>              | Configure the MLD version explicitly on the dynamic interface. MLD version 2 (MLDv2) is used only to support source-specific multicast (SSM).               |
| <b>Options</b>                  | <b>version</b> —MLD version to run on the interface.<br><b>Range:</b> 1 or 2<br><b>Default:</b> 1 (MLDv1)                                                   |
| <b>Required Privilege Level</b> | routing and trace—To view this statement in the configuration.<br>routing-control and trace-control—To add this statement to the configuration.             |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Dynamic MLD Configuration Overview on page 349</a></li><li>• <i>Modifying the MLD Version</i></li></ul> |

## vlan-tag (Dynamic Classifiers)

---

|                                 |                                                                                                                                                                                                                                                                                               |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>vlan-tag (inner   outer);</code>                                                                                                                                                                                                                                                        |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> class-of-service interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> <b>classifiers</b> <b>ieee-802.1</b> ]                                                                                                                    |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                                                                                                |
| <b>Description</b>              | Apply this IEEE-802.1 classifier to the inner or outer VLAN tags in a dynamic profile.                                                                                                                                                                                                        |
| <b>Default</b>                  | If you do not include this statement, the classifier applies to the outer VLAN tag only.                                                                                                                                                                                                      |
| <b>Options</b>                  | <b>inner</b> —Apply the classifier to the inner VLAN tag only.<br><b>outer</b> —Apply the classifier to the outer VLAN tag only.                                                                                                                                                              |
| <b>Required Privilege Level</b> | interface—To view this statement in the configuration.<br>interface-control—To add this statement to the configuration.                                                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li><li>• <a href="#">Applying a Classifier to a Subscriber Interface in a Dynamic Profile on page 226</a></li><li>• <i>classifiers (Definition)</i></li></ul> |

## vlan-tag (Dynamic Rewrite Rules)

|                                 |                                                                                                                                                                                                                                                                                                              |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | vlan-tag (outer   outer-and-inner);                                                                                                                                                                                                                                                                          |
| <b>Hierarchy Level</b>          | [edit dynamic-profiles <i>profile-name</i> class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">rewrite-rules</a> <a href="#">ieee-802.1</a> ]                                                                                                                      |
| <b>Release Information</b>      | Statement introduced in Junos OS Release 10.1.                                                                                                                                                                                                                                                               |
| <b>Description</b>              | Apply this IEEE-802.1 rewrite rule to the outer or outer and inner VLAN tags in a dynamic profile.                                                                                                                                                                                                           |
| <b>Default</b>                  | If you do not include this statement, the rewrite rule applies to the outer VLAN tag only.                                                                                                                                                                                                                   |
| <b>Options</b>                  | <p><b>outer</b>—Apply the rewrite rule to the outer VLAN tag only.</p> <p><b>outer-and-inner</b>—Apply the rewrite rule to both the outer and inner VLAN tags.</p>                                                                                                                                           |
| <b>Required Privilege Level</b> | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>                                                                                                                                                                           |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Guidelines for Configuring Dynamic CoS for Subscriber Access on page 4</a></li> <li>• <a href="#">Applying a Rewrite Rule Definition to a Subscriber Interface in a Dynamic Profile on page 225</a></li> <li>• <a href="#">rewrite-rules</a></li> </ul> |



## CHAPTER 43


# Operational Commands

- clear firewall
- clear igmp membership
- clear igmp statistics
- clear mld membership
- clear mld statistics
- clear services captive-portal-content-delivery statistics
- request interface rebalance (Aggregated Ethernet for Subscriber Management)
- show class-of-service
- show class-of-service adjustment-control-profile
- show class-of-service interface
- show class-of-service interface-set
- show class-of-service scheduler-hierarchy interface
- show class-of-service scheduler-hierarchy interface-set
- show class-of-service scheduler-map
- show class-of-service traffic-control-profile
- show firewall
- show firewall log
- show firewall templates-in-use
- show igmp group
- show igmp interface
- show igmp statistics
- show interfaces targeting (Aggregated Ethernet for Subscriber Management)
- show mld group
- show mld interface
- show mld statistics
- show services captive-portal-content-delivery
- show services service-sets summary

- [show subscribers](#)
- [show subscribers summary](#)



## clear firewall

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>                                                                                                                                                                                                                                                                                                                                                                                                                                            | <a href="#">Syntax on page 693</a><br><a href="#">Syntax (EX Series Switches) on page 693</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Syntax</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                    | clear firewall (all   counter <i>counter-name</i>   filter <i>filter-name</i>   log (all   <i>logical-system-name</i> )   logical-system <i>logical-system-name</i> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Syntax (EX Series Switches)</b>                                                                                                                                                                                                                                                                                                                                                                                                                               | clear firewall (all   counter <i>counter-name</i>   filter <i>filter-name</i>   log (all   <i>logical-system-name</i> )   policer counter (all   counter-id <i>counter-index</i> ))                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Release Information</b>                                                                                                                                                                                                                                                                                                                                                                                                                                       | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p><b>logical-system</b> option introduced in Junos OS Release 9.3.</p> <p><b>log</b> option introduced before Junos OS Release 11.4.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b>                                                                                                                                                                                                                                                                                                                                                                                                                                               | <p>Clear statistics about configured firewall filters.</p> <p>When you clear the counters of a filter, this impacts not only the counters shown by the CLI, but also the ones tracked by SNMP2.</p> <p>Subscriber management uses firewall filters to capture and report the volume-based service accounting counters that are used for subscriber billing. The <b>clear firewall</b> command also clears the service accounting counters that are reported to the RADIUS accounting server. For this reason, you must be cautious in specifying which firewall statistics you want to clear.</p>                                                                                                                                 |
| <div>  <p><b>NOTE:</b> The <b>clear firewall</b> command cannot be used to clear the Routing Engine filter counters on a backup Routing Engine that is enabled for graceful Routing Engine switchover (GRES).</p> </div>                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>If you clear statistics for firewall filters that are applied to Trio-based DPCs and that also use the <b>prefix-action</b> action on matched packets, wait at least 5 seconds before you enter the <b>show firewall prefix-action-stats</b> command. A 5-second pause between issuing the <b>clear firewall</b> and <b>show firewall prefix-action-stats</b> commands avoids a possible timeout of the <b>show firewall prefix-action-stats</b> command.</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Options</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <p><b>all</b>—Clear the packet and byte counts for all filters. On EX Series switches, this option also clears the packet counts for all policer counters.</p> <p><b>counter <i>counter-name</i></b>—Clear the packet and byte counts for a filter counter that has been configured with the counter firewall filter action.</p> <p><b>filter <i>filter-name</i></b>—Clear the packet and byte counts for the specified firewall filter.</p> <p><b>log (all   <i>logical-system-name</i>)</b>—Clear log entries for IPv4 firewall filters that have <b>then log</b> as an action. Use <b>log all</b> to clear all log entries or <b>log <i>logical-system-name</i></b> to clear log entries for the specified logical system.</p> |

**logical-system *logical-system-name***—Clear the packet and byte counts for the specified logical system.

**policer counter (all | counter-id *counter-index*)**—(EX8200 switches only) Clear all policer counters using the **policer counter all** command, or clear a specific policer counter using the **policer counter counter-id *counter-index*** command. The value of *counter-index* can be 0, 1, or 2.

**Required Privilege Level**

clear

**Related Documentation**

- [show firewall on page 748](#)

**List of Sample Output**

[clear firewall all on page 694](#)  
[clear firewall \(counter counter-name\) on page 694](#)  
[clear firewall \(filter filter-name\) on page 694](#)  
[clear firewall \(policer counter all\) \(EX8200 Switch\) on page 694](#)  
[clear firewall \(policer counter counter-id counter-index\) \(EX8200 Switch\) on page 694](#)

## Sample Output

clear firewall all

```
user@host> clear firewall all
```

clear firewall (counter counter-name)

```
user@host> clear firewall counter port-filter-counter
```

clear firewall (filter filter-name)

```
user@host> clear firewall filter ingress-port-filter
```

clear firewall (policer counter all) (EX8200 Switch)

```
user@switch> clear firewall policer counter all
```

clear firewall (policer counter counter-id counter-index) (EX8200 Switch)

```
user@switch> clear firewall policer counter counter-id 0
```

## clear igmp membership

|                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>                               | <a href="#">Syntax on page 695</a><br><a href="#">Syntax (EX Series Switch and the QFX Series) on page 695</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Syntax</b>                                       | <pre>clear igmp membership &lt;all&gt; &lt;group address-range&gt; &lt;interface interface-name&gt; &lt;logical-system (all   logical-system-name)&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Syntax (EX Series Switch and the QFX Series)</b> | <pre>clear igmp membership &lt;group address-range&gt; &lt;interface interface-name&gt;</pre>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Release Information</b>                          | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.3 for the QFX Series.</p> <p>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b>                                  | Clear Internet Group Management Protocol (IGMP) group members.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Options</b>                                      | <p><b>all</b>—(Optional) Clear IGMP members for groups and interfaces in the master instance.</p> <p><b>none</b>— Automatically clears all IGMP members for groups and interfaces.</p> <p><b>group address-range</b>—(Optional) Clear all IGMP members that are in a particular address range. An example of a range is <b>224.2/16</b>. If you omit the destination prefix length, the default is <b>/32</b>.</p> <p><b>interface interface-name</b>—(Optional) Clear all IGMP group members on an interface.</p> <p><b>logical-system (all   logical-system-name)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> |
| <b>Required Privilege Level</b>                     | clear                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Related Documentation</b>                        | <ul style="list-style-type: none"> <li>• <a href="#">show igmp group on page 760</a></li> <li>• <a href="#">show igmp interface on page 764</a></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>List of Sample Output</b>                        | <a href="#">clear igmp membership all on page 696</a><br><a href="#">clear igmp membership interface on page 696</a><br><a href="#">clear igmp membership group on page 697</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Output Fields</b>                                | See <a href="#">show igmp group</a> for an explanation of output fields.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## Sample Output

### clear igmp membership all

The following sample output displays IGMP group information before and after the **clear igmp membership** command is entered:

```
user@host> show igmp group
Interface Group Last Reported Timeout
so-0/0/0 224.2.127.253 10.1.128.1 186
so-0/0/0 224.2.127.254 10.1.128.1 186
so-0/0/0 239.255.255.255 10.1.128.1 187
so-0/0/0 224.1.127.255 10.1.128.1 188
local 224.0.0.6 (null) 0
local 224.0.0.5 (null) 0
local 224.2.127.254 (null) 0
local 239.255.255.255 (null) 0
local 224.0.0.2 (null) 0
local 224.0.0.13 (null) 0
```

```
user@host> clear igmp membership all
Clearing Group Membership Info for so-0/0/0
Clearing Group Membership Info for so-1/0/0
Clearing Group Membership Info for so-2/0/0
```

```
user@host> show igmp group
Interface Group Last Reported Timeout
local 224.0.0.6 (null) 0
local 224.0.0.5 (null) 0
local 224.2.127.254 (null) 0
local 239.255.255.255 (null) 0
local 224.0.0.2 (null) 0
local 224.0.0.13 (null) 0
```

### clear igmp membership interface

The following sample output displays IGMP group information before and after the **clear igmp membership interface** command is issued:

```
user@host> show igmp group
Interface Group Last Reported Timeout
so-0/0/0 224.2.127.253 10.1.128.1 210
so-0/0/0 239.255.255.255 10.1.128.1 210
so-0/0/0 224.1.127.255 10.1.128.1 215
so-0/0/0 224.2.127.254 10.1.128.1 216
local 224.0.0.6 (null) 0
local 224.0.0.5 (null) 0
local 224.2.127.254 (null) 0
local 239.255.255.255 (null) 0
local 224.0.0.2 (null) 0
local 224.0.0.13 (null) 0
```

```
user@host> clear igmp membership interface so-0/0/0
Clearing Group Membership Info for so-0/0/0
```

```
user@host> show igmp group
```

| Interface | Group           | Last Reported | Timeout |
|-----------|-----------------|---------------|---------|
| local     | 224.0.0.6       | (null)        | 0       |
| local     | 224.0.0.5       | (null)        | 0       |
| local     | 224.2.127.254   | (null)        | 0       |
| local     | 239.255.255.255 | (null)        | 0       |
| local     | 224.0.0.2       | (null)        | 0       |
| local     | 224.0.0.13      | (null)        | 0       |

### clear igmp membership group

The following sample output displays IGMP group information before and after the **clear igmp membership group** command is entered:

```
user@host> show igmp group
Interface Group Last Reported Timeout
so-0/0/0 224.2.127.253 10.1.128.1 210
so-0/0/0 239.255.255.255 10.1.128.1 210
so-0/0/0 224.1.127.255 10.1.128.1 215
so-0/0/0 224.2.127.254 10.1.128.1 216
local 224.0.0.6 (null) 0
local 224.0.0.5 (null) 0
local 224.2.127.254 (null) 0
local 239.255.255.255 (null) 0
local 224.0.0.2 (null) 0
local 224.0.0.13 (null) 0
```

```
user@host> clear igmp membership group 239.225/16
Clearing Group Membership Range 239.225.0.0/16 on so-0/0/0
Clearing Group Membership Range 239.225.0.0/16 on so-1/0/0
Clearing Group Membership Range 239.225.0.0/16 on so-2/0/0
```

```
user@host> show igmp group
Interface Group Last Reported Timeout
so-0/0/0 224.1.127.255 10.1.128.1 231
so-0/0/0 224.2.127.254 10.1.128.1 233
so-0/0/0 224.2.127.253 10.1.128.1 236
local 224.0.0.6 (null) 0
local 224.0.0.5 (null) 0
local 224.2.127.254 (null) 0
local 239.255.255.255 (null) 0
local 224.0.0.2 (null) 0
local 224.0.0.13 (null) 0
```

## clear igmp statistics

---

|                             |                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| List of Syntax              | <a href="#">Syntax on page 698</a><br><a href="#">Syntax (EX Series Switches) on page 698</a>                                                                                                                                                                                                                                        |
| Syntax                      | <code>clear igmp statistics</code><br><code>&lt;interface <i>interface-name</i>&gt;</code><br><code>&lt;logical-system (all   <i>logical-system-name</i>)&gt;</code>                                                                                                                                                                 |
| Syntax (EX Series Switches) | <code>clear igmp statistics</code><br><code>&lt;interface <i>interface-name</i>&gt;</code>                                                                                                                                                                                                                                           |
| Release Information         | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.0 for EX Series switches.<br>Command introduced in Junos OS Release 11.3 for the QFX Series.<br>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                   |
| Description                 | Clear Internet Group Management Protocol (IGMP) statistics.                                                                                                                                                                                                                                                                          |
| Options                     | <b>none</b> —Clear IGMP statistics on all interfaces.<br><br><b>interface <i>interface-name</i></b> —(Optional) Clear IGMP statistics for the specified interface only.<br><br><b>logical-system (all   <i>logical-system-name</i>)</b> —(Optional) Perform this operation on all logical systems or on a particular logical system. |
| Required Privilege Level    | clear                                                                                                                                                                                                                                                                                                                                |
| Related Documentation       | <ul style="list-style-type: none"><li>• <a href="#">show igmp statistics on page 768</a></li></ul>                                                                                                                                                                                                                                   |
| List of Sample Output       | <a href="#">clear igmp statistics on page 698</a>                                                                                                                                                                                                                                                                                    |
| Output Fields               | See <a href="#">show igmp statistics</a> for an explanation of output fields.                                                                                                                                                                                                                                                        |

## Sample Output

### clear igmp statistics

The following sample output displays IGMP statistics information before and after the **clear igmp statistics** command is entered:

```
user@host> show igmp statistics
IGMP packet statistics for all interfaces
IGMP Message type Received Sent Rx errors
Membership Query 8883 459 0
V1 Membership Report 0 0 0
DVMRP 19784 35476 0
PIM V1 18310 0 0
Cisco Trace 0 0 0
V2 Membership Report 0 0 0
Group Leave 0 0 0
```

|                                     |   |   |   |
|-------------------------------------|---|---|---|
| Mtrace Response                     | 0 | 0 | 0 |
| Mtrace Request                      | 0 | 0 | 0 |
| Domain Wide Report                  | 0 | 0 | 0 |
| V3 Membership Report                | 0 | 0 | 0 |
| Other Unknown types                 |   |   | 0 |
| IGMP v3 unsupported type            |   |   | 0 |
| IGMP v3 source required for SSM     |   |   | 0 |
| IGMP v3 mode not applicable for SSM |   |   | 0 |

|                        |      |
|------------------------|------|
| IGMP Global Statistics |      |
| Bad Length             | 0    |
| Bad Checksum           | 0    |
| Bad Receive If         | 0    |
| Rx non-local           | 1227 |

```
user@host> clear igmp statistics
```

```
user@host> show igmp statistics
```

```
IGMP packet statistics for all interfaces
```

| IGMP Message type                   | Received | Sent | Rx errors |
|-------------------------------------|----------|------|-----------|
| Membership Query                    | 0        | 0    | 0         |
| V1 Membership Report                | 0        | 0    | 0         |
| DVMRP                               | 0        | 0    | 0         |
| PIM V1                              | 0        | 0    | 0         |
| Cisco Trace                         | 0        | 0    | 0         |
| V2 Membership Report                | 0        | 0    | 0         |
| Group Leave                         | 0        | 0    | 0         |
| Mtrace Response                     | 0        | 0    | 0         |
| Mtrace Request                      | 0        | 0    | 0         |
| Domain Wide Report                  | 0        | 0    | 0         |
| V3 Membership Report                | 0        | 0    | 0         |
| Other Unknown types                 |          |      | 0         |
| IGMP v3 unsupported type            |          |      | 0         |
| IGMP v3 source required for SSM     |          |      | 0         |
| IGMP v3 mode not applicable for SSM |          |      | 0         |
| IGMP Global Statistics              |          |      |           |
| Bad Length                          | 0        |      |           |
| Bad Checksum                        | 0        |      |           |
| Bad Receive If                      | 0        |      |           |
| Rx non-local                        | 0        |      |           |

## clear mld membership

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>clear mld membership</code><br><code>&lt;all&gt;</code><br><code>&lt;group <i>group-name</i>&gt;</code><br><code>&lt;interface <i>interface-name</i>&gt;</code><br><code>&lt;logical-system (all   <i>logical-system-name</i>)&gt;</code>                                                                                                                                                                                                                                                                                                                                            |
| <b>Release Information</b>      | Command introduced before Junos OS Release 7.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Description</b>              | Clear Multicast Listener Discovery (MLD) group membership.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Options</b>                  | <p><b>all</b>—(Optional) Clear MLD memberships for groups and interfaces in the master instance.</p> <p><b>none</b>—Automatically clears MLD memberships for groups and interfaces in the master instance.</p> <p><b>group <i>group-name</i></b>—(Optional) Clear MLD membership for the specified group.</p> <p><b>interface <i>interface-name</i></b>—(Optional) Clear MLD group membership for the specified interface.</p> <p><b>logical-system (all   <i>logical-system-name</i>)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">show mld group on page 773</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>List of Sample Output</b>    | <a href="#">clear mld membership all on page 700</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Output Fields</b>            | When you enter this command, you are provided feedback on the status of your request.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

### Sample Output

#### clear mld membership all

```
user@host> clear mld membership all
```



## clear mld statistics

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | clear mld statistics<br><interface <i>interface-name</i> ><br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                                                                                                                                                     |
| <b>Release Information</b>      | Command introduced before Junos OS Release 7.4.                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b>              | Clear Multicast Listener Discovery (MLD) statistics.                                                                                                                                                                                                                                                                                                                   |
| <b>Options</b>                  | <p><b>none</b>—(Same as <b>logical-system all</b>) Clear MLD statistics for all interfaces.</p> <p><b>interface <i>interface-name</i></b>—(Optional) Clear MLD statistics for the specified interface.</p> <p><b>logical-system (all   <i>logical-system-name</i>)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> |
| <b>Required Privilege Level</b> | clear                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">show mld statistics on page 781</a></li> </ul>                                                                                                                                                                                                                                                                    |
| <b>List of Sample Output</b>    | <a href="#">clear mld statistics on page 701</a>                                                                                                                                                                                                                                                                                                                       |
| <b>Output Fields</b>            | When you enter this command, you are provided feedback on the status of your request.                                                                                                                                                                                                                                                                                  |

## Sample Output

### clear mld statistics

```
user@host> clear mld statistics
```

## clear services captive-portal-content-delivery statistics

---

|                                 |                                                                                                                             |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>clear services captive-portal-content-delivery statistics</code><br><code>&lt;interface <i>pic-name</i>&gt;</code>    |
| <b>Release Information</b>      | Command introduced in Junos OS Release 10.4.                                                                                |
| <b>Description</b>              | Clear captive portal content delivery statistics.                                                                           |
| <b>Options</b>                  | <b>interface</b> —Clear statistics by PIC name.                                                                             |
| <b>Required Privilege Level</b> | clear                                                                                                                       |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">show services captive-portal-content-delivery on page 784</a></li></ul> |
| <b>Output Fields</b>            | When you enter this command, you receive feedback on the status of your request.                                            |

## clear services captive-portal-content-delivery statistics

```
user@host> clear services captive-portal-content-delivery statistics interface ms-5/0/0
user@host> show services captive-portal-content-delivery statistics interface ms-5/0/0
service-set interface: ms-5/0/0

Packets received Packets altered
0 0

Note that the stats are cleared.
```

## **request interface rebalance (Aggregated Ethernet for Subscriber Management)**

---

|                                 |                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>request interface rebalance interface <i>interface-name</i></code>                                |
| <b>Release Information</b>      | Command introduced in Junos OS Release 11.2.                                                            |
| <b>Description</b>              | Manually rebalance the subscribers on an aggregated Ethernet bundle with targeted distribution enabled. |
| <b>Options</b>                  | <i>interface-name</i> —Aggregated Ethernet logical interface number.                                    |
| <b>Required Privilege Level</b> | view                                                                                                    |
| <b>List of Sample Output</b>    | <a href="#">request interface rebalance on page 703</a>                                                 |
| <b>Output Fields</b>            | When you enter this command, you are provided feedback on the status of your request.                   |

### **Sample Output**

#### **request interface rebalance**

```
user@host >request interface rebalance interface ae0
```

## show class-of-service

---

|                                 |                                                                                                                                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show class-of-service                                                                                                                                                                                 |
| <b>Release Information</b>      | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 9.0 for EX Series switches.                                                                                 |
| <b>Description</b>              | Display the entire class-of-service (CoS) configuration, including system-chosen defaults. Executing this command is equivalent to executing all <b>show class-of-service</b> commands in succession. |
| <b>Options</b>                  | This command has no options.                                                                                                                                                                          |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                  |
| <b>List of Sample Output</b>    | <a href="#">show class-of-service on page 704</a>                                                                                                                                                     |
| <b>Output Fields</b>            | See the output field descriptions for the commands.                                                                                                                                                   |

## Sample Output

### show class-of-service

```
user@host> show class-of-service
Forwarding class Queue
 best-effort 0
 expedited-forwarding 1
 assured-forwarding 2
 network-control 3
Code point type: dscp
 Alias Bit pattern
 af11 001010
 af12 001100
 af13 001110
...
Code point type: dscp-ipv6
 Alias Bit pattern
 af11 001010
 af12 001100
 af13 001110
...
Code point type: exp
 Alias Bit pattern
 af11 100
 af12 101
 be 000
...
Code point type: ieee-802.1
 Alias Bit pattern
 af11 100
 af12 101
 be 000
...
Classifier: dscp-default, Code point type: dscp, Index: 6
 Code point Forwarding class Loss priority
 000000 best-effort low
```

```

000001 best-effort low
000010 best-effort low
....
Classifier: dscp-ipv6-default, Code point type: dscp-ipv6, Index: 7
Code point Forwarding class Loss priority
000000 best-effort low
000001 best-effort low
000010 best-effort low
...
Loss-priority-map: frame-relay-de-default, Code point type: frame-relay-de, Index:
12
Code point Loss priority
0 low
1 high

Rewrite rule: dscp-default, Code point type: dscp, Index: 23
Forwarding class Loss priority Code point
best-effort low 000000
best-effort high 000000
expedited-forwarding low 101110
...
Rewrite rule: dscp-ipv6-default, Code point type: dscp-ipv6, Index: 24
Forwarding class Loss priority Code point
best-effort low 000000
best-effort high 000000
...
....
Drop profile: <default-drop-profile>, Type: discrete, Index: 1
Fill level Drop probability
100 100

Scheduler map: <default>, Index: 2

Scheduler: <default-be>, Forwarding class: best-effort, Index: 16
Transmit rate: 95 percent, Rate Limit: none, Buffer size: 95 percent, Priority:
low
Drop profiles:
Loss priority Protocol Index Name
Low any 1 <default-drop-profile>
Medium low any 1 <default-drop-profile>
Medium high any 1 <default-drop-profile>
High any 1 <default-drop-profile>
...
Physical interface: fe-0/0/0, Index: 137
Queues supported: 8, Queues in use: 4
Scheduler map: <default>, Index: 2

Logical interface: fe-0/0/0.0, Index: 69
Object Name Type Index
Adaptive-shaper fr-shaper 35320
Classifier iprec-compatibility ip 11

Physical interface: fe-0/0/1, Index: 138
Queues supported: 8, Queues in use: 4
Scheduler map: <default>, Index: 2
...

```

## show class-of-service adjustment-control-profile

|                                 |                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show class-of-service adjustment-control-profile<br><profile-name>                                                                                                                                                |
| <b>Release Information</b>      | Command introduced in Junos OS Release 13.1 for MX Series Routers.                                                                                                                                                |
| <b>Description</b>              | For MPC/MIC interfaces only, display the adjustment control profiles.                                                                                                                                             |
| <b>Options</b>                  | <p><b>none</b>—Display all profiles.</p> <p><b>profile-name</b>—(Optional) Display information about a single profile.</p>                                                                                        |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                              |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">Verifying the CoS Adjustment Control Profile Configuration on page 191</a></li> </ul>                                                                        |
| <b>List of Sample Output</b>    | <a href="#">show class-of-service adjustment-control-profile on page 707</a>                                                                                                                                      |
| <b>Output Fields</b>            | <a href="#">Table 52 on page 706</a> describes the output fields for the <b>show class-of-service adjustment-control-profile</b> command. Output fields are listed in the approximate order in which they appear. |

**Table 52: show class-of-service adjustment-control-profile Output Fields**

| Field Name       | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Name</b>      | <p>Name of the adjusting application. Possible values:</p> <ul style="list-style-type: none"> <li>• RADIUS-CoA—RADIUS CoA application.</li> <li>• ANCP—ANCP application.</li> <li>• PPPoE IA tags—PPPoE IA tag application.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Priority</b>  | <p>Priority of the adjusting application. Possible values are 1 through 10; 1 being the highest priority.</p> <p>The lower the priority value, the higher the priority</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Algorithm</b> | <p>Algorithm the adjusting application uses to make adjustments.</p> <ul style="list-style-type: none"> <li>• adjust-never—Never perform rate adjustments.</li> <li>• adjust-always—Adjust the shaping rate unconditionally.</li> <li>• adjust-less—Adjust the shaping rate if it is less than the configured value.</li> <li>• adjust-less-or-equal—Adjust the shaping rate if it is less than or equal to the configured value.</li> <li>• adjust-greater—Adjust the shaping rate if it is greater than the configured value.</li> <li>• adjust-greater-or-equal—Adjust the shaping rate if it is greater than or equal to the configured value.</li> </ul> |

## Sample Output

### show class-of-service adjustment-control-profile

```
user@host> show class-of-service adjustment-control-profile

name: ANCP, priority: 1, algorithm: less
name: RADIUS CoA, priority: 1, algorithm: always
name: PPPoE IA tags, priority: 2, algorithm: less
```

## show class-of-service interface

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>show class-of-service interface</code><br><code>&lt;comprehensive   detail&gt; &lt;interface-name&gt;</code>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Release Information</b>      | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Forwarding class map information added in Junos OS Release 9.4.</p> <p>Command introduced in Junos OS Release 11.1 for the QFX Series.</p> <p>Command introduced in Junos OS Release 12.1 for the PTX Series Packet Transport Routers.</p> <p>Command introduced in Junos OS Release 12.2 for the ACX Series Universal Access routers.</p> <p>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p> <p>Options <b>detail</b> and <b>comprehensive</b> introduced in Junos OS Release 11.4.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Description</b>              | Display the logical and physical interface associations for the classifier, rewrite rules, and scheduler map objects.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Options</b>                  | <p><b>none</b>—Display CoS associations for all physical and logical interfaces.</p> <p><b>comprehensive</b>—(M Series, MX Series, and T Series routers) (Optional) Display comprehensive quality-of-service (QoS) information about all physical and logical interfaces.</p> <p><b>detail</b>—(M Series, MX Series, and T Series routers) (Optional) Display QoS and CoS information based on the interface.</p> <p>If the <b>interface</b> <i>interface-name</i> is a physical interface, the output includes:</p> <ul style="list-style-type: none"><li>• Brief QoS information about the physical interface</li><li>• Brief QoS information about the logical interface</li><li>• CoS information about the physical interface</li><li>• Brief information about filters or policers of the logical interface</li><li>• Brief CoS information about the logical interface</li></ul> <p>If the <b>interface</b> <i>interface-name</i> is a logical interface, the output includes:</p> <ul style="list-style-type: none"><li>• Brief QoS information about the logical interface</li><li>• Information about filters or policers for the logical interface</li><li>• CoS information about the logical interface</li></ul> <p><b>interface-name</b>—(Optional) Display class-of-service (CoS) associations for the specified interface.</p> |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |



**List of Sample Output**

- [show class-of-service interface \(Physical\) on page 719](#)
- [show class-of-service interface \(Logical\) on page 720](#)
- [show class-of-service interface \(Gigabit Ethernet\) on page 720](#)
- [show class-of-service interface \(PPPoE Interface\) on page 720](#)
- [show class-of-service interface \(T4000 Routers with Type 5 FPCs\) on page 720](#)
- [show class-of-service interface detail on page 721](#)
- [show class-of-service interface comprehensive on page 721](#)
- [show class-of-service interface \(ACX Series Routers\) on page 732](#)

**Output Fields** Table 53 on page 709 describes the output fields for the **show class-of-service interface** command. Output fields are listed in the approximate order in which they appear.

**Table 53: show class-of-service interface Output Fields**

| Field Name                          | Field Description                                                                                                                                                                                                                                                                                   |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Physical interface                  | Name of a physical interface.                                                                                                                                                                                                                                                                       |
| Index                               | Index of this interface or the internal index of this object.                                                                                                                                                                                                                                       |
| Dedicated Queues                    | Status of dedicated queues configured on an interface. Supported only on Trio MPC/MIC interfaces on MX Series routers.                                                                                                                                                                              |
| Queues supported                    | Number of queues you can configure on the interface.                                                                                                                                                                                                                                                |
| Queues in use                       | Number of queues currently configured.                                                                                                                                                                                                                                                              |
| Total non-default queues created    | Number of queues created in addition to the default queues. Supported only on Trio MPC/MIC interfaces on MX Series routers.                                                                                                                                                                         |
| Rewrite Input IEEE Code-point       | (QFX3500 switches only) IEEE 802.1p code point (priority) rewrite value. Incoming traffic from the Fibre Channel (FC) SAN is classified into the forwarding class specified in the native FC interface (NP_Port) fixed classifier and uses the priority specified as the IEEE 802.1p rewrite value. |
| Shaping rate                        | Maximum transmission rate on the physical interface. You can configure the shaping rate on the physical interface, or on the logical interface, but not on both. Therefore, the <b>Shaping rate</b> field is displayed for either the physical interface or the logical interface.                  |
| Scheduler map                       | Name of the output scheduler map associated with this interface.                                                                                                                                                                                                                                    |
| Scheduler map forwarding class sets | (QFabric system Node devices only) Name of the fabric forwarding class set scheduler map associated with a QFabric system Interconnect device interface.                                                                                                                                            |
| Input shaping rate                  | For Gigabit Ethernet IQ2 PICs, maximum transmission rate on the input interface.                                                                                                                                                                                                                    |
| Input scheduler map                 | For Gigabit Ethernet IQ2 PICs, name of the input scheduler map associated with this interface.                                                                                                                                                                                                      |
| Chassis scheduler map               | Name of the scheduler map associated with the packet forwarding component queues.                                                                                                                                                                                                                   |
| Rewrite                             | Name and type of the rewrite rules associated with this interface.                                                                                                                                                                                                                                  |
| Classifier                          | Name and type of classifiers associated with this interface.                                                                                                                                                                                                                                        |

Table 53: show class-of-service interface Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                                                                                                                   |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Forwarding-class-map</b>    | Name of the forwarding map associated with this interface.                                                                                                                                                                                          |
| <b>Congestion-notification</b> | (QFX Series and EX4600 switches only) Congestion notification state, <b>enabled</b> or <b>disabled</b> .                                                                                                                                            |
| <b>Logical interface</b>       | Name of a logical interface.                                                                                                                                                                                                                        |
| <b>Object</b>                  | Category of an object: <b>Classifier</b> , <b>Fragmentation-map</b> (for LSQ interfaces only), <b>Scheduler-map</b> , <b>Rewrite</b> , or <b>Translation Table</b> (for IQE PICs only).                                                             |
| <b>Name</b>                    | Name of an object.                                                                                                                                                                                                                                  |
| <b>Type</b>                    | Type of an object: <b>dscp</b> , <b>dscp-ipv6</b> , <b>exp</b> , <b>ieee-802.1</b> , <b>ip</b> , or <b>inet-precedence</b> .                                                                                                                        |
| <b>Link-level type</b>         | Encapsulation on the physical interface.                                                                                                                                                                                                            |
| <b>MTU</b>                     | MTU size on the physical interface.                                                                                                                                                                                                                 |
| <b>Speed</b>                   | Speed at which the interface is running.                                                                                                                                                                                                            |
| <b>Loopback</b>                | Whether loopback is enabled and the type of loopback.                                                                                                                                                                                               |
| <b>Source filtering</b>        | Whether source filtering is enabled or disabled.                                                                                                                                                                                                    |
| <b>Flow control</b>            | Whether flow control is enabled or disabled.                                                                                                                                                                                                        |
| <b>Auto-negotiation</b>        | (Gigabit Ethernet interfaces) Whether autonegotiation is enabled or disabled.                                                                                                                                                                       |
| <b>Remote-fault</b>            | (Gigabit Ethernet interfaces) Remote fault status. <ul style="list-style-type: none"> <li>• <b>Online</b>—Autonegotiation is manually configured as online.</li> <li>• <b>Offline</b>—Autonegotiation is manually configured as offline.</li> </ul> |

Table 53: show class-of-service interface Output Fields (*continued*)

| Field Name             | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Device flags</b>    | <p>The <b>Device flags</b> field provides information about the physical device and displays one or more of the following values:</p> <ul style="list-style-type: none"> <li>• <b>Down</b>—Device has been administratively disabled.</li> <li>• <b>Hear-Own-Xmit</b>—Device receives its own transmissions.</li> <li>• <b>Link-Layer-Down</b>—The link-layer protocol has failed to connect with the remote endpoint.</li> <li>• <b>Loopback</b>—Device is in physical loopback.</li> <li>• <b>Loop-Detected</b>—The link layer has received frames that it sent, thereby detecting a physical loopback.</li> <li>• <b>No-Carrier</b>—On media that support carrier recognition, no carrier is currently detected.</li> <li>• <b>No-Multicast</b>—Device does not support multicast traffic.</li> <li>• <b>Present</b>—Device is physically present and recognized.</li> <li>• <b>Promiscuous</b>—Device is in promiscuous mode and recognizes frames addressed to all physical addresses on the media.</li> <li>• <b>Quench</b>—Transmission on the device is quenched because the output buffer is overflowing.</li> <li>• <b>Recv-All-Multicasts</b>—Device is in multicast promiscuous mode and therefore provides no multicast filtering.</li> <li>• <b>Running</b>—Device is active and enabled.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Interface flags</b> | <p>The <b>Interface flags</b> field provides information about the physical interface and displays one or more of the following values:</p> <ul style="list-style-type: none"> <li>• <b>Admin-Test</b>—Interface is in test mode and some sanity checking, such as loop detection, is disabled.</li> <li>• <b>Disabled</b>—Interface is administratively disabled.</li> <li>• <b>Down</b>—A hardware failure has occurred.</li> <li>• <b>Hardware-Down</b>—Interface is nonfunctional or incorrectly connected.</li> <li>• <b>Link-Layer-Down</b>—Interface keepalives have indicated that the link is incomplete.</li> <li>• <b>No-Multicast</b>—Interface does not support multicast traffic.</li> <li>• <b>No-receive No-transmit</b>—Passive monitor mode is configured on the interface.</li> <li>• <b>Point-To-Point</b>—Interface is point-to-point.</li> <li>• <b>Pop all MPLS labels from packets of depth</b>—MPLS labels are removed as packets arrive on an interface that has the <b>pop-all-labels</b> statement configured. The depth value can be one of the following: <ul style="list-style-type: none"> <li>• <b>1</b>—Takes effect for incoming packets with one label only.</li> <li>• <b>2</b>—Takes effect for incoming packets with two labels only.</li> <li>• <b>[ 1 2 ]</b>—Takes effect for incoming packets with either one or two labels.</li> </ul> </li> <li>• <b>Promiscuous</b>—Interface is in promiscuous mode and recognizes frames addressed to all physical addresses.</li> <li>• <b>Recv-All-Multicasts</b>—Interface is in multicast promiscuous mode and provides no multicast filtering.</li> <li>• <b>SNMP-Traps</b>—SNMP trap notifications are enabled.</li> <li>• <b>Up</b>—Interface is enabled and operational.</li> </ul> |

Table 53: show class-of-service interface Output Fields (*continued*)

| Field Name           | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Flags</b>         | <p>The <b>Logical interface flags</b> field provides information about the logical interface and displays one or more of the following values:</p> <ul style="list-style-type: none"> <li>• <b>ACFC Encapsulation</b>—Address control field Compression (ACFC) encapsulation is enabled (negotiated successfully with a peer).</li> <li>• <b>Device-down</b>—Device has been administratively disabled.</li> <li>• <b>Disabled</b>—Interface is administratively disabled.</li> <li>• <b>Down</b>—A hardware failure has occurred.</li> <li>• <b>Clear-DF-Bit</b>—GRE tunnel or IPsec tunnel is configured to clear the Don't Fragment (DF) bit.</li> <li>• <b>Hardware-Down</b>—Interface protocol initialization failed to complete successfully.</li> <li>• <b>PFC</b>—Protocol field compression is enabled for the PPP session.</li> <li>• <b>Point-To-Point</b>—Interface is point-to-point.</li> <li>• <b>SNMP-Traps</b>—SNMP trap notifications are enabled.</li> <li>• <b>Up</b>—Interface is enabled and operational.</li> </ul>                                 |
| <b>Encapsulation</b> | Encapsulation on the logical interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Admin</b>         | Administrative state of the interface ( <b>Up</b> or <b>Down</b> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Link</b>          | Status of physical link ( <b>Up</b> or <b>Down</b> ).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Proto</b>         | Protocol configured on the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Input Filter</b>  | Names of any firewall filters to be evaluated when packets are received on the interface, including any filters attached through activation of dynamic service.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Output Filter</b> | Names of any firewall filters to be evaluated when packets are transmitted on the interface, including any filters attached through activation of dynamic service.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Link flags</b>    | <p>Provides information about the physical link and displays one or more of the following values:</p> <ul style="list-style-type: none"> <li>• <b>ACFC</b>—Address control field compression is configured. The Point-to-Point Protocol (PPP) session negotiates the ACFC option.</li> <li>• <b>Give-Up</b>—Link protocol does not continue connection attempts after repeated failures.</li> <li>• <b>Loose-LCP</b>—PPP does not use the Link Control Protocol (LCP) to indicate whether the link protocol is operational.</li> <li>• <b>Loose-LMI</b>—Frame Relay does not use the Local Management Interface (LMI) to indicate whether the link protocol is operational.</li> <li>• <b>Loose-NCP</b>—PPP does not use the Network Control Protocol (NCP) to indicate whether the device is operational.</li> <li>• <b>Keepalives</b>—Link protocol keepalives are enabled.</li> <li>• <b>No-Keepalives</b>—Link protocol keepalives are disabled.</li> <li>• <b>PFC</b>—Protocol field compression is configured. The PPP session negotiates the PFC option.</li> </ul> |
| <b>Hold-times</b>    | Current interface hold-time up and hold-time down, in milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>CoS queues</b>    | Number of CoS queues configured.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

Table 53: show class-of-service interface Output Fields (*continued*)

| Field Name                     | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Last flapped</b>            | Date, time, and how long ago the interface went from down to up. The format is <b>Last flapped: year-month-day hour:minute:second:timezone (hour:minute:second ago)</b> . For example, <b>Last flapped: 2002-04-26 10:52:40 PDT (04:33:20 ago)</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Statistics last cleared</b> | Number and rate of bytes and packets received and transmitted on the physical interface. <ul style="list-style-type: none"> <li>• <b>Input bytes</b>—Number of bytes received on the interface.</li> <li>• <b>Output bytes</b>—Number of bytes transmitted on the interface.</li> <li>• <b>Input packets</b>—Number of packets received on the interface.</li> <li>• <b>Output packets</b>—Number of packets transmitted on the interface.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>IPv6 transit statistics</b> | Number of IPv6 transit bytes and packets received and transmitted on the logical interface if IPv6 statistics tracking is enabled.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Input errors</b>            | Input errors on the interface. The labels are explained in the following list: <ul style="list-style-type: none"> <li>• <b>Errors</b>—Sum of the incoming frame aborts and FCS errors.</li> <li>• <b>Drops</b>—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.</li> <li>• <b>Framing errors</b>—Number of packets received with an invalid frame checksum (FCS).</li> <li>• <b>Runts</b>—Number of frames received that are smaller than the runt threshold.</li> <li>• <b>Giants</b>—Number of frames received that are larger than the giant threshold.</li> <li>• <b>Bucket Drops</b>—Drops resulting from the traffic load exceeding the interface transmit or receive leaky bucket configuration.</li> <li>• <b>Policed discards</b>—Number of frames that the incoming packet match code discarded because they were not recognized or not of interest. Usually, this field reports protocols that Junos OS does not handle.</li> <li>• <b>L3 incompletes</b>—Number of incoming packets discarded because they failed Layer 3 (usually IPv4) sanity checks of the header. For example, a frame with less than 20 bytes of available IP header is discarded. Layer 3 incomplete errors can be ignored by configuring the <b>ignore-l3-incompletes</b> statement.</li> <li>• <b>L2 channel errors</b>—Number of times the software did not find a valid logical interface for an incoming frame.</li> <li>• <b>L2 mismatch timeouts</b>—Number of malformed or short packets that caused the incoming packet handler to discard the frame as unreadable.</li> <li>• <b>HS link CRC errors</b>—Number of errors on the high-speed links between the ASICs responsible for handling the router interfaces.</li> <li>• <b>HS link FIFO overflows</b>—Number of FIFO overflows on the high-speed links between the ASICs responsible for handling the router interfaces.</li> </ul> |

Table 53: show class-of-service interface Output Fields (*continued*)

| Field Name                                  | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Output errors</b>                        | <p>Output errors on the interface. The labels are explained in the following list:</p> <ul style="list-style-type: none"> <li>• <b>Carrier transitions</b>—Number of times the interface has gone from <b>down</b> to <b>up</b>. This number does not normally increment quickly, increasing only when the cable is unplugged, the far-end system is powered down and up, or another problem occurs. If the number of carrier transitions increments quickly (perhaps once every 10 seconds), the cable, the far-end system, or the PIC is malfunctioning.</li> <li>• <b>Errors</b>—Sum of the outgoing frame aborts and FCS errors.</li> <li>• <b>Drops</b>—Number of packets dropped by the output queue of the I/O Manager ASIC. If the interface is saturated, this number increments once for every packet that is dropped by the ASIC's RED mechanism.</li> </ul> <p><b>NOTE:</b> Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), the <b>Drops</b> field does not always use the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.</p> <ul style="list-style-type: none"> <li>• <b>Aged packets</b>—Number of packets that remained in shared packet SDRAM so long that the system automatically purged them. The value in this field should never increment. If it does, it is most likely a software bug or possibly malfunctioning hardware.</li> <li>• <b>HS link FIFO underflows</b>—Number of FIFO underflows on the high-speed links between the ASICs responsible for handling the router interfaces.</li> <li>• <b>MTU errors</b>—Number of packets whose size exceeds the MTU of the interface.</li> </ul> |
| <b>Egress queues</b>                        | Total number of egress queues supported on the specified interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Queue counters</b>                       | <p>CoS queue number and its associated user-configured forwarding class name.</p> <ul style="list-style-type: none"> <li>• <b>Queued packets</b>—Number of queued packets.</li> <li>• <b>Transmitted packets</b>—Number of transmitted packets.</li> <li>• <b>Dropped packets</b>—Number of packets dropped by the ASIC's RED mechanism.</li> </ul> <p><b>NOTE:</b> Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), the <b>Dropped packets</b> field does not always display the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>SONET alarms</b><br><b>SONET defects</b> | <p>(SONET) SONET media-specific alarms and defects that prevent the interface from passing packets. When a defect persists for a certain period, it is promoted to an alarm. Based on the router configuration, an alarm can ring the red or yellow alarm bell on the router or light the red or yellow alarm LED on the craft interface. See these fields for possible alarms and defects: <b>SONET PHY</b>, <b>SONET section</b>, <b>SONET line</b>, and <b>SONET path</b>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>SONET PHY</b>                            | <p>Counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b>—Number of seconds the defect has been active.</li> <li>• <b>Count</b>—Number of times that the defect has gone from inactive to active.</li> <li>• <b>State</b>—State of the error. A state other than <b>OK</b> indicates a problem.</li> </ul> <p>The <b>SONET PHY</b> field has the following subfields:</p> <ul style="list-style-type: none"> <li>• <b>PLL Lock</b>—Phase-locked loop</li> <li>• <b>PHY Light</b>—Loss of optical signal</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

Table 53: show class-of-service interface Output Fields (*continued*)

| Field Name           | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SONET section</b> | <p>Counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b>—Number of seconds the defect has been active.</li> <li>• <b>Count</b>—Number of times that the defect has gone from inactive to active.</li> <li>• <b>State</b>—State of the error. A state other than <b>OK</b> indicates a problem.</li> </ul> <p>The <b>SONET section</b> field has the following subfields:</p> <ul style="list-style-type: none"> <li>• <b>BIP-B1</b>—Bit interleaved parity for SONET section overhead</li> <li>• <b>SEF</b>—Severely errored framing</li> <li>• <b>LOS</b>—Loss of signal</li> <li>• <b>LOF</b>—Loss of frame</li> <li>• <b>ES-S</b>—Errored seconds (section)</li> <li>• <b>SES-S</b>—Severely errored seconds (section)</li> <li>• <b>SEFS-S</b>—Severely errored framing seconds (section)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>SONET line</b>    | <p>Active alarms and defects, plus counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b>—Number of seconds the defect has been active.</li> <li>• <b>Count</b>—Number of times that the defect has gone from inactive to active.</li> <li>• <b>State</b>—State of the error. A state other than <b>OK</b> indicates a problem.</li> </ul> <p>The <b>SONET line</b> field has the following subfields:</p> <ul style="list-style-type: none"> <li>• <b>BIP-B2</b>—Bit interleaved parity for SONET line overhead</li> <li>• <b>REI-L</b>—Remote error indication (near-end line)</li> <li>• <b>RDI-L</b>—Remote defect indication (near-end line)</li> <li>• <b>AIS-L</b>—Alarm indication signal (near-end line)</li> <li>• <b>BERR-SF</b>—Bit error rate fault (signal failure)</li> <li>• <b>BERR-SD</b>—Bit error rate defect (signal degradation)</li> <li>• <b>ES-L</b>—Errored seconds (near-end line)</li> <li>• <b>SES-L</b>—Severely errored seconds (near-end line)</li> <li>• <b>UAS-L</b>—Unavailable seconds (near-end line)</li> <li>• <b>ES-LFE</b>—Errored seconds (far-end line)</li> <li>• <b>SES-LFE</b>—Severely errored seconds (far-end line)</li> <li>• <b>UAS-LFE</b>—Unavailable seconds (far-end line)</li> </ul> |

Table 53: show class-of-service interface Output Fields (*continued*)

| Field Name                                                              | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>SONET path</b>                                                       | <p>Active alarms and defects, plus counts of specific SONET errors with detailed information.</p> <ul style="list-style-type: none"> <li>• <b>Seconds</b>—Number of seconds the defect has been active.</li> <li>• <b>Count</b>—Number of times that the defect has gone from inactive to active.</li> <li>• <b>State</b>—State of the error. A state other than <b>OK</b> indicates a problem.</li> </ul> <p>The <b>SONET path</b> field has the following subfields:</p> <ul style="list-style-type: none"> <li>• <b>BIP-B3</b>—Bit interleaved parity for SONET section overhead</li> <li>• <b>REI-P</b>—Remote error indication</li> <li>• <b>LOP-P</b>—Loss of pointer (path)</li> <li>• <b>AIS-P</b>—Path alarm indication signal</li> <li>• <b>RDI-P</b>—Path remote defect indication</li> <li>• <b>UNEQ-P</b>—Path unequipped</li> <li>• <b>PLM-P</b>—Path payload (signal) label mismatch</li> <li>• <b>ES-P</b>—Errored seconds (near-end STS path)</li> <li>• <b>SES-P</b>—Severely errored seconds (near-end STS path)</li> <li>• <b>UAS-P</b>—Unavailable seconds (near-end STS path)</li> <li>• <b>ES-PFE</b>—Errored seconds (far-end STS path)</li> <li>• <b>SES-PFE</b>—Severely errored seconds (far-end STS path)</li> <li>• <b>UAS-PFE</b>—Unavailable seconds (far-end STS path)</li> </ul> |
| <b>Received SONET overhead</b><br><br><b>Transmitted SONET overhead</b> | <p>Values of the received and transmitted SONET overhead:</p> <ul style="list-style-type: none"> <li>• <b>C2</b>—Signal label. Allocated to identify the construction and content of the STS-level SPE and for PDI-P.</li> <li>• <b>F1</b>—Section user channel byte. This byte is set aside for the purposes of users.</li> <li>• <b>K1</b> and <b>K2</b>—These bytes are allocated for APS signaling for the protection of the multiplex section.</li> <li>• <b>J0</b>—Section trace. This byte is defined for STS-1 number 1 of an STS-<i>N</i> signal. Used to transmit a 1-byte fixed-length string or a 16-byte message so that a receiving terminal in a section can verify its continued connection to the intended transmitter.</li> <li>• <b>S1</b>—Synchronization status. The S1 byte is located in the first STS-1 number of an STS-<i>N</i> signal.</li> <li>• <b>Z3</b> and <b>Z4</b>—Allocated for future use.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Received path trace</b><br><br><b>Transmitted path trace</b>         | <p>SONET/SDH interfaces allow path trace bytes to be sent inband across the SONET/SDH link. Juniper Networks and other router manufacturers use these bytes to help diagnose misconfigurations and network errors by setting the transmitted path trace message so that it contains the system hostname and name of the physical interface. The received path trace value is the message received from the router at the other end of the fiber. The transmitted path trace value is the message that this router transmits.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>HDLC configuration</b>                                               | <p>Information about the HDLC configuration.</p> <ul style="list-style-type: none"> <li>• <b>Policing bucket</b>—Configured state of the receiving policer.</li> <li>• <b>Shaping bucket</b>—Configured state of the transmitting shaper.</li> <li>• <b>Giant threshold</b>—Giant threshold programmed into the hardware.</li> <li>• <b>Runt threshold</b>—Runt threshold programmed into the hardware.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |



Table 53: show class-of-service interface Output Fields (*continued*)

| Field Name                                    | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Packet Forwarding Engine configuration</b> | Information about the configuration of the Packet Forwarding Engine: <ul style="list-style-type: none"> <li>• <b>Destination slot</b>—FPC slot number.</li> <li>• <b>PLP byte</b>—Packet Level Protocol byte.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>CoS information</b>                        | Information about the CoS queue for the physical interface. <ul style="list-style-type: none"> <li>• <b>CoS transmit queue</b>—Queue number and its associated user-configured forwarding class name.</li> <li>• <b>Bandwidth %</b>—Percentage of bandwidth allocated to the queue.</li> <li>• <b>Bandwidth bps</b>—Bandwidth allocated to the queue (in bps).</li> <li>• <b>Buffer %</b>—Percentage of buffer space allocated to the queue.</li> <li>• <b>Buffer usec</b>—Amount of buffer space allocated to the queue, in microseconds. This value is nonzero only if the buffer size is configured in terms of time.</li> <li>• <b>Priority</b>—Queue priority: <b>low</b> or <b>high</b>.</li> <li>• <b>Limit</b>—Displayed if rate limiting is configured for the queue. Possible values are <b>none</b> and <b>exact</b>. If <b>exact</b> is configured, the queue transmits only up to the configured bandwidth, even if excess bandwidth is available. If <b>none</b> is configured, the queue transmits beyond the configured bandwidth if bandwidth is available.</li> </ul> |
| <b>Forwarding classes</b>                     | Total number of forwarding classes supported on the specified interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Egress queues</b>                          | Total number of egress queues supported on the specified interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Queue</b>                                  | Queue number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Forwarding classes</b>                     | Forwarding class name.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Queued Packets</b>                         | Number of packets queued to this queue.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Queued Bytes</b>                           | Number of bytes queued to this queue. The byte counts vary by PIC type.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Transmitted Packets</b>                    | Number of packets transmitted by this queue. When fragmentation occurs on the egress interface, the first set of packet counters shows the postfragmentation values. The second set of packet counters (displayed under the <b>Packet Forwarding Engine Chassis Queues</b> field) shows the prefragmentation values.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Transmitted Bytes</b>                      | Number of bytes transmitted by this queue. The byte counts vary by PIC type.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Tail-dropped packets</b>                   | Number of packets dropped because of tail drop.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

Table 53: show class-of-service interface Output Fields (*continued*)

| Field Name          | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RED-dropped packets | <p>Number of packets dropped because of random early detection (RED).</p> <ul style="list-style-type: none"> <li>(M Series and T Series routers only) On M320 and M120 routers and the T Series routers, the total number of dropped packets is displayed. On all other M Series routers, the output classifies dropped packets into the following categories: <ul style="list-style-type: none"> <li><b>Low, non-TCP</b>—Number of low-loss priority non-TCP packets dropped because of RED.</li> <li><b>Low, TCP</b>—Number of low-loss priority TCP packets dropped because of RED.</li> <li><b>High, non-TCP</b>—Number of high-loss priority non-TCP packets dropped because of RED.</li> <li><b>High, TCP</b>—Number of high-loss priority TCP packets dropped because of RED.</li> </ul> </li> <li>(MX Series routers with enhanced DPCs, and T Series routers with enhanced FPCs only) The output classifies dropped packets into the following categories: <ul style="list-style-type: none"> <li><b>Low</b>—Number of low-loss priority packets dropped because of RED.</li> <li><b>Medium-low</b>—Number of medium-low loss priority packets dropped because of RED.</li> <li><b>Medium-high</b>—Number of medium-high loss priority packets dropped because of RED.</li> <li><b>High</b>—Number of high-loss priority packets dropped because of RED.</li> </ul> </li> </ul> <p><b>NOTE:</b> Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), this field does not always display the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.</p> |
| RED-dropped bytes   | <p>Number of bytes dropped because of RED. The byte counts vary by PIC type.</p> <ul style="list-style-type: none"> <li>(M Series and T Series routers only) On M320 and M120 routers and the T Series routers, only the total number of dropped bytes is displayed. On all other M Series routers, the output classifies dropped bytes into the following categories: <ul style="list-style-type: none"> <li><b>Low, non-TCP</b>—Number of low-loss priority non-TCP bytes dropped because of RED.</li> <li><b>Low, TCP</b>—Number of low-loss priority TCP bytes dropped because of RED.</li> <li><b>High, non-TCP</b>—Number of high-loss priority non-TCP bytes dropped because of RED.</li> <li><b>High, TCP</b>—Number of high-loss priority TCP bytes dropped because of RED.</li> </ul> </li> </ul> <p><b>NOTE:</b> Due to accounting space limitations on certain Type 3 FPCs (which are supported in M320 and T640 routers), this field does not always display the correct value for queue 6 or queue 7 for interfaces on 10-port 1-Gigabit Ethernet PICs.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Transmit rate       | Configured transmit rate of the scheduler. The rate is a percentage of the total interface bandwidth.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Rate Limit          | <p>Rate limiting configuration of the queue. Possible values are :</p> <ul style="list-style-type: none"> <li><b>None</b>—No rate limit.</li> <li><b>exact</b>—Queue transmits at the configured rate.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Buffer size         | Delay buffer size in the queue.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Priority            | Scheduling priority configured as <b>low</b> or <b>high</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Excess Priority     | Priority of the excess bandwidth traffic on a scheduler: <b>low</b> , <b>medium-low</b> , <b>medium-high</b> , <b>high</b> , or <b>none</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

Table 53: show class-of-service interface Output Fields (*continued*)

| Field Name             | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Drop profiles          | <p>Display the assignment of drop profiles.</p> <ul style="list-style-type: none"> <li>• <b>Loss priority</b>—Packet loss priority for drop profile assignment.</li> <li>• <b>Protocol</b>—Transport protocol for drop profile assignment.</li> <li>• <b>Index</b>—Index of the indicated object. Objects that have indexes in this output include schedulers and drop profiles.</li> <li>• <b>Name</b>—Name of the drop profile.</li> <li>• <b>Type</b>—Type of the drop profile: <b>discrete</b> or <b>interpolated</b>.</li> <li>• <b>Fill Level</b>—Percentage fullness of a queue.</li> <li>• <b>Drop probability</b>—Drop probability at this fill level.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Excess Priority        | Priority of the excess bandwidth traffic on a scheduler.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Drop profiles          | <p>Display the assignment of drop profiles.</p> <ul style="list-style-type: none"> <li>• <b>Loss priority</b>—Packet loss priority for drop profile assignment.</li> <li>• <b>Protocol</b>—Transport protocol for drop profile assignment.</li> <li>• <b>Index</b>—Index of the indicated object. Objects that have indexes in this output include schedulers and drop profiles.</li> <li>• <b>Name</b>—Name of the drop profile.</li> <li>• <b>Type</b>—Type of the drop profile: <b>discrete</b> or <b>interpolated</b>.</li> <li>• <b>Fill Level</b>—Percentage fullness of a queue.</li> <li>• <b>Drop probability</b>—Drop probability at this fill level.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Adjustment information | <p>Display the assignment of shaping-rate adjustments on a scheduler node or queue.</p> <ul style="list-style-type: none"> <li>• <b>Adjusting application</b>—Application that is performing the shaping-rate adjustment. <ul style="list-style-type: none"> <li>• The adjusting application can appear as <b>ancp LS-0</b>, which is the Junos OS Access Node Control Profile process (<b>ancpd</b>) that performs shaping-rate adjustments on schedule nodes.</li> <li>• The adjusting application can also appear as <b>pppoe</b>, which adjusts the shaping-rate and overhead-accounting class-of-service attributes on dynamic subscriber interfaces in a broadband access network based on access line parameters in Point-to-Point Protocol over Ethernet (PPPoE) Tags [TR-101]. This feature is supported on MPC/MIC interfaces on MX Series routers. The shaping rate is based on the actual-data-rate-downstream attribute. The overhead accounting value is based on the access-loop-encapsulation attribute and specifies whether the access loop uses Ethernet (frame mode) or ATM (cell mode).</li> </ul> </li> <li>• <b>Adjustment type</b>—Type of adjustment: <b>absolute</b> or <b>delta</b>.</li> <li>• <b>Configured shaping rate</b>—Shaping rate configured for the scheduler node or queue.</li> <li>• <b>Adjustment value</b>—Value of adjusted shaping rate.</li> <li>• <b>Adjustment target</b>—Level of shaping-rate adjustment performed: <b>node</b> or <b>queue</b>.</li> <li>• <b>Adjustment overhead-accounting mode</b>—Configured shaping mode: <b>frame</b> or <b>cell</b>.</li> </ul> |

## Sample Output

### show class-of-service interface (Physical)

```

user@host> show class-of-service interface so-0/2/3
Physical interface: so-0/2/3, Index: 135
Queues supported: 8, Queues in use: 4

```

Total non-default queues created: 4  
 Scheduler map: <default>, Index: 2032638653

Logical interface: fe-0/0/1.0, Index: 68, Dedicated Queues: no  
 Shaping rate: 32000

| Object               | Name                 | Type | Index |
|----------------------|----------------------|------|-------|
| Scheduler-map        | <default>            |      | 27    |
| Rewrite              | exp-default          | exp  | 21    |
| Classifier           | exp-default          | exp  | 5     |
| Classifier           | ipprec-compatibility | ip   | 8     |
| Forwarding-class-map | exp-default          | exp  | 5     |

### show class-of-service interface (Logical)

user@host> show class-of-service interface so-0/2/3.0

Logical interface: so-0/2/3.0, Index: 68, Dedicated Queues: no  
 Shaping rate: 32000

| Object               | Name                 | Type | Index |
|----------------------|----------------------|------|-------|
| Scheduler-map        | <default>            |      | 27    |
| Rewrite              | exp-default          | exp  | 21    |
| Classifier           | exp-default          | exp  | 5     |
| Classifier           | ipprec-compatibility | ip   | 8     |
| Forwarding-class-map | exp-default          | exp  | 5     |

### show class-of-service interface (Gigabit Ethernet)

user@host> show class-of-service interface ge-6/2/0

Physical interface: ge-6/2/0, Index: 175

Queues supported: 4, Queues in use: 4

Scheduler map: <default>, Index: 2

Input scheduler map: <default>, Index: 3

Chassis scheduler map: <default-chassis>, Index: 4

### show class-of-service interface (PPPoE Interface)

user@host> show class-of-service interface pp0.1

Logical interface: pp0.1, Index: 85

| Object                  | Name                 | Type   | Index      |
|-------------------------|----------------------|--------|------------|
| Traffic-control-profile | tcp-pppoe.o.pp0.1    | Output | 2726446535 |
| Classifier              | ipprec-compatibility | ip     | 13         |

Adjusting application: PPPoE

Adjustment type: absolute

Adjustment value: 5000000

Adjustment overhead-accounting mode: cell

Adjustment target: node

### show class-of-service interface (T4000 Routers with Type 5 FPCs)

user@host> show class-of-service interface xe-4/0/0

Physical interface: xe-4/0/0, Index: 153

Queues supported: 8, Queues in use: 4

Shaping rate: 5000000000 bps

Scheduler map: <default>, Index: 2

Congestion-notification: Disabled

Logical interface: xe-4/0/0.0, Index: 77

| Index | Object     | Name                 | Type |
|-------|------------|----------------------|------|
| 13    | Classifier | ipprec-compatibility | ip   |

### show class-of-service interface detail

```
user@host> show class-of-service interface ge-0/3/0 detail
```

```
Physical interface: ge-0/3/0, Enabled, Physical link is Up
 Link-level type: Ethernet, MTU: 1518, Speed: 1000mbps, Loopback: Disabled,
 Source filtering: Disabled, Flow control: Enabled, Auto-negotiation: Enabled,
 Remote fault: Online
 Device flags : Present Running
 Interface flags: SNMP-Traps Internal: 0x4000
```

```
Physical interface: ge-0/3/0, Index: 138
Queues supported: 4, Queues in use: 5
Shaping rate: 50000 bps
Scheduler map: interface-scheduler-map, Index: 58414
Input shaping rate: 10000 bps
878674 Input scheduler map: scheduler-map, Index: 15103
Chassis scheduler map: <default-chassis>, Index: 4
Congestion-notification: Disabled
```

```
Logical interface ge-0/3/0.0
```

```
 Flags: SNMP-Traps 0x4000 VLAN-Tag [0x8100.1] Encapsulation: ENET2
```

```
 inet
```

```
 mpls
```

| Interface  | Admin | Link | Proto | Input Filter | Output Filter |
|------------|-------|------|-------|--------------|---------------|
| ge-0/3/0.0 | up    | up   | inet  |              |               |

| Interface  | Admin | Link | Proto | Input Policer | Output Policer |
|------------|-------|------|-------|---------------|----------------|
| ge-0/3/0.0 | up    | up   | inet  |               |                |

```
Logical interface: ge-0/3/0.0, Index: 68
```

| Object     | Name                 | Type           | Index |
|------------|----------------------|----------------|-------|
| Rewrite    | exp-default          | exp (mpls-any) | 33    |
| Classifier | exp-default          | exp            | 10    |
| Classifier | ipprec-compatibility | ip             | 13    |

```
Logical interface ge-0/3/0.1
```

```
 Flags: SNMP-Traps 0x4000 VLAN-Tag [0x8100.2] Encapsulation: ENET2
```

```
 inet
```

| Interface  | Admin | Link | Proto | Input Filter | Output Filter |
|------------|-------|------|-------|--------------|---------------|
| ge-0/3/0.1 | up    | up   | inet  |              |               |

| Interface  | Admin | Link | Proto | Input Policer | Output Policer |
|------------|-------|------|-------|---------------|----------------|
| ge-0/3/0.1 | up    | up   | inet  |               |                |

```
Logical interface: ge-0/3/0.1, Index: 69
```

| Object     | Name                 | Type | Index |
|------------|----------------------|------|-------|
| Classifier | ipprec-compatibility | ip   | 13    |

### show class-of-service interface comprehensive

```
user@host> show class-of-service interface ge-0/3/0 comprehensive
```

```
Physical interface: ge-0/3/0, Enabled, Physical link is Up
```

```
 Interface index: 138, SNMP ifIndex: 601, Generation: 141
```

```
 Link-level type: Ethernet, MTU: 1518, Speed: 1000mbps, BPDU Error: None,
 MAC-REWRITE Error: None, Loopback: Disabled, Source filtering: Disabled, Flow
 control: Enabled,
```

```
 Auto-negotiation: Enabled, Remote fault: Online
```

```
 Device flags : Present Running
```

```
 Interface flags: SNMP-Traps Internal: 0x4000
```

```

CoS queues : 4 supported, 4 maximum usable queues
Schedulers : 256
Hold-times : Up 0 ms, Down 0 ms
Current address: 00:14:f6:f4:b4:5d, Hardware address: 00:14:f6:f4:b4:5d
Last flapped : 2010-09-07 06:35:22 PDT (15:14:42 ago)
Statistics last cleared: Never
Traffic statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
IPv6 total statistics:
Input bytes : 0
Output bytes : 0
Input packets: 0
Output packets: 0
Ingress traffic statistics at Packet Forwarding Engine:
Input bytes : 0 0 bps
Input packets: 0 0 pps
Drop bytes : 0 0 bps
Drop packets: 0 0 pps
Label-switched interface (LSI) traffic statistics:
Input bytes : 0 0 bps
Input packets: 0 0 pps
Input errors:
Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 0, L3
incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0, FIFO errors: 0,
Resource errors: 0
Output errors:
Carrier transitions: 5, Errors: 0, Drops: 0, Collisions: 0, Aged packets: 0,
FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
Ingress queues: 4 supported, 5 in use
Queue counters:

```

|       | Queued packets | Transmitted packets | Dropped packets |
|-------|----------------|---------------------|-----------------|
| 0 af3 | 0              | 0                   | 0               |
| 1 af2 | 0              | 0                   | 0               |
| 2 ef2 | 0              | 0                   | 0               |
| 3 ef1 | 0              | 0                   | 0               |

```

Egress queues: 4 supported, 5 in use
Queue counters:

```

|       | Queued packets | Transmitted packets | Dropped packets |
|-------|----------------|---------------------|-----------------|
| 0 af3 | 0              | 0                   | 0               |
| 1 af2 | 0              | 0                   | 0               |
| 2 ef2 | 0              | 0                   | 0               |
| 3 ef1 | 0              | 0                   | 0               |

```

Active alarms : None
Active defects : None
MAC statistics:

```

|                   | Receive | Transmit |
|-------------------|---------|----------|
| Total octets      | 0       | 0        |
| Total packets     | 0       | 0        |
| Unicast packets   | 0       | 0        |
| Broadcast packets | 0       | 0        |
| Multicast packets | 0       | 0        |

```

CRC/Align errors 0 0
FIFO errors 0 0
MAC control frames 0 0
MAC pause frames 0 0
Oversized frames 0
Jabber frames 0
Fragment frames 0
VLAN tagged frames 0
Code violations 0
Filter statistics:
 Input packet count 0
 Input packet rejects 0
 Input DA rejects 0
 Input SA rejects 0
 Output packet count 0
 Output packet pad count 0
 Output packet error count 0
 CAM destination filters: 0, CAM source filters: 0
Autonegotiation information:
 Negotiation status: Complete
 Link partner:
 Link mode: Full-duplex, Flow control: Symmetric/Asymmetric, Remote fault:
OK
 Local resolution:
 Flow control: Symmetric, Remote fault: Link OK
Packet Forwarding Engine configuration:
 Destination slot: 0
CoS information:
 Direction : Output
 CoS transmit queue Bandwidth Buffer Priority
Limit % bps % usec high
 2 ef2 39 19500 0 120
none
 Direction : Input
 CoS transmit queue Bandwidth Buffer Priority
Limit % bps % usec low
 0 af3 30 3000 45 0
none

Physical interface: ge-0/3/0, Enabled, Physical link is Up
Interface index: 138, SNMP ifIndex: 601
Forwarding classes: 16 supported, 5 in use
Ingress queues: 4 supported, 5 in use
Queue: 0, Forwarding classes: af3
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Tail-dropped packets : Not Available
 RED-dropped packets : 0 0 pps
 RED-dropped bytes : 0 0 bps
Queue: 1, Forwarding classes: af2
 Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
 Transmitted:
 Packets : 0 0 pps

```

```

Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 2, Forwarding classes: ef2
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 3, Forwarding classes: ef1
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Forwarding classes: 16 supported, 5 in use
Egress queues: 4 supported, 5 in use
Queue: 0, Forwarding classes: af3
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RL-dropped packets : 0 0 pps
RL-dropped bytes : 0 0 bps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 1, Forwarding classes: af2
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RL-dropped packets : 0 0 pps
RL-dropped bytes : 0 0 bps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps
Queue: 2, Forwarding classes: ef2
Queued:
Packets : 0 0 pps
Bytes : 0 0 bps
Transmitted:
Packets : 0 0 pps
Bytes : 0 0 bps
Tail-dropped packets : Not Available
RL-dropped packets : 0 0 pps
RL-dropped bytes : 0 0 bps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 pps

```



```

 RED-dropped bytes : 0 0 bps
Queue: 3, Forwarding classes: ef1
Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Tail-dropped packets : Not Available
RL-dropped packets : 0 0 pps
RL-dropped bytes : 0 0 bps
RED-dropped packets : 0 0 pps
RED-dropped bytes : 0 0 bps

Packet Forwarding Engine Chassis Queues:
Queues: 4 supported, 5 in use
Queue: 0, Forwarding classes: af3
Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : Not Available
RED-dropped bytes : Not Available
Queue: 1, Forwarding classes: af2
Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : Not Available
RED-dropped bytes : Not Available
Queue: 2, Forwarding classes: ef2
Queued:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Transmitted:
 Packets : 0 0 pps
 Bytes : 0 0 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : Not Available
RED-dropped bytes : Not Available
Queue: 3, Forwarding classes: ef1
Queued:
 Packets : 108546 0 pps
 Bytes : 12754752 376 bps
Transmitted:
 Packets : 108546 0 pps
 Bytes : 12754752 376 bps
Tail-dropped packets : 0 0 pps
RED-dropped packets : Not Available
RED-dropped bytes : Not Available

Physical interface: ge-0/3/0, Index: 138
Queues supported: 4, Queues in use: 5
Shaping rate: 50000 bps

```

Scheduler map: interface-scheduler-map, Index: 58414

Scheduler: ef2, Forwarding class: ef2, Index: 39155

Transmit rate: 39 percent, Rate Limit: none, Buffer size: 120 us, Buffer Limit: none, Priority: high

Excess Priority: unspecified

Drop profiles:

| Loss priority | Protocol | Index | Name                    |
|---------------|----------|-------|-------------------------|
| Low           | any      | 1     | < default-drop-profile> |
| Medium low    | any      | 1     | < default-drop-profile> |
| Medium high   | any      | 1     | < default-drop-profile> |
| High          | any      | 1     | < default-drop-profile> |

Drop profile: < default-drop-profile>, Type: discrete, Index: 1

| Fill level | Drop probability |
|------------|------------------|
| 100        | 100              |

Drop profile: < default-drop-profile>, Type: discrete, Index: 1

| Fill level | Drop probability |
|------------|------------------|
| 100        | 100              |

Drop profile: < default-drop-profile>, Type: discrete, Index: 1

| Fill level | Drop probability |
|------------|------------------|
| 100        | 100              |

Drop profile: < default-drop-profile>, Type: discrete, Index: 1

| Fill level | Drop probability |
|------------|------------------|
| 100        | 100              |

Input shaping rate: 10000 bps

Input scheduler map: scheduler-map

Scheduler map: scheduler-map, Index: 15103

Scheduler: af3, Forwarding class: af3, Index: 35058

Transmit rate: 30 percent, Rate Limit: none, Buffer size: 45 percent, Buffer Limit: none, Priority: low

Excess Priority: unspecified

Drop profiles:

| Loss priority | Protocol | Index | Name                    |
|---------------|----------|-------|-------------------------|
| Low           | any      | 40582 | green                   |
| Medium low    | any      | 1     | < default-drop-profile> |
| Medium high   | any      | 1     | < default-drop-profile> |
| High          | any      | 18928 | yellow                  |

Drop profile: green, Type: discrete, Index: 40582

| Fill level | Drop probability |
|------------|------------------|
| 50         | 0                |
| 100        | 100              |

Drop profile: < default-drop-profile>, Type: discrete, Index: 1

| Fill level | Drop probability |
|------------|------------------|
| 100        | 100              |

Drop profile: < default-drop-profile>, Type: discrete, Index: 1

| Fill level | Drop probability |
|------------|------------------|
| 100        | 100              |

Drop profile: yellow, Type: discrete, Index: 18928

| Fill level | Drop probability |
|------------|------------------|
| 50         | 0                |
| 100        | 100              |

Chassis scheduler map: < default-drop-profile>

Scheduler map: < default-drop-profile>, Index: 4

Scheduler: < default-drop-profile>, Forwarding class: af3, Index: 25

Transmit rate: 25 percent, Rate Limit: none, Buffer size: 25 percent, Buffer Limit: none, Priority: low

Excess Priority: low

Drop profiles:

```

 Loss priority Protocol Index Name
 Low any 1 < default-drop-profile>
 Medium low any 1 < default-drop-profile>
 Medium high any 1 < default-drop-profile>
 High any 1 < default-drop-profile>
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100

Scheduler: < default-drop-profile>, Forwarding class: af2, Index: 25
 Transmit rate: 25 percent, Rate Limit: none, Buffer size: 25 percent, Buffer
 Limit: none, Priority: low
 Excess Priority: low
 Drop profiles:
 Loss priority Protocol Index Name
 Low any 1 < default-drop-profile>
 Medium low any 1 < default-drop-profile>
 Medium high any 1 < default-drop-profile>
 High any 1 < default-drop-profile>
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100

Scheduler: < default-drop-profile>, Forwarding class: ef2, Index: 25
 Transmit rate: 25 percent, Rate Limit: none, Buffer size: 25 percent, Buffer
 Limit: none, Priority: low
 Excess Priority: low
 Drop profiles:
 Loss priority Protocol Index Name
 Low any 1 < default-drop-profile>
 Medium low any 1 < default-drop-profile>
 Medium high any 1 < default-drop-profile>
 High any 1 < default-drop-profile>
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100

```

```

Fill level Drop probability
 100 100

Scheduler: < default-drop-profile>, Forwarding class: ef1, Index: 25
Transmit rate: 25 percent, Rate Limit: none, Buffer size: 25 percent, Buffer
Limit: none, Priority: low
Excess Priority: low
Drop profiles:
 Loss priority Protocol Index Name
 Low any 1 < default-drop-profile>
 Medium low any 1 < default-drop-profile>
 Medium high any 1 < default-drop-profile>
 High any 1 < default-drop-profile>
Drop profile: , Type: discrete, Index: 1
 Fill level Drop probability
 100 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100
Drop profile: < default-drop-profile>, Type: discrete, Index: 1
 Fill level Drop probability
 100 100
Congestion-notification: Disabled
Forwarding class
priority Policing priority
af3 normal
af2 normal
ef2 normal
ef1 normal
af1 normal
ID Queue Restricted queue Fabric
0 0 0 low
1 1 1 low
2 2 2 high
3 3 3 high
4 4 0 low

Logical interface ge-0/3/0.0 (Index 68) (SNMP ifIndex 152) (Generation 159)
Flags: SNMP-Traps 0x4000 VLAN-Tag [0x8100.1] Encapsulation: ENET2
Traffic statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Local statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Transit statistics:
 Input bytes : 0
 Output bytes : 0
 Input packets: 0
 Output packets: 0
Protocol inet, MTU: 1500, Generation: 172, Route table: 0
Flags: Sendbcst-pkt-to-re
Input Filters: filter-in-ge-0/3/0.0-i,
Policer: Input: p1-ge-0/3/0.0-inet-i
Protocol mpls, MTU: 1488, Maximum labels: 3, Generation: 173, Route table: 0

```

Flags: Is-Primary  
Output Filters: exp-filter,,,,,

Logical interface ge-1/2/0.0 (Index 347) (SNMP ifIndex 638) (Generation 156)

| Forwarding class ID | Queue | Restricted queue | Fabric priority | Policing priority |
|---------------------|-------|------------------|-----------------|-------------------|
| SPU priority        |       |                  |                 |                   |
| best-effort         | 0     | 0                | low             | normal            |
| low                 |       |                  |                 |                   |

Aggregate Forwarding-class statistics per forwarding-class

Aggregate Forwarding-class statistics:

Forwarding-class statistics:

Forwarding-class best-effort statistics:

Input unicast bytes: 0  
Output unicast bytes: 0  
Input unicast packets: 0  
Output unicast packets: 0

Input multicast bytes: 0  
Output multicast bytes: 0  
Input multicast packets: 0  
Output multicast packets: 0

Forwarding-class expedited-forwarding statistics:

Input unicast bytes: 0  
Output unicast bytes: 0  
Input unicast packets: 0  
Output unicast packets: 0

Input multicast bytes: 0  
Output multicast bytes: 0  
Input multicast packets: 0  
Output multicast packets: 0

IPv4 protocol forwarding-class statistics:

Forwarding-class statistics:

Forwarding-class best-effort statistics:

Input unicast bytes: 0  
Output unicast bytes: 0  
Input unicast packets: 0  
Output unicast packets: 0

Input multicast bytes: 0  
Output multicast bytes: 0  
Input multicast packets: 0  
Output multicast packets: 0

Forwarding-class expedited-forwarding statistics:

Input unicast bytes: 0  
Output unicast bytes: 0  
Input unicast packets: 0  
Output unicast packets: 0

Input multicast bytes: 0  
Output multicast bytes: 0  
Input multicast packets: 0  
Output multicast packets: 0

IPv6 protocol forwarding-class statistics:  
 Forwarding-class statistics:  
 Forwarding-class best-effort statistics:

Input unicast bytes: 0  
 Output unicast bytes: 0  
 Input unicast packets: 0  
 Output unicast packets: 0

Input multicast bytes: 0  
 Output multicast bytes: 0  
 Input multicast packets: 0  
 Output multicast packets: 0

Forwarding-class expedited-forwarding statistics:

Input unicast bytes: 0  
 Output unicast bytes: 0  
 Input unicast packets: 0  
 Output unicast packets: 0

Input multicast bytes: 0  
 Output multicast bytes: 0  
 Input multicast packets: 0  
 Output multicast packets: 0

Logical interface ge-0/3/0.0 (Index 68) (SNMP ifIndex 152)  
 Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.1 ] Encapsulation: ENET2  
 Input packets : 0  
 Output packets: 0

| Interface  | Admin | Link | Proto | Input Filter           | Output Filter   |
|------------|-------|------|-------|------------------------|-----------------|
| ge-0/3/0.0 | up    | up   | inet  | filter-in-ge-0/3/0.0-i |                 |
|            |       |      | mpls  |                        | exp-filter      |
| Interface  | Admin | Link | Proto | Input Policier         | Output Policier |
| ge-0/3/0.0 | up    | up   | inet  | p1-ge-0/3/0.0-inet-i   |                 |
|            |       |      | mpls  |                        |                 |

Filter: filter-in-ge-0/3/0.0-i

Counters:

| Name                         | Bytes | Packets |
|------------------------------|-------|---------|
| count-filter-in-ge-0/3/0.0-i | 0     | 0       |

Filter: exp-filter

Counters:

| Name                  | Bytes | Packets |
|-----------------------|-------|---------|
| count-exp-seven-match | 0     | 0       |
| count-exp-zero-match  | 0     | 0       |

Policers:

| Name                 | Packets |
|----------------------|---------|
| p1-ge-0/3/0.0-inet-i | 0       |

Logical interface: ge-0/3/0.0, Index: 68

| Object  | Name        | Type           | Index |
|---------|-------------|----------------|-------|
| Rewrite | exp-default | exp (mpls-any) | 33    |

Rewrite rule: exp-default, Code point type: exp, Index: 33

| Forwarding class | Loss priority | Code point |       |
|------------------|---------------|------------|-------|
| af3              | low           | 000        |       |
| af3              | high          | 001        |       |
| af2              | low           | 010        |       |
| af2              | high          | 011        |       |
| ef2              | low           | 100        |       |
| ef2              | high          | 101        |       |
| ef1              | low           | 110        |       |
| ef1              | high          | 111        |       |
| Object           | Name          | Type       | Index |
| Classifier       | exp-default   | exp        | 10    |

Classifier: exp-default, Code point type: exp, Index: 10

| Code point | Forwarding class     | Loss priority |       |
|------------|----------------------|---------------|-------|
| 000        | af3                  | low           |       |
| 001        | af3                  | high          |       |
| 010        | af2                  | low           |       |
| 011        | af2                  | high          |       |
| 100        | ef2                  | low           |       |
| 101        | ef2                  | high          |       |
| 110        | ef1                  | low           |       |
| 111        | ef1                  | high          |       |
| Object     | Name                 | Type          | Index |
| Classifier | ipprec-compatibility | ip            | 13    |

Classifier: ipprec-compatibility, Code point type: inet-precedence, Index: 13

| Code point                 | Forwarding class | Loss priority |                  |        |
|----------------------------|------------------|---------------|------------------|--------|
| 000                        | af3              | low           |                  |        |
| 001                        | af3              | high          |                  |        |
| 010                        | af3              | low           |                  |        |
| 011                        | af3              | high          |                  |        |
| 100                        | af3              | low           |                  |        |
| 101                        | af3              | high          |                  |        |
| 110                        | ef1              | low           |                  |        |
| 111                        | ef1              | high          |                  |        |
| Forwarding class           | ID               | Queue         | Restricted queue | Fabric |
| priority Policing priority |                  |               |                  |        |
| af3                        | 0                | 0             | 0                | low    |
| af2                        | 1                | 1             | 1                | low    |
| ef2                        | 2                | 2             | 2                | high   |
| ef1                        | 3                | 3             | 3                | high   |
| af1                        | 4                | 4             | 0                | low    |

Logical interface ge-0/3/0.1 (Index 69) (SNMP ifIndex 154) (Generation 160)

Flags: SNMP-Traps 0x4000 VLAN-Tag [ 0x8100.2 ] Encapsulation: ENET2

Traffic statistics:

|                 |   |
|-----------------|---|
| Input bytes :   | 0 |
| Output bytes :  | 0 |
| Input packets:  | 0 |
| Output packets: | 0 |

Local statistics:

|                |   |
|----------------|---|
| Input bytes :  | 0 |
| Output bytes : | 0 |
| Input packets: | 0 |

```

Output packets: 0
Transit statistics:
Input bytes : 0 0 bps
Output bytes : 0 0 bps
Input packets: 0 0 pps
Output packets: 0 0 pps
Protocol inet, MTU: 1500, Generation: 174, Route table: 0
Flags: Sendbroadcast-pkt-to-re

```

```

Logical interface ge-0/3/0.1 (Index 69) (SNMP ifIndex 154)
Flags: SNMP-Traps 0x4000 VLAN-Tag [0x8100.2] Encapsulation: ENET2
Input packets : 0
Output packets: 0

```

```

Interface Admin Link Proto Input Filter Output Filter
ge-0/3/0.1 up up mpls
Interface Admin Link Proto Input Policer Output Policer
ge-0/3/0.1 up up

```

```

Logical interface: ge-0/3/0.1, Index: 69
Object Name Type Index
Classifier ipprec-compatibility ip 13

```

```
Classifier: ipprec-compatibility, Code point type: inet-precedence, Index: 13
```

```

Code point Forwarding class Loss priority
000 af3 low
001 af3 high
010 af3 low
011 af3 high
100 af3 low
101 af3 high
110 ef1 low
111 ef1 high

```

```

Forwarding class ID Queue Restricted queue Fabric
priority Policing priority
af3 0 0 0 low
normal
af2 1 1 1 low
normal
ef2 2 2 2 high
normal
ef1 3 3 3 high
normal
af1 4 4 0 low
normal

```

### show class-of-service interface (ACX Series Routers)

```

user@host-g11# show class-of-service interface
Physical interface: at-0/0/0, Index: 130
Queues supported: 4, Queues in use: 4
Scheduler map: <default>, Index: 2
Congestion-notification: Disabled

```

```
Logical interface: at-0/0/0.0, Index: 69
```



Logical interface: at-0/0/0.32767, Index: 70

Physical interface: at-0/0/1, Index: 133

Queues supported: 4, Queues in use: 4

Scheduler map: <default>, Index: 2

Congestion-notification: Disabled

Logical interface: at-0/0/1.0, Index: 71

Logical interface: at-0/0/1.32767, Index: 72

Physical interface: ge-0/1/0, Index: 146

Queues supported: 8, Queues in use: 5

Scheduler map: <default>, Index: 2

Congestion-notification: Disabled

| Object     | Name         | Type      | Index |
|------------|--------------|-----------|-------|
| Rewrite    | dscp-default | dscp      | 31    |
| Classifier | d1           | dscp      | 11331 |
| Classifier | ci           | ieee8021p | 583   |

Logical interface: ge-0/1/0.0, Index: 73

| Object  | Name       | Type           | Index |
|---------|------------|----------------|-------|
| Rewrite | custom-exp | exp (mpls-any) | 46413 |

Logical interface: ge-0/1/0.1, Index: 74

Logical interface: ge-0/1/0.32767, Index: 75

Physical interface: ge-0/1/1, Index: 147

Queues supported: 8, Queues in use: 5

Scheduler map: <default>, Index: 2

Congestion-notification: Disabled

| Object     | Name                 | Type | Index |
|------------|----------------------|------|-------|
| Classifier | ipprec-compatibility | ip   | 13    |

Logical interface: ge-0/1/1.0, Index: 76

Physical interface: ge-0/1/2, Index: 148

Queues supported: 8, Queues in use: 5

Scheduler map: <default>, Index: 2

Congestion-notification: Disabled

| Object     | Name | Type              | Index |
|------------|------|-------------------|-------|
| Rewrite    | ri   | ieee8021p (outer) | 35392 |
| Classifier | ci   | ieee8021p         | 583   |

Physical interface: ge-0/1/3, Index: 149

Queues supported: 8, Queues in use: 5

Scheduler map: <default>, Index: 2

Congestion-notification: Disabled

| Object     | Name                 | Type | Index |
|------------|----------------------|------|-------|
| Classifier | ipprec-compatibility | ip   | 13    |

Logical interface: ge-0/1/3.0, Index: 77

| Object  | Name        | Type           | Index |
|---------|-------------|----------------|-------|
| Rewrite | custom-exp2 | exp (mpls-any) | 53581 |

Physical interface: ge-0/1/4, Index: 150

Queues supported: 8, Queues in use: 5

Scheduler map: <default>, Index: 2

Congestion-notification: Disabled

| Object | Name | Type | Index |
|--------|------|------|-------|
|--------|------|------|-------|

```

Classifier ipprec-compatibility ip 13

Physical interface: ge-0/1/5, Index: 151
Queues supported: 8, Queues in use: 5
 Scheduler map: <default>, Index: 2
 Congestion-notification: Disabled
Object Name Type Index
Classifier ipprec-compatibility ip 13

Physical interface: ge-0/1/6, Index: 152
Queues supported: 8, Queues in use: 5
 Scheduler map: <default>, Index: 2
 Congestion-notification: Disabled
Object Name Type Index
Classifier ipprec-compatibility ip 13

Physical interface: ge-0/1/7, Index: 153
Queues supported: 8, Queues in use: 5
 Scheduler map: <default>, Index: 2
 Congestion-notification: Disabled
Object Name Type Index
Classifier d1 dscp 11331

Physical interface: ge-0/2/0, Index: 154
Queues supported: 8, Queues in use: 5
 Scheduler map: <default>, Index: 2
 Congestion-notification: Disabled
Object Name Type Index
Classifier ipprec-compatibility ip 13

Physical interface: ge-0/2/1, Index: 155
Queues supported: 8, Queues in use: 5
 Scheduler map: <default>, Index: 2
 Congestion-notification: Disabled
Object Name Type Index
Classifier ipprec-compatibility ip 13

Logical interface: ge-0/2/1.0, Index: 78

Logical interface: ge-0/2/1.32767, Index: 79

Physical interface: xe-0/3/0, Index: 156
Queues supported: 8, Queues in use: 5
 Scheduler map: <default>, Index: 2
 Congestion-notification: Disabled
Object Name Type Index
Classifier ipprec-compatibility ip 13

Logical interface: xe-0/3/0.0, Index: 80

Physical interface: xe-0/3/1, Index: 157
Queues supported: 8, Queues in use: 5
 Scheduler map: <default>, Index: 2
 Congestion-notification: Disabled
Object Name Type Index
Classifier ipprec-compatibility ip 13

Logical interface: xe-0/3/1.0, Index: 81

[edit]
user@host-g11#

```



## show class-of-service interface-set

|                                 |                                                                                                                                                                                                        |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <b>show class-of-service interface-set</b><br><i>&lt;interface-set-name&gt;</i>                                                                                                                        |
| <b>Release Information</b>      | Command introduced in Junos OS Release 9.4.                                                                                                                                                            |
| <b>Description</b>              | Display the configured shaping rate and the adjusted shaping rate for each logical interface set configured for hierarchical class of service (CoS).                                                   |
| <b>Options</b>                  | <p><b>none</b>—Display CoS associations for all logical interface sets.</p> <p><b>interface-set <i>interface-set-name</i></b>—(Optional) Display CoS associations for the specified interface set.</p> |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                   |
| <b>List of Sample Output</b>    | <a href="#">show class-of-service interface-set on page 737</a>                                                                                                                                        |
| <b>Output Fields</b>            | <a href="#">Table 54 on page 736</a> describes the output fields for the <b>show class-of-service interface-set</b> command. Output fields are listed in the approximate order in which they appear.   |

**Table 54: show class-of-service interface-set Output Fields**

| Field Name                            | Field Description                                                                                                        |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Interface-set</b>                  | Name of a logical interface set composed of one or more logical interfaces for which hierarchical scheduling is enabled. |
| <b>Index</b>                          | Index number of this interface set or the internal index number of this object.                                          |
| <b>Physical interface</b>             | Name of a physical interface.                                                                                            |
| <b>Queues supported</b>               | Number of queues you can configure on the interface.                                                                     |
| <b>Queues in use</b>                  | Number of queues currently configured.                                                                                   |
| <b>Output traffic control profile</b> | Name of the output traffic-control profile attached to the logical interface set.                                        |

Table 54: show class-of-service interface-set Output Fields (*continued*)

| Field Name                          | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Adjusting application               | <p>Name of the application that communicates shaping-rate adjustment information to the Junos OS class-of-service process (<b>cosd</b>) on the broadband services router (BSR). The BSR uses the information from this application to perform shaping-rate adjustments on the scheduler node that manages the interface set. The adjusting application appears as <b>ancp LS-0</b> which is the Junos OS Access Node Control Profile process (<b>ancpd</b>) that performs shaping-rate adjustments on schedule nodes. The nodes are logical interface sets configured to represent subscriber local loops. When the synchronization speed of the DSL line changes, <b>ancpd</b> communicates the local loop speed to <b>cosd</b> over the default logical system, <b>LS-0</b>, and then the BSR throttles the shaping rate on the scheduler node to the loop speed.</p> <p>The adjusting application can also appear as <b>PPPoE</b>, which adjusts the shaping-rate and overhead-accounting class-of-service attributes on dynamic subscriber interfaces in a broadband access network based on access line parameters in Point-to-Point Protocol over Ethernet (PPPoE) Tags [TR-101]. This feature is supported on MPC/MIC interfaces on MX Series routers. The shaping rate is based on the actual data rate downstream attribute. The overhead accounting value is based on the access loop encapsulation attribute and specifies whether the access loop uses Ethernet (frame mode) or ATM (cell mode).</p> |
| Adjustment type                     | Type of shaping-rate adjustment performed by the BSR on the scheduler node. The type of adjustment appears as <b>Adjustment type</b> , meaning that the configured shaping rate is adjusted by an absolute value as opposed to by a percentage of the configured rate.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Configured shaping rate             | The maximum transmission rate on the physical interface as configured by the output traffic-control profile attached to the scheduler node.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Adjustment value                    | Value of the shaping-rate adjustment information sent by the adjusting application to <b>cosd</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Adjustment overhead-accounting mode | Configured shaping mode: <b>frame</b> or <b>cell</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## Sample Output

### show class-of-service interface-set

```

user@host> show class-of-service interface-set example-ifset-ge-4/0/0-7
Interface-set: example-ifset-ge-4/0/0-7, Index: 8
Physical interface: ge-4/0/0, Index: 270
Queues supported: 8, Queues in use: 8
Output traffic control profile: example-tcp-basic-rate, Index: 11395
Adjusting application: ancp LS-0
Adjustment type: absolute
Configured shaping rate: 50000000
Adjustment value: 888000
Adjustment overhead-accounting mode: cell

```

## show class-of-service scheduler-hierarchy interface

|                                 |                                                                                                                                                                                                      |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show class-of-service scheduler-hierarchy interface <i>interface-name</i> <detail>                                                                                                                   |
| <b>Release Information</b>      | Command introduced in Junos OS Release 13.3 for MX Series Routers.                                                                                                                                   |
| <b>Description</b>              | For MPC/MIC interfaces only, display the scheduler hierarchy.                                                                                                                                        |
| <b>Options</b>                  | <b>detail</b> —(Optional) Display scheduler hierarchies based on the interface-set.<br><i>interface-name</i> —Display information about a specific interface.                                        |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                 |
| <b>Related Documentation</b>    |                                                                                                                                                                                                      |
| <b>List of Sample Output</b>    | <a href="#">show class-of-service scheduler-hierarchy interface on page 738</a>                                                                                                                      |
| <b>Output Fields</b>            | Table 55 on page 738 describes the output fields for the <b>show class-of-service scheduler-hierarchy interface</b> command. Output fields are listed in the approximate order in which they appear. |

Table 55: show class-of-service scheduler-hierarchy interface Output Fields

| Field Name          | Field Description                                                          |
|---------------------|----------------------------------------------------------------------------|
| interface           | Type of interface                                                          |
| resource            | Traffic resource associated with the logical interface                     |
| shaping-rate        | Actual shaping rate in bits per second                                     |
| guaranteed rate     | Actual guaranteed rate in bits per second                                  |
| guaranteed priority | Actual queue priority in the guaranteed region (high, low, or none)        |
| excess priority     | Actual queue priority in the excess region (high, low, or none)            |
| queue weight        | Actual queue weight for excess CoS weighted round-robin                    |
| excess weight       | Actual interface unit per priority weights for excess weighted round-robin |

## Sample Output

### show class-of-service scheduler-hierarchy interface

```
user@host> show class-of-service scheduler-hierarchy interface ge-1/0/0
```

```

Interface/ shaping guaranteed guaranteed/ queue excess
resource name rate rate excess weight weight
```

|                | kbits  | kbits    | priority |      | high/low |         |
|----------------|--------|----------|----------|------|----------|---------|
| -----          |        |          |          |      |          |         |
| ge-1/0/0       | 100000 |          |          |      |          |         |
| ge-1/0/0 RTP   | 100000 | 0        |          |      | 1        | 1       |
| be             | 100000 | 1000     | Low      | Low  | 1        |         |
| da             | 9000   | 2000     | Medium   | High | 1        |         |
| vi             | 100000 | 3000     | Medium   | None | 626      |         |
| vo             | 100000 | 4000     | High     | High | 373      |         |
| gt             | 100000 | 0        | High     | High | 1        |         |
| ifset          | 75000  | 0        |          |      |          | 1 1     |
| ifset RTP      | 100000 | 0        |          |      |          | 1 1     |
| best-effort    | 100000 | 0        | Low      | Low  | 950      |         |
| vi             | 100000 | 0        | Low      | Low  | 50       |         |
| ge-1/0/0.50    | 100000 | 23000    |          |      |          | 1 1     |
| be             | 100000 | 1000     | Low      | Low  | 1        |         |
| da             | 9000   | 2000     | Medium   | High | 1        |         |
| vi             | 100000 | 3000     | Medium   | None | 626      |         |
| vo             | 100000 | 4000     | High     | High | 373      |         |
| gt             | 100000 |          | High     | High | 1        |         |
| ge-1/0/0.20    | 50000  | 40000    |          |      |          | 750 750 |
| be             | 50000  | 1000     | Low      | Low  | 1        |         |
| da             | 9000   | 2000     | Medium   | High | 1        |         |
| vi             | 50000  | 3000     | Medium   | None | 626      |         |
| vo             | 50000  | 4000     | High     | High | 373      |         |
| gt             | 50000  | Disabled | High     | High | 1        |         |
| ge-1/0/0.32767 | 100000 | 2000     |          |      |          | 1 1     |
| best-effort    | 100000 | 1900     | Low      | Low  | 950      |         |
| vi             | 100000 | 100      | Low      | Low  | 50       |         |

## show class-of-service scheduler-hierarchy interface-set

|                                 |                                                                                                                                                                                                          |
|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show class-of-service scheduler-hierarchy interface-set <i>interface-set-name</i> <detail>                                                                                                               |
| <b>Release Information</b>      | Command introduced in Junos OS Release 13.3 for MX Series Routers.                                                                                                                                       |
| <b>Description</b>              | For MPC/MIC interface sets only, display the scheduler hierarchy.                                                                                                                                        |
| <b>Options</b>                  | <b>detail</b> —(Optional) Display scheduler hierarchies based on the interface-set.<br><i>interface-set-name</i> —Display information about a specific interface-set.                                    |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                     |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <i>show interfaces queue</i></li> </ul>                                                                                                                         |
| <b>List of Sample Output</b>    | <a href="#">show class-of-service scheduler-hierarchy interface-set on page 740</a>                                                                                                                      |
| <b>Output Fields</b>            | Table 56 on page 740 describes the output fields for the <b>show class-of-service scheduler-hierarchy interface-set</b> command. Output fields are listed in the approximate order in which they appear. |

Table 56: show class-of-service scheduler-hierarchy interface-set Output Fields

| Field Name                 | Field Description                                                         |
|----------------------------|---------------------------------------------------------------------------|
| <b>interface</b>           | Type of interface                                                         |
| <b>resource</b>            | Traffic resource associated with the logical interface                    |
| <b>shaping-rate</b>        | Actual shaping rate in bits per second                                    |
| <b>guaranteed rate</b>     | Actual guaranteed rate in bits per second                                 |
| <b>guaranteed priority</b> | Actual queue priority in the guaranteed region (high, low, or none)       |
| <b>excess priority</b>     | Actual queue priority in the excess region (high, low, or none)           |
| <b>queue weight</b>        | Actual queue weight for excess CoS weighted round-robin                   |
| <b>excess weight</b>       | Actual interface-set per priority weights for excess weighted round-robin |

## Sample Output

### show class-of-service scheduler-hierarchy interface-set

```
user@host> show class-of-service scheduler-hierarchy interface-set ifset
```

```

Interface/ shaping guaranteed guaranteed/ queue excess
resource name rate rate excess weight weight
```



|              | kbits  | kbits    | priority |      | high/low |     |
|--------------|--------|----------|----------|------|----------|-----|
| ge-1/0/0     | 100000 |          |          |      |          |     |
| ge-1/0/0 RTP | 100000 | 0        |          |      | 1        | 1   |
| be           | 100000 | 1000     | Low      | Low  | 1        |     |
| da           | 9000   | 2000     | Medium   | High | 1        |     |
| vi           | 100000 | 3000     | Medium   | None | 626      |     |
| vo           | 100000 | 4000     | High     | High | 373      |     |
| gt           | 100000 | 0        | High     | High | 1        |     |
| ge-1/0/0.20  | 50000  | 40000    |          |      | 750      | 750 |
| be           | 50000  | 1000     | Low      | Low  | 1        |     |
| da           | 9000   | 2000     | Medium   | High | 1        |     |
| vi           | 50000  | 3000     | Medium   | None | 626      |     |
| vo           | 50000  | 4000     | High     | High | 373      |     |
| gt           | 50000  | Disabled | High     | High | 1        |     |

## show class-of-service scheduler-map

|                                 |                                                                                                                                                                                                      |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>show class-of-service scheduler-map</code><br><code>&lt;name&gt;</code>                                                                                                                        |
| <b>Release Information</b>      | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 11.1 for the QFX Series.<br>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.         |
| <b>Description</b>              | Display the mapping of schedulers to forwarding classes and a summary of scheduler parameters for each entry.                                                                                        |
| <b>Options</b>                  | <b>none</b> —Display all scheduler maps.<br><br><b>name</b> —(Optional) Display a summary of scheduler parameters for each forwarding class to which the named scheduler is assigned.                |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                 |
| <b>List of Sample Output</b>    | <a href="#">show class-of-service scheduler-map on page 743</a>                                                                                                                                      |
| <b>Output Fields</b>            | <a href="#">Table 57 on page 742</a> describes the output fields for the <b>show class-of-service scheduler-map</b> command. Output fields are listed in the approximate order in which they appear. |

Table 57: show class-of-service scheduler-map Output Fields

| Field Name                  | Field Description                                                                                                                                                                                                                                                                                          |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Scheduler map</b>        | Name of the scheduler map.                                                                                                                                                                                                                                                                                 |
| <b>Index</b>                | Index of the indicated object. Objects having indexes in this output include scheduler maps, schedulers, and drop profiles.                                                                                                                                                                                |
| <b>Scheduler</b>            | Name of the scheduler.                                                                                                                                                                                                                                                                                     |
| <b>Forwarding class</b>     | Classification of a packet affecting the forwarding, scheduling, and marking policies applied as the packet transits the router.                                                                                                                                                                           |
| <b>Transmit rate</b>        | Configured transmit rate of the scheduler (in bps). The rate is a percentage of the total interface bandwidth, or the keyword <b>remainder</b> , which indicates that the scheduler receives the remaining bandwidth of the interface.                                                                     |
| <b>Rate Limit</b>           | Rate limiting configuration of the queue. Possible values are <b>none</b> , meaning no rate limiting, and <b>exact</b> , meaning the queue only transmits at the configured rate.                                                                                                                          |
| <b>Maximum buffer delay</b> | Amount of transmit delay (in milliseconds) or the buffer size of the queue. The buffer size is shown as a percentage of the total interface buffer allocation, or by the keyword <b>remainder</b> to indicate that the buffer is sized according to what remains after other scheduler buffer allocations. |
| <b>Priority</b>             | Scheduling priority: <b>low</b> or <b>high</b> .                                                                                                                                                                                                                                                           |

Table 57: show class-of-service scheduler-map Output Fields (*continued*)

| Field Name                       | Field Description                                                                                                                                                                                                                                                                           |
|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Excess priority                  | Priority of excess bandwidth: <b>low</b> , <b>medium-low</b> , <b>medium-high</b> , <b>high</b> , or <b>none</b> .                                                                                                                                                                          |
| Explicit Congestion Notification | (QFX Series, OCX Series, and EX4600 switches only) Explicit congestion notification (ECN) state: <ul style="list-style-type: none"> <li>Disable—ECN is disabled on the specified scheduler</li> <li>Enable—ECN is enabled on the specified scheduler</li> </ul> ECN is disabled by default. |
| Adjust minimum                   | Minimum shaping rate for an adjusted queue, in bps.                                                                                                                                                                                                                                         |
| Adjust percent                   | Bandwidth adjustment applied to a queue, in percent.                                                                                                                                                                                                                                        |
| Drop profiles                    | Table displaying the assignment of drop profiles by name and index to a given loss priority and protocol pair.                                                                                                                                                                              |
| Loss priority                    | Packet loss priority for drop profile assignment.                                                                                                                                                                                                                                           |
| Protocol                         | Transport protocol for drop profile assignment.                                                                                                                                                                                                                                             |
| Name                             | Name of the drop profile.                                                                                                                                                                                                                                                                   |

## Sample Output

### show class-of-service scheduler-map

```

user@host> show class-of-service scheduler-map
Scheduler map: dd-scheduler-map, Index: 84

Scheduler: aa-scheduler, Index: 8721, Forwarding class: aa-forwarding-class
Transmit rate: 30 percent, Rate Limit: none, Maximum buffer delay: 39 ms,
Priority: high
Drop profiles:
 Loss priority Protocol Index Name
 Low non-TCP 8724 aa-drop-profile
 Low TCP 9874 bb-drop-profile
 High non-TCP 8833 cc-drop-profile
 High TCP 8484 dd-drop-profile

Scheduler: bb-scheduler, Forwarding class: aa-forwarding-class
Transmit rate: 40 percent, Rate limit: none, Maximum buffer delay: 68 ms,
Priority: high
Drop profiles:
 Loss priority Protocol Index Name
 Low non-TCP 8724 aa-drop-profile
 Low TCP 9874 bb-drop-profile
 High non-TCP 8833 cc-drop-profile
 High TCP 8484 dd-drop-profile

```

## show class-of-service traffic-control-profile

|                                 |                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>show class-of-service traffic-control-profile</code><br><code>&lt;profile-name&gt;</code>                                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | Command introduced before Junos OS Release 7.4.<br>Command introduced in Junos OS Release 11.1 for the QFX Series.<br>Command introduced in Junos OS Release 12.2 for ACX Series Routers.<br>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.                                                                                  |
| <b>Description</b>              | For Gigabit Ethernet IQ PICs, Channelized IQ PICs, EQ DPCs, and Trio MPC/MIC interfaces only, display traffic shaping and scheduling profiles.<br><br>(ACX Series routers) For ATM IMA pseudowire interfaces, display traffic shaping and scheduling profiles.                                                                                       |
| <b>Options</b>                  | <b>none</b> —Display all profiles.<br><br><b>profile-name</b> —(Optional) Display information about a single profile.                                                                                                                                                                                                                                |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                 |
| <b>List of Sample Output</b>    | <a href="#">show class-of-service traffic-control-profile on page 746</a><br><a href="#">show class-of-service traffic-control-profile (MX Series routers with Clear Channel Multi-Rate CE MIC) on page 746</a><br><a href="#">show class-of-service traffic-control-profile (ACX Series routers with ATM IMA pseudowire interfaces) on page 746</a> |
| <b>Output Fields</b>            | <a href="#">Table 58 on page 744</a> describes the output fields for the <b>show class-of-service traffic-control-profile</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                       |

**Table 58: show class-of-service traffic-control-profile Output Fields**

| Field Name                     | Field Description                                                                                                                                                                                                                                                                                            |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Traffic control profile</b> | Name of the traffic control profile.                                                                                                                                                                                                                                                                         |
| <b>Index</b>                   | Index number of the traffic control profile.                                                                                                                                                                                                                                                                 |
| <b>ATM Service</b>             | (MX Series routers with ATM Multi-Rate CE MIC) Configured category of ATM service. Possible values: <ul style="list-style-type: none"> <li>cbr—Constant bit rate.</li> <li>rtvbr—Real time variable bit rate.</li> <li>nrtvbr—Non real time variable bit rate.</li> <li>ubr—Unspecified bit rate.</li> </ul> |
| <b>Maximum Burst Size</b>      | Configured maximum burst size, in cells.                                                                                                                                                                                                                                                                     |
| <b>Peak rate</b>               | Configured peak rate, in cps.                                                                                                                                                                                                                                                                                |

**Table 58: show class-of-service traffic-control-profile Output Fields** (*continued*)

| Field Name                          | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sustained rate</b>               | Configured sustained rate, in cps.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Shaping rate</b>                 | Configured shaping rate, in bps.<br><br><b>NOTE:</b> (MX Series routers with ATM Multi-Rate CE MIC) Configured peak rate, in cps.                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Shaping rate burst</b>           | Configured burst size for the shaping rate, in bytes.<br><br><b>NOTE:</b> (MX Series routers with ATM Multi-Rate CE MIC) Configured maximum burst rate, in cells.                                                                                                                                                                                                                                                                                                                                      |
| <b>Shaping rate priority high</b>   | Configured shaping rate for high-priority traffic, in bps.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Shaping rate priority medium</b> | Configured shaping rate for medium-priority traffic, in bps.                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Shaping rate priority low</b>    | Configured shaping rate for low-priority traffic, in bps.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Shaping rate excess high</b>     | Configured shaping rate for high-priority excess traffic, in bps.                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Shaping rate excess low</b>      | Configured shaping rate for low-priority excess traffic, in bps.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Scheduler map</b>                | Name of the associated scheduler map.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Delay Buffer rate</b>            | Configured delay buffer rate, in bps.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Excess rate</b>                  | Configured excess rate, in percent or proportion.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Excess rate high</b>             | Configured excess rate for high priority traffic, in percent or proportion.                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Excess rate low</b>              | Configured excess rate for low priority traffic, in percent or proportion.                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Guaranteed rate</b>              | Configured guaranteed rate, in bps or cps.<br><br><b>NOTE:</b> (MX Series routers with ATM Multi-Rate CE MIC) This value depends on the ATM service category chosen. Possible values: <ul style="list-style-type: none"> <li>• <b>cbr</b>—Guaranteed rate is equal to the configured peak rate in cps.</li> <li>• <b>rtvbr</b>—Guaranteed rate is equal to the configured sustained rate in cps.</li> <li>• <b>nrtvbr</b>—Guaranteed rate is equal to the configured sustained rate in cps.</li> </ul> |
| <b>Guaranteed rate burst</b>        | Configured burst size for the guaranteed rate, in bytes.                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>adjust-minimum</b>               | Configured minimum shaping rate for an adjusted queue, in bps.                                                                                                                                                                                                                                                                                                                                                                                                                                         |

Table 58: show class-of-service traffic-control-profile Output Fields (*continued*)

| Field Name               | Field Description                                                |
|--------------------------|------------------------------------------------------------------|
| overhead accounting mode | Configured shaping mode: <b>Frame Mode</b> or <b>Cell Mode</b> . |
| Overhead bytes           | Configured byte adjustment value.                                |

## Sample Output

### show class-of-service traffic-control-profile

```

user@host> show class-of-service traffic-control-profile
Traffic control profile: Profile1, Index: 57625
 Scheduler map: m1
 Delay Buffer rate: 500000
 Guaranteed rate: 1000000

Traffic control profile: Profile2, Index: 57624
 Scheduler map: m2
 Delay Buffer rate: 600000
 Guaranteed rate: 2000000

Traffic control profile: Profile3, Index: 57627
 Scheduler map: m3
 Delay Buffer rate: 800000
 Guaranteed rate: 3000000
 .Excess rate high: proportion 4

Traffic control profile: Profile4, Index: 57626
 Scheduler map: m4
 Delay Buffer rate: 750000
 Guaranteed rate: 4000000
 ..adjust-minimum 20000000

```

### show class-of-service traffic-control-profile (MX Series routers with Clear Channel Multi-Rate CE MIC)

```

user@host> show class-of-service traffic-control-profile
Traffic control profile: at-vbr1, Index: 11395
 ATM Service: RTVBR
 Scheduler map: m3
 overhead accounting mode: Frame Mode
 Shaping rate: 1000 cps
 Shaping rate burst: 500 cells
 Delay Buffer rate: 2000 cps
 Guaranteed rate: 1000 cps

Traffic control profile: foo, Index: 38286
 ATM Service: UBR
 Scheduler map: m3
 overhead accounting mode: Frame Mode

```

### show class-of-service traffic-control-profile (ACX Series routers with ATM IMA pseudowire interfaces)

```

user@host> show class-of-service traffic-control-profile
Traffic control profile: foo, Index: 38286
 ATM Service: RTVBR
 Shaping rate: 2000 cps

```

```
Shaping rate burst: 200 cells
Scheduler map: <default>
Delay Buffer rate: 1000 cps
Guaranteed rate: 1700 cps
```

## show firewall

---

**List of Syntax**   [Syntax on page 748](#)  
                          [Syntax \(EX Series Switches\) on page 748](#)

**Syntax**   `show firewall`  
              `<counter counter-name>`  
              `<detail>`  
              `<filter filter-name>`  
              `<log>`  
              `<logical-system (all | logical-system-name)>`  
              `<terse>`

**Syntax (EX Series Switches)**   `show firewall`  
                                      `<counter counter-name>`  
                                      `<detail>`  
                                      `<filter filter-name>`  
                                      `<log <(detail | interface interface-name)>>`  
                                      `<policer counters <(detail | counter-id counter-index <detail>)>>`  
                                      `<terse>`

**Release Information**   Command introduced before Junos OS Release 7.4.  
                              Command introduced in Junos OS Release 9.0 for EX Series switches.  
                              Option **logical-system** introduced in Junos OS Release 9.3.  
                              Option **terse** introduced in Junos OS Release 9.4.  
                              Option **policer counters** introduced in Junos OS Release 12.2 for EX Series switches.  
                              Option **detail** introduced in Junos OS Release 12.3 for EX Series switches.  
                              Option **detail** introduced in Junos OS Release 14.1 for MX Series routers.

**Description**   Display enhanced statistics and counters for all configured firewall filters.

**Options**   **none**—(Optional) Display statistics and counters for all configured firewall filters and counters. For EX Series switches, this command also displays statistics about all configured policers.

**counter *counter-name***—(Optional) Name of a filter counter.

**detail**—(EX Series switches and MX Series routers only) (Optional) Display firewall filter statistics and enhanced policer statistics and counters.

**filter *filter-name***—(Optional) Name of a configured filter.

**logical-system (all | *logical-system-name*)**—(Optional) Perform this operation on all logical systems or on a particular logical system.

**log**—(Optional) Display log entries for firewall filters.

**log <(detail | interface *interface-name*)>**—(EX Series switches only) (Optional) Display detailed log entries of firewall activity or log information about a specific interface.

**policer counters <(detail | counter-id *counter-index* <detail>)>**—(EX8200 switches only) (Optional) Display policer counter statistics in brief or in detail.



**terse**—(Optional) Display firewall filter names only.

**Required Privilege Level** view

- Related Documentation**
- [clear firewall on page 693](#)
  - [show firewall log on page 755](#)
  - [show policer](#)
  - [Enhanced Policer Statistics Overview on page 339](#)
  - [enhanced-policer on page 541](#)

- List of Sample Output**
- [show firewall filter \(MX Series Router and EX Series Switch\) on page 752](#)
  - [show firewall filter \(non MX Series Router and EX Series Switch\) on page 752](#)
  - [show firewall filter \(Dynamic Input Filter\) on page 752](#)
  - [show firewall \(Logical Systems\) on page 752](#)
  - [show firewall \(counter counter-name\) on page 753](#)
  - [show firewall log on page 753](#)
  - [show firewall policer counters \(EX8200 Switch\) on page 753](#)
  - [show firewall policer counters \(detail\) \(EX8200 Switch\) on page 753](#)
  - [show firewall policer counters \(counter-id counter-index\) \(EX8200 Switch\) on page 754](#)
  - [show firewall policer counters \(counter-id counter-index detail\) \(EX8200 Switch\) on page 754](#)
  - [show firewall detail on page 754](#)

**Output Fields** Table 59 on page 749 lists the output fields for the **show firewall** command. Output fields are listed in the approximate order in which they appear.

**Table 59: show firewall Output Fields**

| Field Name    | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Filter</b> | <p>Name of a filter that has been configured with the <b>filter</b> statement at the <b>[edit firewall]</b> hierarchy level.</p> <p>Except on EX Series switches:</p> <ul style="list-style-type: none"> <li>• When an interface-specific filter is displayed, the name of the filter is followed by the full interface name and by either <b>-i</b> for an input filter or <b>-o</b> for an output filter.</li> <li>• When dynamic filters are displayed, the name of the filter is followed by the full interface name and by either <b>-in</b> for an input filter or <b>-out</b> for an output filter. When a logical system-specific filter is displayed, the name of the filter is prefixed with two underscore (__) characters and the name of the logical system (for example, __ls1/filter1).</li> <li>• When a service filter is displayed that uses a service set, the separator between the service-set name and the service-filter name is a semicolon (;).</li> </ul> <p><b>NOTE:</b> For <b>bridge family filter</b>, the <b>ip-protocol</b> match criteria is supported only for IPv4 and not for IPv6. This is applicable for line cards that support the Junos Trio chipset, such as the MX 3D MPC line cards.</p> |

Table 59: show firewall Output Fields (*continued*)

| Field Name                   | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Counters</b>              | <p>Display filter counter information:</p> <ul style="list-style-type: none"> <li>• <b>Name</b>—Name of a filter counter that has been configured with the <b>counter</b> firewall filter action.</li> <li>• <b>Bytes</b>—Number of bytes that match the filter term under which the <b>counter</b> action is specified.</li> <li>• <b>Packets</b>—Number of packets that matched the filter term under which the <b>counter</b> action is specified.</li> </ul> <p><b>NOTE:</b> On M and T series routers, firewall filters cannot count <b>ip-options</b> packets on a per option type and per interface basis. A limited work around is to use the <b>show pfe statistics ip options</b> command to see <b>ip-options</b> statistics on a per Packet Forwarding Engine (PFE) basis. See <i>show pfe statistics ip</i> for sample output.</p>                           |
| <b>Policers</b>              | <p>Display policer information:</p> <ul style="list-style-type: none"> <li>• <b>Name</b>—Name of policer.</li> <li>• <b>Bytes</b>—(For two-color policers on MX Series routers and EX Series switches, and for hierarchical policers on MS-DPC, MIC, and MPC interfaces on MX Series routers) Number of bytes that match the filter term under which the policer action is specified. This is only the number out-of-specification (out-of-spec) byte counts, not all the bytes in all packets policed by the policer.<br/>For other combinations of policer type, device, and line card type, this field is blank.</li> <li>• <b>Packets</b>—Number of packets that matched the filter term under which the policer action is specified. This is only the number of out-of-specification (out-of-spec) packet counts, not all packets policed by the policer.</li> </ul> |
| <b>Policer Counter Index</b> | (EX8200 switch only) Global management counter ID. The counter ID value ( <i>counter-index</i> ) can be 0, 1, or 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Green</b>                 | (EX8200 switch only) Number of packets within the limits. The number of packets is smaller than the committed information rate (CIR).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Yellow</b>                | (EX8200 switch only) Number of packets partially within the limits. The number of packets is greater than the CIR, but the burst size is within the excess burst size (EBS) limit.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Discard</b>               | (EX8200 switch only) Number of discarded packets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Bytes</b>                 | (EX8200 switch only) Number of green, yellow, red, or discarded packets in bytes.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Packets</b>               | (EX8200 switch only) Number of green, yellow, red, or discarded packets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Filter name</b>           | (EX8200 switch only) Name of the filter with a term associated to a policer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Term name</b>             | (EX8200 switch only) Name of the term associated with a policer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Policer name</b>          | (EX8200 switch only) Name of the policer that is associated with a global management counter.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

Table 59: show firewall Output Fields (*continued*)

| Field Name | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PI-t1      | <ul style="list-style-type: none"><li>• OOS packet statistics for packets that are marked out-of-specification (out-of-spec) by the policer. Changes to all packets that have out-of-spec actions, such as discard, color marking, or forwarding-class, are included in this counter.</li><li>• Offered packet statistics for traffic subjected to policing.</li><li>• Transmitted packet statistics for traffic that is not discarded by the policer. When the policer action is discard, the statistics are the same as the in-spec statistics; when the policer action is non-discard (loss-priority or forwarding-class), the statistics are included in this counter.</li></ul> |

## Sample Output

### show firewall filter (MX Series Router and EX Series Switch)

```
user@host> show firewall filter test
Filter: test
Counters:
Name Bytes Packets
Counter-1 0 0
Counter-2 0 0
Policers:
Name Bytes Packets
Policer-1 2770 70
```

### show firewall filter (non MX Series Router and EX Series Switch)

```
user@host> show firewall filter test
Filter: test
Counters:
Name Bytes Packets
Counter-1 0 0
Counter-2 0 0
Policers:
Name Bytes Packets
Policer-1 70
```

### show firewall filter (Dynamic Input Filter)

```
user@host> show firewall filter dfwd-ge-5/0/0.1-in
Filter: dfwd-ge-5/0/0.1-in
Counters:
Name Bytes Packets
c1-ge-5/0/0.1-in 0 0
```

### show firewall (Logical Systems)

```
user@host> show firewall

Filter: __lr1/test
Counters:
Name Bytes Packets
icmp 420 5
Filter: __default_bpdu_filter__
Filter: __lr1/inet_filter1
Counters:
Name Bytes Packets
inet_tcp_count 0 0
inet_udp_count 0 0
Filter: __lr1/inet_filter2
Counters:
Name Bytes Packets
inet_icmp_count 0 0
inet_pim_count 0 0
Filter: __lr2/inet_filter1
Counters:
Name Bytes Packets
inet_tcp_count 0 0
inet_udp_count 0 0
```

**show firewall (counter counter-name)**

```

user@host> show firewall counter icmp-counter
Filter: ingress-port-voip-class-filter
Counters:
Name Bytes Packets
icmp-counter 0 0

```

**show firewall log**

```

user@host> show firewall log
Log :

Time Filter Action Interface Protocol Src Addr
 Dest Addr
08:00:53 pfe R ge-1/0/1.0 ICMP 192.168.3.5
 192.168.3.4
08:00:52 pfe R ge-1/0/1.0 ICMP 192.168.3.5
 192.168.3.4
08:00:51 pfe R ge-1/0/1.0 ICMP 192.168.3.5
 192.168.3.4
08:00:50 pfe R ge-1/0/1.0 ICMP 192.168.3.5
 192.168.3.4
08:00:49 pfe R ge-1/0/1.0 ICMP 192.168.3.5
 192.168.3.4
08:00:48 pfe R ge-1/0/1.0 ICMP 192.168.3.5
 192.168.3.4
08:00:47 pfe R ge-1/0/1.0 ICMP 192.168.3.5
 192.168.3.4

```

**show firewall policer counters (EX8200 Switch)**

```

user@switch> show firewall policer counters
Policer Counter Index 0:

 Bytes Packets
Green: 73 15914
Yellow: 9 1962
Discard: 119 25942

Policer Counter Index 1:

 Bytes Packets
Green: 0 0
Yellow: 0 0
Discard: 0 0

Policer Counter Index 2:

 Bytes Packets
Green: 0 0
Yellow: 0 0
Discard: 0 0

```

**show firewall policer counters (detail) (EX8200 Switch)**

```

user@switch> show firewall policer counters detail
Policer Counter Index 0:

 Bytes Packets
Green: 73 15914
Yellow: 9 1962
Discard: 119 25942

```

| Filter name    | Term name    | Policer name     |
|----------------|--------------|------------------|
| myfilter       | polcr-term-1 | myfilter-polcr-1 |
| inet-filter-ae | ae-snmp      | policer-1        |
| inet-filter-ae | ae-ssh       | policer-2        |

## Policer Counter Index 1:

|          | Bytes | Packets |
|----------|-------|---------|
| Green:   | 0     | 0       |
| Yellow:  | 0     | 0       |
| Discard: | 0     | 0       |

| Filter name | Term name | Policer name |
|-------------|-----------|--------------|
|-------------|-----------|--------------|

## Policer Counter Index 2:

|          | Bytes | Packets |
|----------|-------|---------|
| Green:   | 0     | 0       |
| Yellow:  | 0     | 0       |
| Discard: | 0     | 0       |

| Filter name | Term name | Policer name |
|-------------|-----------|--------------|
|-------------|-----------|--------------|

## show firewall policer counters (counter-id counter-index) (EX8200 Switch)

user@switch&gt; show firewall policer counters counter-id 0

## Policer Counter Index 0:

|          | Bytes | Packets |
|----------|-------|---------|
| Green:   | 73    | 15914   |
| Yellow:  | 9     | 1962    |
| Discard: | 119   | 25942   |

## show firewall policer counters (counter-id counter-index detail) (EX8200 Switch)

user@switch&gt; show firewall policer counters counter-id 0 detail

## Policer Counter Index 0:

|          | Bytes | Packets |
|----------|-------|---------|
| Green:   | 73    | 15914   |
| Yellow:  | 9     | 1962    |
| Discard: | 119   | 25942   |

| Filter name    | Term name    | Policer name     |
|----------------|--------------|------------------|
| myfilter       | polcr-term-1 | myfilter-polcr-1 |
| inet-filter-ae | ae-snmp      | policer-1        |
| inet-filter-ae | ae-ssh       | policer-2        |

## show firewall detail

user@host&gt; show firewall detail

Filter: \_\_default\_bpdu\_filter\_\_

Filter: foo

Counters:

| Name | Bytes    | Packets |
|------|----------|---------|
| c1   | 17652140 | 160474  |

Policers:

| Name        | Bytes | Packets              |
|-------------|-------|----------------------|
| P1-t1       |       |                      |
| OOS         | 0     | 18286                |
| Offered     | 0     | 18446744073709376546 |
| Transmitted | 0     | 18446744073709358260 |

## show firewall log

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>              | <a href="#">Syntax on page 755</a><br><a href="#">Syntax (EX Series Switches) on page 755</a>                                                                                                                                                                                                                                                                                                     |
| <b>Syntax</b>                      | <pre>show firewall log &lt;detail&gt; &lt;interface <i>interface-name</i>&gt; &lt;logical-system (<i>logical-system-name</i>   all)&gt;</pre>                                                                                                                                                                                                                                                     |
| <b>Syntax (EX Series Switches)</b> | <pre>show firewall log &lt;detail&gt; &lt;interface <i>interface-name</i>&gt;</pre>                                                                                                                                                                                                                                                                                                               |
| <b>Release Information</b>         | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p><b>logical-system</b> option introduced in Junos OS Release 9.3.</p>                                                                                                                                                                                          |
| <b>Description</b>                 | Display log information about firewall filters.                                                                                                                                                                                                                                                                                                                                                   |
| <b>Options</b>                     | <p><b>none</b>—Display log information about firewall filters.</p> <p><b>detail</b>—(Optional) Display detailed information.</p> <p><b>interface <i>interface-name</i></b>—(Optional) Display log information about a specific interface.</p> <p><b>logical-system (<i>logical-system-name</i>   all)</b>—(Optional) Perform this operation on all logical systems or on a particular system.</p> |
| <b>Required Privilege Level</b>    | view                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>List of Sample Output</b>       | <a href="#">show firewall log on page 756</a><br><a href="#">show firewall log detail on page 756</a>                                                                                                                                                                                                                                                                                             |
| <b>Output Fields</b>               | <p><a href="#">Table 60 on page 755</a> lists the output fields for the <b>show firewall log</b> command. Output fields are listed in the approximate order in which they appear.</p>                                                                                                                                                                                                             |

**Table 60: show firewall log Output Fields**

| Field Name         | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Time of Log</b> | Time that the event occurred.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Filter</b>      | <ul style="list-style-type: none"> <li>Displays the name of a configured firewall filter or service filter only if the packet hit the filter's <b>log</b> action in a kernel filter (in the control plane). For any traffic that reaches the Routing Engine, the packets hit the <b>log</b> action in the kernel.</li> <li>For all other logged packets (packet hit the filter's <b>log</b> action in the Packet Forwarding Engine), this field displays <b>pfe</b> instead of a configured filter name.</li> </ul> |

Table 60: show firewall log Output Fields (*continued*)

| Field Name          | Field Description                                                                                                                                                                                                                                                                                                                                             |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Filter Action       | Filter action: <ul style="list-style-type: none"> <li>• <b>A</b>—Accept</li> <li>• <b>D</b>—Discard</li> <li>• <b>R</b>—Reject</li> </ul>                                                                                                                                                                                                                     |
| Name of Interface   | <ul style="list-style-type: none"> <li>• Displays a physical interface name if the packet arrived at a port on a line card.</li> <li>• Displays <b>local</b> if the packet was generated by the device's internal Ethernet interface, <b>em1</b> or <b>fxp1</b>, which connects the Routing Engine with the router's packet-forwarding components.</li> </ul> |
| Name of protocol    | Packet's protocol name: <b>egp</b> , <b>gre</b> , <b>icmp</b> , <b>ipip</b> , <b>ospf</b> , <b>pim</b> , <b>rsvp</b> , <b>tcp</b> , or <b>udp</b> .                                                                                                                                                                                                           |
| Packet length       | Length of the packet.                                                                                                                                                                                                                                                                                                                                         |
| Source address      | Packet's source address.                                                                                                                                                                                                                                                                                                                                      |
| Destination address | Packet's destination address and port.                                                                                                                                                                                                                                                                                                                        |

## Sample Output

### show firewall log

```
user@host>show firewall log
Time Filter Action Interface Protocol Src Addr Dest Addr
13:10:12 pfe D rlsq0.902 ICMP 180.1.177.2 180.1.177.1
13:10:11 pfe D rlsq0.902 ICMP 180.1.177.2 180.1.177.1
```

### show firewall log detail

```
user@host> show firewall log detail
Time of Log: 2004-10-13 10:37:17 PDT, Filter: f, Filter action: accept, Name of
interface: fxp0.0Name of protocol: TCP, Packet Length: 50824, Source address:
172.17.22.108:829,
Destination address: 192.168.70.66:513
Time of Log: 2004-10-13 10:37:17 PDT, Filter: f, Filter action: accept, Name of
interface: fxp0.0
Name of protocol: TCP, Packet Length: 1020, Source address: 172.17.22.108:829,
Destination address: 192.168.70.66:513
Time of Log: 2004-10-13 10:37:17 PDT, Filter: f, Filter action: accept, Name of
interface: fxp0.0
Name of protocol: TCP, Packet Length: 49245, Source address: 172.17.22.108:829,
Destination address: 192.168.70.66:513
Time of Log: 2004-10-13 10:37:17 PDT, Filter: f, Filter action: accept, Name of
interface: fxp0.0
Name of protocol: TCP, Packet Length: 49245, Source address: 172.17.22.108:829,
Destination address: 192.168.70.66:513
Time of Log: 2004-10-13 10:37:17 PDT, Filter: f, Filter action: accept, Name of
interface: fxp0.0
```



```
Name of protocol: TCP, Packet Length: 49245, Source address: 172.17.22.108:829,
Destination address: 192.168.70.66:513
Time of Log: 2004-10-13 10:37:17 PDT, Filter: f, Filter action: accept, Name of
interface: fxp0.0
Name of protocol: TCP, Packet Length: 49245, Source address: 172.17.22.108:829,
Destination address: 192.168.70.66:513
....
```

## show firewall templates-in-use

---

|                          |                                                                                                                                                                                             |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Syntax                   | show firewall templates-in-use                                                                                                                                                              |
| Release Information      | Command introduced in Junos OS Release 12.3.                                                                                                                                                |
| Description              | Display the names of configured filter templates that are currently in use by dynamic subscribers and the number of times each template is referenced.                                      |
| Required Privilege Level | view                                                                                                                                                                                        |
| Related Documentation    | <ul style="list-style-type: none"><li>• <a href="#">clear firewall on page 693</a></li><li>• <a href="#">show firewall log on page 755</a></li></ul>                                        |
| List of Sample Output    | <a href="#">show firewall templates-in-use on page 759</a>                                                                                                                                  |
| Output Fields            | <a href="#">Table 61 on page 758</a> lists the output fields for the <b>show firewall templates-in-use</b> command. Output fields are listed in the approximate order in which they appear. |

Table 61: show firewall templates-in-use Output Fields

| Field Name      | Field Description                                                                                                                                                                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Filter Template | Name of a filter that has been configured using the <b>filter</b> statement at either the <b>[edit firewall]</b> or <b>[edit dynamic-profiles <i>profile-name</i> firewall]</b> hierarchy and is being used as a template for dynamic subscriber filtering. |
| Reference Count | Number of times the filter has been referenced by subscribers accessing the network.                                                                                                                                                                        |

## Sample Output

### show firewall templates-in-use

```
user@host> show firewall templates-in-use
```

| Filter Template | Dynamic Subscribers | Reference Counts |
|-----------------|---------------------|------------------|
| -----           |                     | -----            |
| egressFilter    |                     | 10               |
| ingressFilter   |                     | 10               |
| dfilter         |                     | 5                |
| dfilter-pol     |                     | 5                |

## show igmp group

|                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>                               | <a href="#">Syntax on page 760</a><br><a href="#">Syntax (EX Series Switch and the QFX Series) on page 760</a>                                                                                                                                                                                                                                                                                                            |
| <b>Syntax</b>                                       | <pre>show igmp group &lt;brief   detail&gt; &lt;group-name&gt; &lt;logical-system (all   logical-system-name)&gt;</pre>                                                                                                                                                                                                                                                                                                   |
| <b>Syntax (EX Series Switch and the QFX Series)</b> | <pre>show igmp group &lt;brief   detail&gt; &lt;group-name&gt;</pre>                                                                                                                                                                                                                                                                                                                                                      |
| <b>Release Information</b>                          | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.3 for the QFX Series.</p> <p>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>                                                                                                                                     |
| <b>Description</b>                                  | Display Internet Group Management Protocol (IGMP) group membership information.                                                                                                                                                                                                                                                                                                                                           |
| <b>Options</b>                                      | <p><b>none</b>—Display standard information about membership for all IGMP groups.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output.</p> <p><b>group-name</b>—(Optional) Display group membership for the specified IP address only.</p> <p><b>logical-system (all   logical-system-name)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> |
| <b>Required Privilege Level</b>                     | view                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Related Documentation</b>                        | <ul style="list-style-type: none"> <li>• <a href="#">clear igmp membership on page 695</a></li> </ul>                                                                                                                                                                                                                                                                                                                     |
| <b>List of Sample Output</b>                        | <a href="#">show igmp group (Include Mode) on page 761</a><br><a href="#">show igmp group (Exclude Mode) on page 762</a><br><a href="#">show igmp group brief on page 762</a><br><a href="#">show igmp group detail on page 762</a>                                                                                                                                                                                       |
| <b>Output Fields</b>                                | <p><a href="#">Table 62 on page 760</a> describes the output fields for the <b>show igmp group</b> command. Output fields are listed in the approximate order in which they appear.</p>                                                                                                                                                                                                                                   |

**Table 62: show igmp group Output Fields**

| Field Name       | Field Description                                                                                                                                       | Level of Output |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Interface</b> | Name of the interface that received the IGMP membership report. A name of <b>local</b> indicates that the local routing device joined the group itself. | All levels      |
| <b>Group</b>     | Group address.                                                                                                                                          | All levels      |

Table 62: show igmp group Output Fields (*continued*)

| Field Name              | Field Description                                                                                                                                                                                                         | Level of Output   |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| <b>Group Mode</b>       | Mode the SSM group is operating in: <b>Include</b> or <b>Exclude</b> .                                                                                                                                                    | All levels        |
| <b>Source</b>           | Source address.                                                                                                                                                                                                           | All levels        |
| <b>Source timeout</b>   | Time remaining until the group traffic is no longer forwarded. The timer is refreshed when a listener in include mode sends a report. A group in exclude mode or configured as a static group displays a zero timer.      | <b>detail</b>     |
| <b>Last reported by</b> | Address of the host that last reported membership in this group.                                                                                                                                                          | All levels        |
| <b>Timeout</b>          | Time remaining until the group membership is removed.                                                                                                                                                                     | <b>brief none</b> |
| <b>Group timeout</b>    | Time remaining until a group in exclude mode moves to include mode. The timer is refreshed when a listener in exclude mode sends a report. A group in include mode or configured as a static group displays a zero timer. | <b>detail</b>     |
| <b>Type</b>             | Type of group membership: <ul style="list-style-type: none"> <li>• <b>Dynamic</b>—Host reported the membership.</li> <li>• <b>Static</b>—Membership is configured.</li> </ul>                                             | All levels        |

## Sample Output

### show igmp group (Include Mode)

```

user@host> show igmp group
Interface: t1-0/1/0.0
 Group: 232.1.1.1
 Group mode: Include
 Source: 10.0.0.2
 Last reported by: 10.9.5.2
 Timeout: 24 Type: Dynamic
 Group: 232.1.1.1
 Group mode: Include
 Source: 10.0.0.3
 Last reported by: 10.9.5.2
 Timeout: 24 Type: Dynamic
 Group: 232.1.1.1
 Group mode: Include
 Source: 10.0.0.4
 Last reported by: 10.9.5.2
 Timeout: 24 Type: Dynamic
 Group: 232.1.1.2
 Group mode: Include
 Source: 10.0.0.4
 Last reported by: 10.9.5.2
 Timeout: 24 Type: Dynamic
Interface: t1-0/1/1.0
Interface: ge-0/2/2.0
Interface: ge-0/2/0.0
Interface: local
 Group: 224.0.0.2
 Source: 0.0.0.0

```

```
 Last reported by: Local
 Timeout: 0 Type: Dynamic
Group: 224.0.0.22
 Source: 0.0.0.0
 Last reported by: Local
 Timeout: 0 Type: Dynamic
```

### show igmp group (Exclude Mode)

```
user@host> show igmp group
Interface: t1-0/1/0.0
Interface: t1-0/1/1.0
Interface: ge-0/2/2.0
Interface: ge-0/2/0.0
Interface: local
 Group: 224.0.0.2
 Source: 0.0.0.0
 Last reported by: Local
 Timeout: 0 Type: Dynamic
 Group: 224.0.0.22
 Source: 0.0.0.0
 Last reported by: Local
 Timeout: 0 Type: Dynamic
```

### show igmp group brief

The output for the **show igmp group brief** command is identical to that for the **show igmp group** command.

### show igmp group detail

```
user@host> show igmp group detail
Interface: t1-0/1/0.0
 Group: 232.1.1.1
 Group mode: Include
 Source: 10.0.0.2
 Source timeout: 12
 Last reported by: 10.9.5.2
 Group timeout: 0 Type: Dynamic
 Group: 232.1.1.1
 Group mode: Include
 Source: 10.0.0.3
 Source timeout: 12
 Last reported by: 10.9.5.2
 Group timeout: 0 Type: Dynamic
 Group: 232.1.1.1
 Group mode: Include
 Source: 10.0.0.4
 Source timeout: 12
 Last reported by: 10.9.5.2
 Group timeout: 0 Type: Dynamic
 Group: 232.1.1.2
 Group mode: Include
 Source: 10.0.0.4
 Source timeout: 12
 Last reported by: 10.9.5.2
 Group timeout: 0 Type: Dynamic
Interface: t1-0/1/1.0
Interface: ge-0/2/2.0
Interface: ge-0/2/0.0
Interface: local
```

```
Group: 224.0.0.2
 Group mode: Exclude
 Source: 0.0.0.0
 Source timeout: 0
 Last reported by: Local
 Group timeout: 0 Type: Dynamic
Group: 224.0.0.22
 Group mode: Exclude
 Source: 0.0.0.0
 Source timeout: 0
 Last reported by: Local
 Group timeout: 0 Type: Dynamic
```

## show igmp interface

|                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>                                 | <a href="#">Syntax on page 764</a><br><a href="#">Syntax (EX Series Switches and the QFX Series) on page 764</a>                                                                                                                                                                                                                                                                                                                    |
| <b>Syntax</b>                                         | <pre>show igmp interface &lt;brief   detail&gt; &lt;interface-name&gt; &lt;logical-system (all   logical-system-name)&gt;</pre>                                                                                                                                                                                                                                                                                                     |
| <b>Syntax (EX Series Switches and the QFX Series)</b> | <pre>show igmp interface &lt;brief   detail&gt; &lt;interface-name&gt;</pre>                                                                                                                                                                                                                                                                                                                                                        |
| <b>Release Information</b>                            | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.3 for the QFX Series.</p> <p>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>                                                                                                                                               |
| <b>Description</b>                                    | Display information about Internet Group Management Protocol (IGMP)-enabled interfaces.                                                                                                                                                                                                                                                                                                                                             |
| <b>Options</b>                                        | <p><b>none</b>—Display standard information about all IGMP-enabled interfaces.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output.</p> <p><b>interface-name</b>—(Optional) Display information about the specified IGMP-enabled interface only.</p> <p><b>logical-system (all   logical-system-name)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> |
| <b>Required Privilege Level</b>                       | view                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Related Documentation</b>                          | <ul style="list-style-type: none"> <li>• <a href="#">clear igmp membership on page 695</a></li> </ul>                                                                                                                                                                                                                                                                                                                               |
| <b>List of Sample Output</b>                          | <a href="#">show igmp interface on page 766</a><br><a href="#">show igmp interface brief on page 767</a><br><a href="#">show igmp interface detail on page 767</a><br><a href="#">show igmp interface &lt;interface-name&gt; on page 767</a>                                                                                                                                                                                        |
| <b>Output Fields</b>                                  | <p><a href="#">Table 63 on page 764</a> describes the output fields for the <b>show igmp interface</b> command. Output fields are listed in the approximate order in which they appear.</p>                                                                                                                                                                                                                                         |

**Table 63: show igmp interface Output Fields**

| Field Name | Field Description      | Level of Output |
|------------|------------------------|-----------------|
| Interface  | Name of the interface. | All levels      |



Table 63: show igmp interface Output Fields (*continued*)

| Field Name                | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Level of Output |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Querier</b>            | Address of the routing device that has been elected to send membership queries.                                                                                                                                                                                                                                                                                                                                                                                                             | All levels      |
| <b>State</b>              | State of the interface: <b>Up</b> or <b>Down</b> .                                                                                                                                                                                                                                                                                                                                                                                                                                          | All levels      |
| <b>SSM Map Policy</b>     | Name of the source-specific multicast (SSM) map policy that has been applied to the IGMP interface.                                                                                                                                                                                                                                                                                                                                                                                         | All levels      |
| <b>Timeout</b>            | How long until the IGMP querier is declared to be unreachable, in seconds.                                                                                                                                                                                                                                                                                                                                                                                                                  | All levels      |
| <b>Version</b>            | IGMP version being used on the interface: 1, 2, or 3.                                                                                                                                                                                                                                                                                                                                                                                                                                       | All levels      |
| <b>Groups</b>             | Number of groups on the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                          | All levels      |
| <b>Group limit</b>        | Maximum number of groups allowed on the interface. Any joins requested after the limit is reached are rejected.                                                                                                                                                                                                                                                                                                                                                                             | All levels      |
| <b>Group threshold</b>    | Configured threshold at which a warning message is generated.<br><br>This threshold is based on a percentage of groups received on the interface. If the number of groups received reaches the configured threshold, the device generates a warning message.                                                                                                                                                                                                                                | All levels      |
| <b>Group log-interval</b> | Time (in seconds) between consecutive log messages.                                                                                                                                                                                                                                                                                                                                                                                                                                         | All levels      |
| <b>Immediate Leave</b>    | State of the immediate leave option: <ul style="list-style-type: none"> <li>• <b>On</b>—Indicates that the router removes a host from the multicast group as soon as the router receives a leave group message from a host associated with the interface.</li> <li>• <b>Off</b>—Indicates that after receiving a leave group message, instead of removing a host from the multicast group immediately, the router sends a group query to determine if another receiver responds.</li> </ul> | All levels      |
| <b>Promiscuous Mode</b>   | State of the promiscuous mode option: <ul style="list-style-type: none"> <li>• <b>On</b>—Indicates that the router can accept IGMP reports from subnetworks that are not associated with its interfaces.</li> <li>• <b>Off</b>—Indicates that the router can accept IGMP reports only from subnetworks that are associated with its interfaces.</li> </ul>                                                                                                                                  | All levels      |

Table 63: show igmp interface Output Fields (*continued*)

| Field Name                   | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Level of Output |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Passive</b>               | <p>State of the passive mode option:</p> <ul style="list-style-type: none"> <li>• <b>On</b>—Indicates that the router can run IGMP on the interface but not send or receive control traffic such as IGMP reports, queries, and leaves.</li> <li>• <b>Off</b>—Indicates that the router can run IGMP on the interface and send or receive control traffic such as IGMP reports, queries, and leaves.</li> </ul> <p>The <b>passive</b> statement enables you to selectively activate up to two out of a possible three available query or control traffic options. When enabled, the following options appear after the <b>on</b> state declaration:</p> <ul style="list-style-type: none"> <li>• <b>send-general-query</b>—The interface sends general queries.</li> <li>• <b>send-group-query</b>—The interface sends group-specific and group-source-specific queries.</li> <li>• <b>allow-receive</b>—The interface receives control traffic.</li> </ul> | All levels      |
| <b>OIF map</b>               | Name of the OIF map (if configured) associated with the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | All levels      |
| <b>SSM map</b>               | Name of the source-specific multicast (SSM) map (if configured) used on the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | All levels      |
| <b>Configured Parameters</b> | <p>Information configured by the user:</p> <ul style="list-style-type: none"> <li>• <b>IGMP Query Interval</b>—Interval (in seconds) at which this router sends membership queries when it is the querier.</li> <li>• <b>IGMP Query Response Interval</b>—Time (in seconds) that the router waits for a report in response to a general query.</li> <li>• <b>IGMP Last Member Query Interval</b>—Time (in seconds) that the router waits for a report in response to a group-specific query.</li> <li>• <b>IGMP Robustness Count</b>—Number of times the router retries a query.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                | All levels      |
| <b>Derived Parameters</b>    | <p>Derived information:</p> <ul style="list-style-type: none"> <li>• <b>IGMP Membership Timeout</b>—Timeout period (in seconds) for group membership. If no report is received for these groups before the timeout expires, the group membership is removed.</li> <li>• <b>IGMP Other Querier Present Timeout</b>—Time (in seconds) that the router waits for the IGMP querier to send a query.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | All levels      |

## Sample Output

### show igmp interface

```

user@host> show igmp interface
Interface: at-0/3/1.0
 Querier: 10.111.30.1
 State: Up Timeout: None Version: 2 Groups: 4
 SSM Map Policy: ssm-policy-A
Interface: so-1/0/0.0
 Querier: 10.111.10.1
 State: Up Timeout: None Version: 2 Groups: 2
 SSM Map Policy: ssm-policy-B
Interface: so-1/0/1.0
 Querier: 10.111.20.1

```

```

 State: Up Timeout: None Version: 2 Groups: 4
 SSM Map Policy: ssm-policy-C
Immediate Leave: On
Promiscuous Mode: Off

Configured Parameters:
IGMP Query Interval: 125.0
IGMP Query Response Interval: 10.0
IGMP Last Member Query Interval: 1.0
IGMP Robustness Count: 2

Derived Parameters:
IGMP Membership Timeout: 260.0
IGMP Other Querier Present Timeout: 255.0

```

### show igmp interface brief

The output for the **show igmp interface brief** command is identical to that for the **show igmp interface** command. For sample output, see [show igmp interface on page 766](#).

### show igmp interface detail

The output for the **show igmp interface detail** command is identical to that for the **show igmp interface** command. For sample output, see [show igmp interface on page 766](#).

### show igmp interface <interface-name>

```

user@host# show igmp interface ge-3/2/0.0
Interface: ge-3/2/0.0
Querier: 20.1.1.1
State: Up Timeout: None Version: 3 Groups: 1
Group limit: 8
Group threshold: 60
Group log-interval: 10
Immediate leave: Off
Promiscuous mode: Off

```

## show igmp statistics

|                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>List of Syntax</b>                               | <a href="#">Syntax on page 768</a><br><a href="#">Syntax (EX Series Switch and the QFX Series) on page 768</a>                                                                                                                                                                                                                                                                                                                 |
| <b>Syntax</b>                                       | <pre>show igmp statistics &lt;brief   detail&gt; &lt;interface <i>interface-name</i>&gt; &lt;logical-system (all   <i>logical-system-name</i>)&gt;</pre>                                                                                                                                                                                                                                                                       |
| <b>Syntax (EX Series Switch and the QFX Series)</b> | <pre>show igmp statistics &lt;brief   detail&gt; &lt;interface <i>interface-name</i>&gt;</pre>                                                                                                                                                                                                                                                                                                                                 |
| <b>Release Information</b>                          | <p>Command introduced before Junos OS Release 7.4.</p> <p>Command introduced in Junos OS Release 9.0 for EX Series switches.</p> <p>Command introduced in Junos OS Release 11.3 for the QFX Series.</p> <p>Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.</p>                                                                                                                                          |
| <b>Description</b>                                  | Display Internet Group Management Protocol (IGMP) statistics.                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Options</b>                                      | <p><b>none</b>—Display IGMP statistics for all interfaces.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output.</p> <p><b>interface <i>interface-name</i></b>—(Optional) Display IGMP statistics about the specified interface only.</p> <p><b>logical-system (all   <i>logical-system-name</i>)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> |
| <b>Required Privilege Level</b>                     | view                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Related Documentation</b>                        | <ul style="list-style-type: none"> <li><a href="#">clear igmp statistics on page 698</a></li> </ul>                                                                                                                                                                                                                                                                                                                            |
| <b>List of Sample Output</b>                        | <a href="#">show igmp statistics on page 769</a><br><a href="#">show igmp statistics interface on page 770</a>                                                                                                                                                                                                                                                                                                                 |
| <b>Output Fields</b>                                | <p><a href="#">Table 64 on page 768</a> describes the output fields for the <b>show igmp statistics</b> command. Output fields are listed in the approximate order in which they appear.</p>                                                                                                                                                                                                                                   |

**Table 64: show igmp statistics Output Fields**

| Field Name             | Field Description                                                                          |
|------------------------|--------------------------------------------------------------------------------------------|
| IGMP packet statistics | Heading for IGMP packet statistics for all interfaces or for the specified interface name. |

Table 64: show igmp statistics Output Fields (*continued*)

| Field Name             | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IGMP Message type      | <p>Summary of IGMP statistics:</p> <ul style="list-style-type: none"> <li>• <b>Membership Query</b>—Number of membership queries sent and received.</li> <li>• <b>V1 Membership Report</b>—Number of version 1 membership reports sent and received.</li> <li>• <b>DVMRP</b>—Number of DVMRP messages sent or received.</li> <li>• <b>PIM V1</b>—Number of PIM version 1 messages sent or received.</li> <li>• <b>Cisco Trace</b>—Number of Cisco trace messages sent or received.</li> <li>• <b>V2 Membership Report</b>—Number of version 2 membership reports sent or received.</li> <li>• <b>Group Leave</b>—Number of group leave messages sent or received.</li> <li>• <b>Mtrace Response</b>—Number of Mtrace response messages sent or received.</li> <li>• <b>Mtrace Request</b>—Number of Mtrace request messages sent or received.</li> <li>• <b>Domain Wide Report</b>—Number of domain-wide reports sent or received.</li> <li>• <b>V3 Membership Report</b>—Number of version 3 membership reports sent or received.</li> <li>• <b>Other Unknown types</b>—Number of unknown message types received.</li> <li>• <b>IGMP v3 unsupported type</b>—Number of messages received with unknown and unsupported IGMP version 3 message types.</li> <li>• <b>IGMP v3 source required for SSM</b>—Number of IGMP version 3 messages received that contained no source.</li> <li>• <b>IGMP v3 mode not applicable for SSM</b>—Number of IGMP version 3 messages received that did not contain a mode applicable for source-specific multicast (SSM).</li> </ul> |
| Received               | Number of messages received.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Sent                   | Number of messages sent.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Rx errors              | Number of received packets that contained errors.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| IGMP Global Statistics | <p>Summary of IGMP statistics for all interfaces.</p> <ul style="list-style-type: none"> <li>• <b>Bad Length</b>—Number of messages received with length errors so severe that further classification could not occur.</li> <li>• <b>Bad Checksum</b>—Number of messages received with a bad IP checksum. No further classification was performed.</li> <li>• <b>Bad Receive If</b>—Number of messages received on an interface not enabled for IGMP.</li> <li>• <b>Rx non-local</b>—Number of messages received from senders that are not local.</li> <li>• <b>Timed out</b>—Number of groups that timed out as a result of not receiving an explicit leave message.</li> <li>• <b>Rejected Report</b>—Number of reports dropped because of the IGMP group policy.</li> <li>• <b>Total Interfaces</b>—Number of interfaces configured to support IGMP.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## Sample Output

### show igmp statistics

```

user@host> show igmp statistics
IGMP packet statistics for all interfaces
IGMP Message type Received Sent Rx errors
Membership Query 8883 459 0
V1 Membership Report 0 0 0

```

|                                     |      |   |   |
|-------------------------------------|------|---|---|
| DVMRP                               | 0    | 0 | 0 |
| PIM V1                              | 0    | 0 | 0 |
| Cisco Trace                         | 0    | 0 | 0 |
| V2 Membership Report                | 0    | 0 | 0 |
| Group Leave                         | 0    | 0 | 0 |
| Mtrace Response                     | 0    | 0 | 0 |
| Mtrace Request                      | 0    | 0 | 0 |
| Domain Wide Report                  | 0    | 0 | 0 |
| V3 Membership Report                | 0    | 0 | 0 |
| Other Unknown types                 |      |   | 0 |
| IGMP v3 unsupported type            |      |   | 0 |
| IGMP v3 source required for SSM     |      |   | 0 |
| IGMP v3 mode not applicable for SSM |      |   | 0 |
| IGMP Global Statistics              |      |   |   |
| Bad Length                          | 0    |   |   |
| Bad Checksum                        | 0    |   |   |
| Bad Receive If                      | 0    |   |   |
| Rx non-local                        | 1227 |   |   |
| Timed out                           | 0    |   |   |
| Rejected Report                     | 0    |   |   |
| Total Interfaces                    | 2    |   |   |

#### show igmp statistics interface

```
user@host> show igmp statistics interface fe-1/0/1.0
IGMP interface packet statistics for fe-1/0/1.0
IGMP Message type Received Sent Rx errors
Membership Query 0 230 0
V1 Membership Report 0 0 0
```

## show interfaces targeting (Aggregated Ethernet for Subscriber Management)

|                                 |                                                                                                                                                                        |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show interfaces targeting aex                                                                                                                                          |
| <b>Release Information</b>      | Command introduced in Junos OS Release 11.2.                                                                                                                           |
| <b>Description</b>              | (MX Series routers only) Display status information about the distribution of subscribers on different links in an aggregated Ethernet bundle.                         |
| <b>Required Privilege Level</b> | view                                                                                                                                                                   |
| <b>Output Fields</b>            | Table 65 on page 771 lists the output fields for the <b>show interfaces targeting</b> command. Output fields are listed in the approximate order in which they appear. |

Table 65: show interfaces targeting Output Fields

| Field Name                                    | Field Description                                                                              | Level of Output |
|-----------------------------------------------|------------------------------------------------------------------------------------------------|-----------------|
| <b>Aggregated Ethernet Interface</b>          |                                                                                                |                 |
| <b>Aggregated interface</b>                   | Name of the aggregated Ethernet bundle.                                                        | All levels      |
| <b>Redundancy mode</b>                        | Redundancy mechanism on the interface: <b>Link Level Redundancy</b> or <b>FPC Redundancy</b> . | All levels      |
| <b>Total number of distributed interfaces</b> | Number of distributed links in the bundle.                                                     | All levels      |
| <b>Physical Interface</b>                     |                                                                                                |                 |
| <b>Physical interface</b>                     | Name of the physical interface and state of the interface.                                     | All levels      |
| <b>Link status</b>                            | Status of the link on the physical interface: <b>up</b> or <b>down</b> .                       |                 |
| <b>Number of primary distributions</b>        | Number of subscribers distributed on primary links.                                            | All levels      |
| <b>Number of backup distributions</b>         | Number of subscribers distributed on backup links.                                             | All levels      |

### Sample Output

#### show interfaces targeting ae0

```

user@host> show interfaces targeting ae0
Aggregated interface: ae0
Redundancy mode: Link Level Redundancy
Total number of distributed interfaces: 3
Physical interface: ge-1/0/0, Link status: Up
Number of primary distributions: 200
Number of backup distributions: 200

```

Physical interface: ge-1/1/0, Link status: Up  
Number of primary distributions: 200  
Number of backup distributions: 199  
Physical interface: ge-2/0/7, Link status: Up  
Number of primary distributions: 200  
Number of backup distributions: 200  
Physical interface: ge-2/0/8, Link status: Up  
Number of primary distributions: 199  
Number of backup distributions: 200



## show mld group

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show mld group<br><brief   detail><br><group-name><br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                                                                                                                                                                                              |
| <b>Release Information</b>      | Command introduced before Junos OS Release 7.4.                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b>              | Display information about Multicast Listener Discovery (MLD) group membership.                                                                                                                                                                                                                                                                                                                          |
| <b>Options</b>                  | <p><b>none</b>—Display standard information about all MLD groups.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output.</p> <p><b>group-name</b>—(Optional) Display MLD information about the specified group.</p> <p><b>logical-system (all   <i>logical-system-name</i>)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li><a href="#">clear mld membership on page 700</a></li> </ul>                                                                                                                                                                                                                                                                                                      |
| <b>List of Sample Output</b>    | <p><a href="#">show mld group (Include Mode) on page 774</a></p> <p><a href="#">show mld group (Exclude Mode) on page 775</a></p> <p><a href="#">show mld group brief on page 775</a></p> <p><a href="#">show mld group detail (Include Mode) on page 775</a></p> <p><a href="#">show mld group detail (Exclude Mode) on page 776</a></p>                                                               |
| <b>Output Fields</b>            | <a href="#">Table 66 on page 773</a> describes the output fields for the <b>show mld group</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                                                                                                         |

**Table 66: show mld group Output Fields**

| Field Name              | Field Description                                                                                                                | Level of Output |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Interface</b>        | Name of the interface that received the MLD membership report; <b>local</b> means that the local router joined the group itself. | All levels      |
| <b>Group</b>            | Group address.                                                                                                                   | All levels      |
| <b>Source</b>           | Source address.                                                                                                                  | All levels      |
| <b>Group Mode</b>       | Mode the SSM group is operating in: <b>Include</b> or <b>Exclude</b> .                                                           | All levels      |
| <b>Last reported by</b> | Address of the host that last reported membership in this group.                                                                 | All levels      |

Table 66: show mld group Output Fields (*continued*)

| Field Name     | Field Description                                                                                                                                                                                                         | Level of Output |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Source timeout | Time remaining until the group traffic is no longer forwarded. The timer is refreshed when a listener in include mode sends a report. A group in exclude mode or configured as a static group displays a zero timer.      | detail          |
| Timeout        | Time remaining until the group membership is removed.                                                                                                                                                                     | brief none      |
| Group timeout  | Time remaining until a group in exclude mode moves to include mode. The timer is refreshed when a listener in exclude mode sends a report. A group in include mode or configured as a static group displays a zero timer. | detail          |
| Type           | Type of group membership: <ul style="list-style-type: none"> <li>• <b>Dynamic</b>—Host reported the membership.</li> <li>• <b>Static</b>—Membership is configured.</li> </ul>                                             | All levels      |

## Sample Output

### show mld group (Include Mode)

```

user@host> show mld group
Interface: fe-0/1/2.0
 Group: ff02::1:ff05:1a67
 Group mode: Include
 Source: ::
 Last reported by: fe80::2e0:81ff:fe05:1a67
 Timeout: 245 Type: Dynamic
 Group: ff02::1:ffa8:c35e
 Group mode: Include
 Source: ::
 Last reported by: fe80::2e0:81ff:fe05:1a67
 Timeout: 241 Type: Dynamic
 Group: ff02::2:43e:d7f6
 Group mode: Include
 Source: ::
 Last reported by: fe80::2e0:81ff:fe05:1a67
 Timeout: 244 Type: Dynamic
 Group: ff05::2
 Group mode: Include
 Source: ::
 Last reported by: fe80::2e0:81ff:fe05:1a67
 Timeout: 244 Type: Dynamic
Interface: local
 Group: ff02::2
 Source: ::
 Last reported by: Local
 Timeout: 0 Type: Dynamic
 Group: ff02::16
 Source: ::
 Last reported by: Local
 Timeout: 0 Type: Dynamic

```

### show mld group (Exclude Mode)

```

user@host> show mld group
Interface: ge-0/2/2.0
Interface: ge-0/2/0.0
 Group: ff02::6
 Source: ::
 Last reported by: fe80::21f:12ff:feb6:4b3a
 Timeout: 245 Type: Dynamic
 Group: ff02::16
 Source: ::
 Last reported by: fe80::21f:12ff:feb6:4b3a
 Timeout: 28 Type: Dynamic
Interface: local
 Group: ff02::2
 Source: ::
 Last reported by: Local
 Timeout: 0 Type: Dynamic
 Group: ff02::16
 Source: ::
 Last reported by: Local
 Timeout: 0 Type: Dynamic

```

### show mld group brief

The output for the **show mld group brief** command is identical to that for the **show mld group** command. For sample output, see [show mld group \(Include Mode\) on page 774](#) and [show mld group \(Exclude Mode\) on page 775](#).

### show mld group detail (Include Mode)

```

user@host> show mld group detail
Interface: fe-0/1/2.0
 Group: ff02::1:ff05:1a67
 Group mode: Include
 Source: ::
 Last reported by: fe80::2e0:81ff:fe05:1a67
 Timeout: 224 Type: Dynamic
 Group: ff02::1:ffa8:c35e
 Group mode: Include
 Source: ::
 Last reported by: fe80::2e0:81ff:fe05:1a67
 Timeout: 220 Type: Dynamic
 Group: ff02::2:43e:d7f6
 Group mode: Include
 Source: ::
 Last reported by: fe80::2e0:81ff:fe05:1a67
 Timeout: 223 Type: Dynamic
 Group: ff05::2
 Group mode: Include
 Source: ::
 Last reported by: fe80::2e0:81ff:fe05:1a67
 Timeout: 223 Type: Dynamic
Interface: so-1/0/1.0
 Group: ff02::2
 Group mode: Include
 Source: ::
 Last reported by: fe80::280:42ff:fe15:f445
 Timeout: 258 Type: Dynamic
Interface: local

```

```
Group: ff02::2
 Group mode: Include
 Source: ::
 Last reported by: Local
 Timeout: 0 Type: Dynamic
Group: ff02::16
 Source: ::
 Last reported by: Local
 Timeout: 0 Type: Dynamic
```

#### show mld group detail (Exclude Mode)

```
user@host> show mld group detail
Interface: ge-0/2/2.0
Interface: ge-0/2/0.0
 Group: ff02::6
 Group mode: Exclude
 Source: ::
 Source timeout: 0
 Last reported by: fe80::21f:12ff:feb6:4b3a
 Group timeout: 226 Type: Dynamic
 Group: ff02::16
 Group mode: Exclude
 Source: ::
 Source timeout: 0
 Last reported by: fe80::21f:12ff:feb6:4b3a
 Group timeout: 246 Type: Dynamic
Interface: local
 Group: ff02::2
 Group mode: Exclude
 Source: ::
 Source timeout: 0
 Last reported by: Local
 Group timeout: 0 Type: Dynamic
 Group: ff02::16
 Group mode: Exclude
 Source: ::
 Source timeout: 0
 Last reported by: Local
 Group timeout: 0 Type: Dynamic
```

## show mld interface

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show mld interface<br><brief   detail><br><interface-name><br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | Command introduced before Junos OS Release 7.4.                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b>              | Display information about Multicast Listener Discovery (MLD)-enabled interfaces.                                                                                                                                                                                                                                                                                                                                        |
| <b>Options</b>                  | <p><b>none</b>—Display standard information about all MLD-enabled interfaces.</p> <p><b>brief   detail</b>—(Optional) Display the specified level of output.</p> <p><b>interface-name</b>—(Optional) Display information about the specified interface.</p> <p><b>logical-system (all   <i>logical-system-name</i>)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li><a href="#">clear mld membership on page 700</a></li> </ul>                                                                                                                                                                                                                                                                                                                      |
| <b>List of Sample Output</b>    | <a href="#">show mld interface on page 779</a><br><a href="#">show mld interface brief on page 779</a><br><a href="#">show mld interface detail on page 780</a><br><a href="#">show mld interface &lt;interface-name&gt; on page 780</a>                                                                                                                                                                                |
| <b>Output Fields</b>            | <p><a href="#">Table 67 on page 777</a> describes the output fields for the <b>show mld interface</b> command. Output fields are listed in the approximate order in which they appear.</p>                                                                                                                                                                                                                              |

**Table 67: show mld interface Output Fields**

| Field Name            | Field Description                                                                              | Level of Output |
|-----------------------|------------------------------------------------------------------------------------------------|-----------------|
| <b>Interface</b>      | Name of the interface.                                                                         | All levels      |
| <b>Querier</b>        | Address of the router that has been elected to send membership queries.                        | All levels      |
| <b>State</b>          | State of the interface: <b>Up</b> or <b>Down</b> .                                             | All levels      |
| <b>SSM Map Policy</b> | Name of the source-specific multicast (SSM) map policy that has been applied to the interface. | All levels      |
| <b>SSM Map Policy</b> | Name of the source-specific multicast (SSM) map policy at the MLD interface.                   | All levels      |
| <b>Timeout</b>        | How long until the MLD querier is declared to be unreachable, in seconds.                      | All levels      |
| <b>Version</b>        | MLD version being used on the interface: 1 or 2.                                               | All levels      |

Table 67: show mld interface Output Fields (*continued*)

| Field Name                | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Level of Output |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Groups</b>             | Number of groups on the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | All levels      |
| <b>Passive</b>            | <p>State of the passive mode option:</p> <ul style="list-style-type: none"> <li>• <b>On</b>—Indicates that the router can run IGMP or MLD on the interface but not send or receive control traffic such as IGMP or MLD reports, queries, and leaves.</li> <li>• <b>Off</b>—Indicates that the router can run IGMP or MLD on the interface and send or receive control traffic such as IGMP or MLD reports, queries, and leaves.</li> </ul> <p>The <b>passive</b> statement enables you to selectively activate up to two out of a possible three available query or control traffic options. When enabled, the following options appear after the <b>on</b> state declaration:</p> <ul style="list-style-type: none"> <li>• <b>send-general-query</b>—The interface sends general queries.</li> <li>• <b>send-group-query</b>—The interface sends group-specific and group-source-specific queries.</li> <li>• <b>allow-receive</b>—The interface receives control traffic</li> </ul> | All levels      |
| <b>OIF map</b>            | Name of the OIF map associated to the interface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | All levels      |
| <b>SSM map</b>            | Name of the source-specific multicast (SSM) map used on the interface, if configured.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | All levels      |
| <b>Group limit</b>        | Maximum number of groups allowed on the interface. Any memberships requested after the limit is reached are rejected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | All levels      |
| <b>Group threshold</b>    | <p>Configured threshold at which a warning message is generated.</p> <p>This threshold is based on a percentage of groups received on the interface. If the number of groups received reaches the configured threshold, the device generates a warning message.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | All levels      |
| <b>Group log-interval</b> | Time (in seconds) between consecutive log messages.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | All levels      |
| <b>Immediate Leave</b>    | <p>State of the immediate leave option:</p> <ul style="list-style-type: none"> <li>• <b>On</b>—Indicates that the router removes a host from the multicast group as soon as the router receives a multicast listener done message from a host associated with the interface.</li> <li>• <b>Off</b>—Indicates that after receiving a multicast listener done message, instead of removing a host from the multicast group immediately, the router sends a group query to determine if another receiver responds.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                            | All levels      |

Table 67: show mld interface Output Fields (*continued*)

| Field Name                   | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Level of Output |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>Configured Parameters</b> | <p>Information configured by the user.</p> <ul style="list-style-type: none"> <li>• <b>MLD Query Interval (.1 secs)</b>—Interval at which this router sends membership queries when it is the querier.</li> <li>• <b>MLD Query Response Interval (.1 secs)</b>—Time that the router waits for a report in response to a general query.</li> <li>• <b>MLD Last Member Query Interval (.1 secs)</b>—Time that the router waits for a report in response to a group-specific query.</li> <li>• <b>MLD Robustness Count</b>—Number of times the router retries a query.</li> </ul> | All levels      |
| <b>Derived Parameters</b>    | <p>Derived information.</p> <ul style="list-style-type: none"> <li>• <b>MLD Membership Timeout (.1 secs)</b>—Timeout period for group membership. If no report is received for these groups before the timeout expires, the group membership will be removed.</li> <li>• <b>MLD Other Querier Present Timeout (.1 secs)</b>—Time that the router waits for the IGMP querier to send a query.</li> </ul>                                                                                                                                                                        | All levels      |

## Sample Output

### show mld interface

```

user@host> show mld interface
Interface: fe-0/0/0
 Querier: None
 State: Up Timeout: 0 Version: 1 Groups: 0
 SSM Map Policy: ssm-policy-A
Interface: at-0/3/1.0
 Querier: 8038::c0a8:c345
 State: Up Timeout: None Version: 1 Groups: 0
 SSM Map Policy: ssm-policy-B
Interface: fe-1/0/1.0
 Querier: ::192.168.195.73
 State: Up Timeout: None Version: 1 Groups: 3
 SSM Map Policy: ssm-policy-C
 SSM map: ipv6map1
Immediate Leave: On

Configured Parameters:
MLD Query Interval (.1 secs): 1250
MLD Query Response Interval (.1 secs): 100
MLD Last Member Query Interval (.1 secs): 10
MLD Robustness Count: 2

Derived Parameters:
MLD Membership Timeout (.1secs): 2600
MLD Other Querier Present Timeout (.1 secs): 2550

```

### show mld interface brief

The output for the **show mld interface brief** command is identical to that for the **show mld interface** command. For sample output, see [show mld interface on page 779](#).

### show mld interface detail

The output for the **show mld interface detail** command is identical to that for the **show mld interface** command. For sample output, see [show mld interface on page 779](#).

### show mld interface <interface-name>

```
user@host# show mld interface ge-3/2/0.0
Interface: ge-3/2/0.0
Querier: 20.1.1.1
State: Up Timeout: None Version: 3 Groups: 1
Group limit: 8
Group threshold: 60
Group log-interval: 10
Immediate leave: Off
Promiscuous mode: Off
```



## show mld statistics

|                                 |                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show mld statistics<br><interface <i>interface-name</i> ><br><logical-system (all   <i>logical-system-name</i> )>                                                                                                                                                                                                                    |
| <b>Release Information</b>      | Command introduced before Junos OS Release 7.4.                                                                                                                                                                                                                                                                                      |
| <b>Description</b>              | Display information about Multicast Listener Discovery (MLD) statistics.                                                                                                                                                                                                                                                             |
| <b>Options</b>                  | <p><b>none</b>—Display MLD statistics for all interfaces.</p> <p><b>interface <i>interface-name</i></b>—(Optional) Display statistics about the specified interface.</p> <p><b>logical-system (all   <i>logical-system-name</i>)</b>—(Optional) Perform this operation on all logical systems or on a particular logical system.</p> |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                 |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"> <li>• <a href="#">clear mld statistics on page 701</a></li> </ul>                                                                                                                                                                                                                                 |
| <b>List of Sample Output</b>    | <a href="#">show mld statistics on page 782</a><br><a href="#">show mld statistics interface on page 783</a>                                                                                                                                                                                                                         |
| <b>Output Fields</b>            | <p><a href="#">Table 68 on page 781</a> describes the output fields for the <b>show mld statistics</b> command. Output fields are listed in the approximate order in which they appear.</p>                                                                                                                                          |

**Table 68: show mld statistics Output Fields**

| Field Name | Field Description                                 |
|------------|---------------------------------------------------|
| Received   | Number of received packets.                       |
| Sent       | Number of transmitted packets.                    |
| Rx errors  | Number of received packets that contained errors. |

Table 68: show mld statistics Output Fields (*continued*)

| Field Name                   | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MLD Message type</b>      | Summary of MLD statistics. <ul style="list-style-type: none"> <li>• <b>Listener Query (v1/v2)</b>—Number of membership queries sent and received.</li> <li>• <b>Listener Report (v1)</b>—Number of version 1 membership reports sent and received.</li> <li>• <b>Listener Done (v1/v2)</b>—Number of Listener Done messages sent and received.</li> <li>• <b>Listener Report (v2)</b>—Number of version 2 membership reports sent and received.</li> <li>• <b>Other Unknown types</b>—Number of unknown message types received.</li> <li>• <b>MLD v2 source required for SSM</b>—Number of MLD version 2 messages received that contained no source.</li> <li>• <b>MLD v2 mode not applicable for SSM</b>—Number of MLD version 2 messages received that did not contain a mode applicable for source-specific multicast (SSM).</li> </ul>          |
| <b>MLD Global Statistics</b> | Summary of MLD statistics for all interfaces. <ul style="list-style-type: none"> <li>• <b>Bad Length</b>—Number of messages received with length errors so severe that further classification could not occur.</li> <li>• <b>Bad Checksum</b>—Number of messages received with an invalid IP checksum. No further classification was performed.</li> <li>• <b>Bad Receive If</b>—Number of messages received on an interface not enabled for MLD.</li> <li>• <b>Rx non-local</b>—Number of messages received from nonlocal senders.</li> <li>• <b>Timed out</b>—Number of groups that timed out as a result of not receiving an explicit leave message.</li> <li>• <b>Rejected Report</b>—Number of reports dropped because of the MLD group policy.</li> <li>• <b>Total Interfaces</b>—Number of interfaces configured to support IGMP.</li> </ul> |

## Sample Output

### show mld statistics

```

user@host> show mld statistics
MLD packet statistics for all interfaces
MLD Message type Received Sent Rx errors
Listener Query (v1/v2) 0 2 0
Listener Report (v1) 0 0 0
Listener Done (v1/v2) 0 0 0
Listener Report (v2) 0 0 0
Other Unknown types 0 0 0
MLD v2 source required for SSM 2
MLD v2 mode not applicable for SSM 0

MLD Global Statistics
Bad Length 0
Bad Checksum 0
Bad Receive If 0
Rx non-local 0
Timed out 0

```

|                  |   |
|------------------|---|
| Rejected Report  | 0 |
| Total Interfaces | 2 |

#### show mld statistics interface

```
user@host> show mld statistics interface fe-1/0/1.0
MLD interface packet statistics for fe-1/0/1.0
MLD Message type Received Sent Rx errors
Listener Query (v1/v2) 0 2 0
Listener Report (v1) 0 0 0
Listener Done (v1/v2) 0 0 0
Listener Report (v2) 0 0 0
Other Unknown types 0
MLD v2 source required for SSM 2
MLD v2 mode not applicable for SSM 0

MLD Global Statistics
Bad Length 0
Bad Checksum 0
Bad Receive If 0
Rx non-local 0
Timed out 0
Rejected Report 0
Total Interfaces 2
```

## show services captive-portal-content-delivery

---

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | <code>show services captive-portal-content-delivery</code><br><code>&lt;pic <i>pic-name</i>&gt;</code><br><code>&lt;profile <i>profile-name</i>&gt;</code><br><code>&lt;rule <i>rule-name</i>&gt; &lt;term <i>term-name</i>&gt;</code><br><code>&lt;ruleset <i>ruleset-name</i>&gt;</code><br><code>&lt;sset <i>sset-name</i>&gt; &lt;brief&gt; &lt;detail&gt; &lt;summary&gt;</code><br><code>&lt;statistics&gt; &lt;interface <i>pic-name</i>&gt;</code>                                                                                                                                                                                                                                      |
| <b>Release Information</b>      | Command introduced in Junos OS Release 10.4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>              | Display the current operational state of all captive portal interfaces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Options</b>                  | <b>brief</b> —(Optional) Display brief service set database information.<br><br><b>detail</b> —(Optional) Display detailed service set database information.<br><br><b>pic</b> —Display the PIC database.<br><br><b>profile</b> —Display the profile database.<br><br><b>rule</b> —Display the rule database.<br><br><b>ruleset</b> —Display the rule set database.<br><br><b>sset</b> —Display the service set database.<br><br><b>statistics</b> —Display captive portal and content delivery statistics about a PIC.<br><br><b>summary</b> —(Optional) Display a summary of service set database information.<br><br><b>term</b> —(Optional) Display term information for the rule database. |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Related Documentation</b>    | <ul style="list-style-type: none"><li>• <a href="#">clear services captive-portal-content-delivery statistics on page 702</a></li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>List of Sample Output</b>    | <a href="#">show services captive-portal-content-delivery on page 784</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

### Sample Output

#### show services captive-portal-content-delivery

```
user@host> show services captive-portal-content-delivery pic ms-5/0/0
Name Index
ms-5/0/0 20

user@host> show services captive-portal-content-delivery profile
Profile Rules or Rule Sets
http-redirect 1
ipda-rewrite 1
```

```

user@host> show services captive-portal-content-delivery http-redirect
Profile Rules or Rule Sets
http-redirect 1

```

```

user@host> show services captive-portal-content-delivery rule
Rule Name Term Name
redirect t2
rewrite t1

```

```

user@host> show services captive-portal-content-delivery profile ipda-rewrite
Profile Rules or Rule Sets
ipda-rewrite 1

```

```

user@host> show services captive-portal-content-delivery rule redirect
Rule Name Term Name
redirect t2

```

```

user@host> show services captive-portal-content-delivery rule rewrite
Rule Name Term Name
rewrite t1

```

```

user@host> show services captive-portal-content-delivery rule rewrite term t1
Rule name: rewrite
Rule match direction: input-output
Term name: t1
Term action: rewrite
Term action option: null

```

```

user@host> show services captive-portal-content-delivery rule redirect term t2
Rule name: redirect
Rule match direction: input
Term name: t2
Term action: redirect
Term action option: http://www.google.net

```

```

user@host> show services captive-portal-content-delivery sset sset1 detail
Service Set Id Profile Compiled Rules
sset1 1 ipda-rewrite 1

```

```

user@host> show services captive-portal-content-delivery statistics interface ms-5/0/0
service-set interface: ms-5/0/0

```

```

Packets received Packets altered
5 3

```

## show services service-sets summary

|                                 |                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Syntax</b>                   | show services service-sets summary<br><interface <i>interface-name</i> >                                                                                                                                                                                                                                                                                          |
| <b>Release Information</b>      | Command introduced before Junos OS Release 7.4.                                                                                                                                                                                                                                                                                                                   |
| <b>Description</b>              | Display service set summary information.                                                                                                                                                                                                                                                                                                                          |
| <b>Options</b>                  | <p><b>none</b>—Display service set summary information for all adaptive services interfaces.</p> <p><b>interface <i>interface-name</i></b>—(Optional) Display service set summary information for a particular interface. On M Series and T Series routers, <i>interface-name</i> can be <i>ms-fpc/pic/port</i>, <i>sp-fpc/pic/port</i>, or <i>rspnumber</i>.</p> |
| <b>Required Privilege Level</b> | view                                                                                                                                                                                                                                                                                                                                                              |
| <b>List of Sample Output</b>    | <a href="#">show services service-sets summary on page 786</a><br><a href="#">show services service-sets summary interface on page 787</a>                                                                                                                                                                                                                        |
| <b>Output Fields</b>            | Table 69 on page 786 lists the output fields for the <b>show services service-sets summary</b> command. Output fields are listed in the approximate order in which they appear.                                                                                                                                                                                   |

Table 69: show services service-sets summary Output Fields

| Field Name                     | Field Description                                                                                                                                                                                                                          |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Interface</b>               | Name of an adaptive services interface                                                                                                                                                                                                     |
| <b>Service type</b>            | Type of adaptive service, such as stateful firewall (SFW), Network Address Translation (NAT), intrusion detection service (IDS), Layer 2 Tunneling Protocol (L2TP), Compressed Real-Time Transport Protocol (CRTP), or IP Security (IPsec) |
| <b>Service sets configured</b> | Total number of service sets configured on the PIC that use internal service set IDs and do not consume external service sets, including CRTP and L2TP                                                                                     |
| <b>Bytes used</b>              | Bytes used by a particular service or all services                                                                                                                                                                                         |
| <b>Policy bytes used</b>       | Policy bytes used by a particular service or all services                                                                                                                                                                                  |
| <b>CPU utilization</b>         | Percentage of the CPU resources being used                                                                                                                                                                                                 |

## Sample Output

### show services service-sets summary

```

user@host> show services service-sets summary
Service sets
Interface configured Bytes used Policy bytes used CPU
utilization

```

|          |   |                    |                  |     |
|----------|---|--------------------|------------------|-----|
| ms-4/0/0 | 1 | 14821556 ( 4.53 %) | 855124 ( 0.40 %) | N/A |
| ms-4/1/0 | 1 | 14691700 ( 4.49 %) | 855068 ( 0.40 %) | N/A |

#### show services service-sets summary interface

```
user@host> show services service-sets summary interface sp-1/3/0
Interface: sp-1/3/0
```

| Service type | Service sets<br>configured | Bytes used       | CPU<br>utilization |
|--------------|----------------------------|------------------|--------------------|
| SFW/NAT/IDS  | 1                          | 54 ( 0.00 %)     | N/A                |
| L2TP         | 1                          | 58 ( 0.00 %)     | N/A                |
| C RTP        | 1                          | 58 ( 0.00 %)     | N/A                |
| System       | 0                          | 920831 ( 0.44 %) | N/A                |
| Idle         | 0                          | 0 ( 0.00 %)      | N/A                |
| Total        | 3                          | 921001 ( 0.44 %) | N/A                |

## show subscribers

---

**Syntax**    `show subscribers`  
              `<detail | extensive | terse>`  
              `<aci-interface-set-name aci-interface-set-name>`  
              `<address address>`  
              `<agent-circuit-identifier agent-circuit-identifier-substring>`  
              `<client-type client-type>`  
              `<count>`  
              `<id>`  
              `<interface interface>`  
              `<logical-system logical-system>`  
              `<mac-address mac-address>`  
              `<physical-interface physical-interface-name>`  
              `<profile-name profile-name>`  
              `<routing-instance routing-instance>`  
              `<stacked-vlan-id stacked-vlan-id>`  
              `<subscriber-state subscriber-state>`  
              `<user-name user-name>`  
              `<vci vci-identifier>`  
              `<vpi vpi-identifier>`  
              `<vlan-id vlan-id>`

**Release Information**    Command introduced in Junos OS Release 9.3.  
                              Command introduced in Junos OS Release 9.3 for EX Series switches.  
                              **client-type**, **mac-address**, **subscriber-state**, and **extensive** options introduced in Junos OS Release 10.2.  
                              **count** option usage with other options introduced in Junos OS Release 10.2.  
                              Command introduced in Junos OS Release 11.1 for the QFX Series.  
                              Options **aci-interface-set-name** and **agent-circuit-identifier** introduced in Junos OS Release 12.2.  
                              The **physical-interface** and **user-name** options introduced in Junos OS Release 12.3.  
                              Options **vci** and **vpi** introduced in Junos OS Release 12.3R3 and supported in later 12.3Rx releases.  
                              Options **vci** and **vpi** supported in Junos OS Release 13.2 and later releases. (Not supported in Junos OS Release 13.1.)  
                              Command introduced in Junos OS Release 14.1X53-D20 for the OCX Series.

**Description**    Display information for active subscribers.

**Options**    **detail | extensive | terse**—(Optional) Display the specified level of output.

**aci-interface-set-name**—(Optional) Display all dynamic subscriber sessions that use the specified agent circuit identifier (ACI) interface set. Use the ACI interface set name generated by the router, such as `aci-1003-ge-1/0/0.4001`, and not the actual ACI value found in the DHCP or PPPoE control packets.

**address**—(Optional) Display subscribers whose IP address matches the specified address. You must specify the IPv4 or IPv6 address prefix without a netmask (for example, `192.168.17.1`). If you specify the IP address as a prefix with a netmask (for example,



192.168.17.1/32), the router displays a message that the IP address is invalid, and rejects the command.

***agent-circuit-identifier-substring***—(Optional) Display all dynamic subscriber sessions whose ACI value matches the specified substring.

***client-type***—(Optional) Display subscribers whose client type matches the specified client type (DHCP, L2TP, PPP, PPPOE, VLAN, or static).

***count***—(Optional) Display the count of total subscribers and active subscribers for any specified option. You can use the ***count*** option alone or with the ***address***, ***client-type***, ***interface***, ***logical-system***, ***mac-address***, ***profile-name***, ***routing-instance***, ***stacked-vlan-id***, ***subscriber-state***, or ***vlan-id*** options.

***id***—(Optional) Display a specific subscriber session whose session id matches the specified subscriber ID. You can display subscriber IDs by using the ***show subscribers extensive*** or the ***show subscribers interface extensive*** commands.

***interface***—(Optional) Display subscribers whose interface matches the specified interface.

***logical-system***—(Optional) Display subscribers whose logical system matches the specified logical system.

***mac-address***—(Optional) Display subscribers whose MAC address matches the specified MAC address.

***physical-interface-name***—(M120, M320, and MX Series routers only) (Optional) Display subscribers whose physical interface matches the specified physical interface.

***profile-name***—(Optional) Display subscribers whose dynamic profile matches the specified profile name.

***routing-instance***—(Optional) Display subscribers whose routing instance matches the specified routing instance.

***stacked-vlan-id***—(Optional) Display subscribers whose stacked VLAN ID matches the specified stacked VLAN ID.

***subscriber-state***—(Optional) Display subscribers whose subscriber state matches the specified subscriber state (ACTIVE, CONFIGURED, INIT, TERMINATED, or TERMINATING).

***user-name***—(M120, M320, and MX Series routers only) (Optional) Display subscribers whose username matches the specified subscriber name.

***vci-identifier***—(MX Series routers with MPCs and ATM MICs with SFP only) (Optional) Display active ATM subscribers whose ATM virtual circuit identifier (VCI) matches the specified VCI identifier. The range of values is **0** through **255**.

***vpi-identifier***—(MX Series routers with MPCs and ATM MICs with SFP only) (Optional) Display active ATM subscribers whose ATM virtual path identifier (VPI) matches the specified VPI identifier. The range of values is **0** through **65535**.

**vlan-id**—(Optional) Display subscribers whose VLAN ID matches the specified VLAN ID, regardless of whether the subscriber uses a single-tagged or double-tagged VLAN. For subscribers using a double-tagged VLAN, this option displays subscribers where the inner VLAN tag matches the specified VLAN ID. To display only subscribers where the specified value matches only double-tagged VLANs, use the **stacked-vlan-id** **stacked-vlan-id** option to match the outer VLAN tag.



**NOTE:** Due to display limitations, logical system and routing instance output values are truncated when necessary.

**Required Privilege Level** view

**Related Documentation**

- [show subscribers summary on page 806](#)
- *Verifying and Managing Agent Circuit Identifier-Based Dynamic VLAN Configuration*

**List of Sample Output**

- [show subscribers \(IPv4\) on page 794](#)
- [show subscribers \(IPv6\) on page 794](#)
- [show subscribers \(IPv4 and IPv6 Dual Stack\) on page 794](#)
- [show subscribers \(LNS on MX Series Routers\) on page 795](#)
- [show subscribers \(L2TP Switched Tunnels\) on page 795](#)
- [show subscribers client-type dhcp detail on page 795](#)
- [show subscribers count on page 795](#)
- [show subscribers address detail \(IPv6\) on page 796](#)
- [show subscribers detail \(IPv4\) on page 796](#)
- [show subscribers detail \(IPv6\) on page 796](#)
- [show subscribers detail \(IPv6 Static Demux Interface\) on page 797](#)
- [show subscribers detail \(L2TP LNS Subscribers on MX Series Routers\) on page 797](#)
- [show subscribers detail \(L2TP Switched Tunnels\) on page 797](#)
- [show subscribers detail \(Tunneled Subscriber\) on page 798](#)
- [show subscribers detail \(IPv4 and IPv6 Dual Stack\) on page 798](#)
- [show subscribers detail \(ACI Interface Set Session\) on page 799](#)
- [show subscribers detail \(PPPoE Subscriber Session with ACI Interface Set\) on page 799](#)
- [show subscribers extensive on page 799](#)
- [show subscribers extensive \(RPF Check Fail Filter\) on page 800](#)
- [show subscribers extensive \(L2TP LNS Subscribers on MX Series Routers\) on page 800](#)
- [show subscribers extensive \(IPv4 and IPv6 Dual Stack\) on page 800](#)
- [show subscribers extensive \(Effective Shaping-Rate\) on page 801](#)
- [show subscribers aci-interface-set-name detail \(Subscriber Sessions Using Specified ACI Interface Set\) on page 802](#)
- [show subscribers agent-circuit-identifier detail \(Subscriber Sessions Using Specified ACI Substring\) on page 802](#)
- [show subscribers interface extensive on page 803](#)
- [show subscribers logical-system terse on page 803](#)
- [show subscribers physical-interface count on page 804](#)
- [show subscribers routing-instance inst1 count on page 804](#)

[show subscribers stacked-vlan-id detail on page 804](#)  
[show subscribers stacked-vlan-id vlan-id detail \(Combined Output\) on page 804](#)  
[show subscribers stacked-vlan-id vlan-id interface detail \(Combined Output for a Specific Interface\) on page 804](#)  
[show subscribers user-name detail on page 804](#)  
[show subscribers vlan-id on page 805](#)  
[show subscribers vlan-id detail on page 805](#)  
[show subscribers vpi vci extensive \(PPPoE-over-ATM Subscriber Session\) on page 805](#)

**Output Fields** Table 70 on page 791 lists the output fields for the **show subscribers** command. Output fields are listed in the approximate order in which they appear.

**Table 70: show subscribers Output Fields**

| Field Name                    | Field Description                                                                                                                                                                                                                                   |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Interface</b>              | Interface associated with the subscriber. The router or switch displays subscribers whose interface matches or begins with the specified interface.<br><br>The * character indicates a continuation of addresses for the same session.              |
| <b>IP Address/VLAN ID</b>     | Subscriber IP address or VLAN ID associated with the subscriber in the form <i>tpid.vlan-id</i><br><br>No IP address or VLAN ID is assigned to an L2TP tunnel-switched session. For these subscriber sessions the value is <b>Tunnel-switched</b> . |
| <b>User Name</b>              | Name of subscriber.                                                                                                                                                                                                                                 |
| <b>LS:RI</b>                  | Logical system and routing instance associated with the subscriber.                                                                                                                                                                                 |
| <b>Type</b>                   | Subscriber client type (DHCP, L2TP, PPP, PPPoE, STATIC-INTERFACE, VLAN).                                                                                                                                                                            |
| <b>IP Address</b>             | Subscriber IPv4 address.                                                                                                                                                                                                                            |
| <b>IP Netmask</b>             | Subscriber IP netmask.                                                                                                                                                                                                                              |
| <b>Primary DNS Address</b>    | IP address of primary DNS server.                                                                                                                                                                                                                   |
| <b>Secondary DNS Address</b>  | IP address of secondary DNS server.                                                                                                                                                                                                                 |
| <b>Primary WINS Address</b>   | IP address of primary WINS server.                                                                                                                                                                                                                  |
| <b>Secondary WINS Address</b> | IP address of secondary WINS server.                                                                                                                                                                                                                |
| <b>IPv6 Address</b>           | Subscriber IPv6 address, or multiple addresses.                                                                                                                                                                                                     |
| <b>IPv6 Prefix</b>            | Subscriber IPv6 prefix. If you are using DHCPv6 prefix delegation, this is the delegated prefix.                                                                                                                                                    |
| <b>IPv6 User Prefix</b>       | IPv6 prefix obtained through ND/RA.                                                                                                                                                                                                                 |
| <b>IPv6 Address Pool</b>      | Subscriber IPv6 address pool. The IPv6 address pool is used to allocate IPv6 prefixes to the DHCPv6 clients.                                                                                                                                        |

Table 70: show subscribers Output Fields (*continued*)

| Field Name                 | Field Description                                                                                                                                                                                                                                                                   |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IPv6 Network Prefix Length | Length of the network portion of the IPv6 address.                                                                                                                                                                                                                                  |
| IPv6 Prefix Length         | Length of the subscriber IPv6 prefix.                                                                                                                                                                                                                                               |
| Logical System             | Logical system associated with the subscriber.                                                                                                                                                                                                                                      |
| Routing Instance           | Routing instance associated with the subscriber.                                                                                                                                                                                                                                    |
| Interface Type             | Whether the subscriber interface is <b>Static</b> or <b>Dynamic</b> .                                                                                                                                                                                                               |
| Interface Set              | Internally generated name of the dynamic ACI interface set used by the subscriber session.                                                                                                                                                                                          |
| Interface Set Type         | Interface type of the ACI interface set: <b>Dynamic</b> . This is the only ACI interface set type currently supported.                                                                                                                                                              |
| Interface Set Session ID   | Identifier of the dynamic ACI interface set entry in the session database.                                                                                                                                                                                                          |
| Underlying Interface       | Name of the underlying interface for the subscriber session.                                                                                                                                                                                                                        |
| Dynamic Profile Name       | Dynamic profile used for the subscriber.                                                                                                                                                                                                                                            |
| Dynamic Profile Version    | Version number of the dynamic profile used for the subscriber.                                                                                                                                                                                                                      |
| MAC Address                | MAC address associated with the subscriber.                                                                                                                                                                                                                                         |
| State                      | Current state of the subscriber session ( <b>Init</b> , <b>Configured</b> , <b>Active</b> , <b>Terminating</b> , <b>Tunneled</b> ).                                                                                                                                                 |
| L2TP State                 | Current state of the L2TP session, <b>Tunneled</b> or <b>Tunnel-switched</b> . When the value is <b>Tunnel-switched</b> , two entries are displayed for the subscriber; the first entry is at the LNS interface on the LTS and the second entry is at the LAC interface on the LTS. |
| Tunnel switch Profile Name | Name of the L2TP tunnel switch profile that initiates tunnel switching.                                                                                                                                                                                                             |
| Local IP Address           | IP address of the local gateway (LAC).                                                                                                                                                                                                                                              |
| Remote IP Address          | IP address of the remote peer (LNS).                                                                                                                                                                                                                                                |
| VLAN Id                    | VLAN ID associated with the subscriber in the form <i>tpid.vlan-id</i> .                                                                                                                                                                                                            |
| Stacked VLAN Id            | Stacked VLAN ID associated with the subscriber in the form <i>tpid.vlan-id</i> .                                                                                                                                                                                                    |
| RADIUS Accounting ID       | RADIUS accounting ID associated with the subscriber.                                                                                                                                                                                                                                |
| Agent Circuit ID           | Option 82 agent circuit ID associated with the subscriber. The ID is displayed as an ASCII string unless the value has nonprintable characters, in which case it is displayed in hexadecimal format.                                                                                |

Table 70: show subscribers Output Fields (*continued*)

| Field Name                                  | Field Description                                                                                                                                                                                   |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Agent Remote ID</b>                      | Option 82 agent remote ID associated with the subscriber. The ID is displayed as an ASCII string unless the value has nonprintable characters, in which case it is displayed in hexadecimal format. |
| <b>DHCP Relay IP Address</b>                | IP address used by the DHCP relay agent.                                                                                                                                                            |
| <b>ATM VPI</b>                              | (MX Series routers with MPCs and ATM MICs with SFP only) ATM virtual path identifier (VPI) on the subscriber's physical interface.                                                                  |
| <b>ATM VCI</b>                              | (MX Series routers with MPCs and ATM MICs with SFP only) ATM virtual circuit identifier (VCI) for each VPI configured on the subscriber interface.                                                  |
| <b>Login Time</b>                           | Date and time at which the subscriber logged in.                                                                                                                                                    |
| <b>Effective shaping-rate</b>               | Actual downstream traffic shaping rate for the subscriber, in kilobits per second.                                                                                                                  |
| <b>IPv4 rpf-check Fail Filter Name</b>      | Name of the filter applied by the dynamic profile to IPv4 packets that fail the RPF check.                                                                                                          |
| <b>IPv6 rpf-check Fail Filter Name</b>      | Name of the filter applied by the dynamic profile to IPv6 packets that fail the RPF check.                                                                                                          |
| <b>DHCP Options</b>                         | <b>len</b> = number of hex values in the message. The hex values specify the type, length, value (TLV) for DHCP options, as defined in RFC 2132.                                                    |
| <b>Session ID</b>                           | ID number for a subscriber service session.                                                                                                                                                         |
| <b>Underlying Session ID</b>                | For DHCPv6 subscribers on a PPPoE network, displays the session ID of the underlying PPPoE interface.                                                                                               |
| <b>Service Sessions</b>                     | Number of service sessions (that is, a service activated using RADIUS CoA) associated with the subscribers.                                                                                         |
| <b>Service Session Name</b>                 | Service session profile name.                                                                                                                                                                       |
| <b>Session Timeout (seconds)</b>            | Number of seconds of access provided to the subscriber before the session is automatically terminated.                                                                                              |
| <b>Idle Timeout (seconds)</b>               | Number of seconds subscriber can be idle before the session is automatically terminated.                                                                                                            |
| <b>IPv6 Delegated Address Pool</b>          | Name of the pool used for DHCPv6 prefix delegation.                                                                                                                                                 |
| <b>IPv6 Delegated Network Prefix Length</b> | Length of the prefix configured for the IPv6 delegated address pool.                                                                                                                                |
| <b>IPv6 Interface Address</b>               | Address assigned by the Framed-lpv6-Prefix AAA attribute.                                                                                                                                           |
| <b>IPv6 Framed Interface Id</b>             | Interface ID assigned by the Framed-Interface-Id AAA attribute.                                                                                                                                     |

Table 70: show subscribers Output Fields (*continued*)

| Field Name                         | Field Description                                                                                                                                                                                                                                      |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ADF IPv4 Input Filter Name</b>  | Name assigned to the Ascend-Data-Filter (ADF) interface IPv4 input filter (client or service session). The filter name is followed by the rules (in hexadecimal format) associated with the ADF filter and the decoded rule in Junos OS filter style.  |
| <b>ADF IPv4 Output Filter Name</b> | Name assigned to the Ascend-Data-Filter (ADF) interface IPv4 output filter (client or service session). The filter name is followed by the rules (in hexadecimal format) associated with the ADF filter and the decoded rule in Junos OS filter style. |
| <b>ADF IPv6 Input Filter Name</b>  | Name assigned to the Ascend-Data-Filter (ADF) interface IPv6 input filter (client or service session). The filter name is followed by the rules (in hexadecimal format) associated with the ADF filter and the decoded rule in Junos OS filter style.  |
| <b>ADF IPv6 Output Filter Name</b> | Name assigned to the Ascend-Data-Filter (ADF) interface IPv6 output filter (client or service session). The filter name is followed by the rules (in hexadecimal format) associated with the ADF filter and the decoded rule in Junos OS filter style. |
| <b>IPv4 Input Filter Name</b>      | Name assigned to the IPv4 input filter (client or service session).                                                                                                                                                                                    |
| <b>IPv4 Output Filter Name</b>     | Name assigned to the IPv4 output filter (client or service session).                                                                                                                                                                                   |
| <b>IPv6 Input Filter Name</b>      | Name assigned to the IPv6 input filter (client or service session).                                                                                                                                                                                    |
| <b>IPv6 Output Filter Name</b>     | Name assigned to the IPv6 output filter (client or service session).                                                                                                                                                                                   |
| <b>IFL Input Filter Name</b>       | Name assigned to the logical interface input filter (client or service session).                                                                                                                                                                       |
| <b>IFL Output Filter Name</b>      | Name assigned to the logical interface output filter (client or service session).                                                                                                                                                                      |

## Sample Output

### show subscribers (IPv4)

```

user@host> show subscribers
Interface IP Address/VLAN ID User Name LS:RI
ge-1/3/0.1073741824 100 WHOLESALE-CLIENT default:default
demux0.1073741824 10.0.0.10 RETAILER1-CLIENT test1:retailer1
demux0.1073741825 11.0.0.3 RETAILER2-CLIENT test1:retailer1
demux0.1073741826 12.0.0.3 RETAILER2-CLIENT test1:retailer2

```

### show subscribers (IPv6)

```

user@host> show subscribers
Interface IP Address/VLAN ID User Name LS:RI
ge-1/0/0.0 2001:db8::c0:0:0:0/74 WHOLESALE-CLIENT default:default
* 2001:db8::1/128 subscriber-25 default:default

```

### show subscribers (IPv4 and IPv6 Dual Stack)

```

user@host> show subscribers
Interface IP Address/VLAN ID User Name
LS:RI
demux0.1073741834 0x8100.1002 0x8100.1

```

```

default:default
demux0.1073741835 0x8100.1001 0x8100.1
default:default
pp0.1073741836 61.1.1.1 dualstackuser1@EXAMPLE1.com
default:ASP-1
* 2041:1:1::/48
* 2061:1:1:1::/64
pp0.1073741837 23.1.1.3 dualstackuser2@EXAMPLE1.com
default:ASP-1
* 2001:db8:1:2:5::/64

```

### show subscribers (LNS on MX Series Routers)

```

user@host> show subscribers
Interface IP Address/VLAN ID User Name LS:RI
si-4/0/0.1 192.168.4.1 xyz@example.com default:default

```

### show subscribers (L2TP Switched Tunnels)

```

user@host> show subscribers
Interface IP Address/VLAN ID User Name LS:RI
si-2/1/0.1073741842 Tunnel-switched ap@example.com default:default
si-2/1/0.1073741843 Tunnel-switched ap@example.com default:default

```

### show subscribers client-type dhcp detail

```

user@host> show subscribers client-type dhcp detail
Type: DHCP
IP Address: 10.20.9.7
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: demux0.1073744127
Interface type: Dynamic
Dynamic Profile Name: dhcp-demux-prof
MAC Address: 00:10:95:00:00:98
State: Active
Radius Accounting ID: jnpr :2304
Login Time: 2009-08-25 14:43:52 PDT

Type: DHCP
IP Address: 10.20.10.7
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: demux0.1073744383
Interface type: Dynamic
Dynamic Profile Name: dhcp-demux-prof
MAC Address: 00:10:94:00:01:f3
State: Active
Radius Accounting ID: jnpr :2560
Login Time: 2009-08-25 14:43:56 PDT

```

### show subscribers count

```

user@host> show subscribers count
Total Subscribers: 188, Active Subscribers: 188

```

**show subscribers address detail (IPv6)**

```
user@host> show subscribers address 10.16.12.137 detail
Type: PPPoE
User Name: pppoeTerV6User1Svc
IP Address: 10.16.12.137
IP Netmask: 255.0.0.0
IPv6 User Prefix: 1016:0:0:c88::/64
Logical System: default
Routing Instance: default
Interface: pp0.1073745151
Interface type: Dynamic
Underlying Interface: demux0.8201
Dynamic Profile Name: pppoe-client-profile
MAC Address: 00:0d:02:01:00:01
Session Timeout (seconds): 31622400
Idle Timeout (seconds): 86400
State: Active
Radius Accounting ID: jnpr demux0.8201:6544
Session ID: 6544
Agent Circuit ID: if13720
Agent Remote ID: if13720
Login Time: 2012-05-21 13:37:27 PDT
Service Sessions: 1
```

**show subscribers detail (IPv4)**

```
user@host> show subscribers detail
Type: DHCP
IP Address: 10.20.9.7
IP Netmask: 255.255.0.0
Primary DNS Address: 192.168.17.1
Secondary DNS Address: 192.168.17.2
Primary WINS Address: 192.168.22.1
Secondary WINS Address: 192.168.22.2
Logical System: default
Routing Instance: default
Interface: demux0.1073744127
Interface type: Dynamic
Dynamic Profile Name: dhcp-demux-prof
MAC Address: 00:10:95:00:00:98
State: Active
Radius Accounting ID: jnpr :2304
Idle Timeout (seconds): 600
Login Time: 2009-08-25 14:43:52 PDT
DHCP Options: len 52
35 01 01 39 02 02 40 3d 07 01 00 10 94 00 00 08 33 04 00 00
00 3c 0c 15 63 6c 69 65 6e 74 5f 50 6f 72 74 20 2f 2f 36 2f
33 2d 37 2d 30 37 05 01 06 0f 21 2c
Service Sessions: 2
```

**show subscribers detail (IPv6)**

```
user@host> show subscribers detail
Type: DHCP
User Name: pd-user1
IPv6 Prefix: 2001:db8:db2:ffff:1::/64
Logical System: default
Routing Instance: default
Interface: ge-3/1/3.2
Interface type: Static
```



```

MAC Address: 00:51:ff:ff:00:03
State: Active
Radius Accounting ID: 1
Session ID: 1
Login Time: 2011-08-25 12:12:26 PDT
DHCP Options: len 42
00 08 00 02 00 00 00 01 00 0a 00 03 00 01 00 51 ff ff 00 03
00 06 00 02 00 19 00 19 00 0c 00 00 00 00 00 00 00 00 00
00 00

```

#### show subscribers detail (IPv6 Static Demux Interface)

```

user@host> show subscribers detail
Type: STATIC-INTERFACE
User Name: demux0.1@example.net
IPv6 Prefix: 1:2:3:4:5:6:7:aa/128
Logical System: default
Routing Instance: default
Interface: demux0.1
Interface type: Static
Dynamic Profile Name: junos-default-profile
State: Active
Radius Accounting ID: 185
Login Time: 2010-05-18 14:33:56 EDT

```

#### show subscribers detail (L2TP LNS Subscribers on MX Series Routers)

```

user@host> show subscribers detail
Type: L2TP
User Name: user1@example.net
IP Address: 10.1.32.58
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: si-5/2/0.1073749824
Interface type: Dynamic
Dynamic Profile Name: dyn-lns-profile2
Dynamic Profile Version: 1
State: Active
Radius Accounting ID: 8001
Session ID: 8001
Login Time: 2011-04-25 20:27:50 IST

```

#### show subscribers detail (L2TP Switched Tunnels)

```

user@host> show subscribers detail
Type: L2TP
User Name: ap@example.com
Logical System: default
Routing Instance: default
Interface: si-2/1/0.1073741842
Interface type: Dynamic
Dynamic Profile Name: dyn-lts-profile
State: Active
L2TP State: Tunnel-switched
Tunnel switch Profile Name: ce-lts-profile
Local IP Address: 10.50.1.1
Remote IP Address: 192.168.20.3
Radius Accounting ID: 21
Session ID: 21
Login Time: 2013-01-18 03:01:11 PST

```

```
Type: L2TP
User Name: ap@example.com
Logical System: default
Routing Instance: default
Interface: si-2/1/0.1073741843
Interface type: Dynamic
Dynamic Profile Name: dyn-lts-profile
State: Active
L2TP State: Tunnel-switched
Tunnel switch Profile Name: ce-lts-profile
Local IP Address: 10.30.1.1
Remote IP Address: 172.20.1.10
Session ID: 22
Login Time: 2013-01-18 03:01:14 PST
```

#### show subscribers detail (Tunneled Subscriber)

```
user@host> show subscribers detail
Type: PPPoE
User Name: user1@example.com
Logical System: default
Routing Instance: default
Interface: pp0.1
State: Active, Tunneled
Radius Accounting ID: 512
```

#### show subscribers detail (IPv4 and IPv6 Dual Stack)

```
user@host> show subscribers detail
Type: VLAN
Logical System: default
Routing Instance: default
Interface: demux0.1073741824
Interface type: Dynamic
Dynamic Profile Name: svlanProfile
State: Active
Session ID: 1
Stacked VLAN Id: 0x8100.1001
VLAN Id: 0x8100.1
Login Time: 2011-11-30 00:18:04 PST

Type: PPPoE
User Name: dualstackuser1@EXAMPLE1.com
IP Address: 61.1.1.1
IPv6 Prefix: 2041:1:1::/48
IPv6 User Prefix: 2061:1:1:1::/64
Logical System: default
Routing Instance: ASP-1
Interface: pp0.1073741825
Interface type: Dynamic
Dynamic Profile Name: dualStack-Profile1
MAC Address: 00:00:64:03:01:02
State: Active
Radius Accounting ID: 2
Session ID: 2
Login Time: 2011-11-30 00:18:05 PST

Type: DHCP
IPv6 Prefix: 2041:1:1::/48
Logical System: default
Routing Instance: ASP-1
```

```

Interface: pp0.1073741825
Interface type: Static
MAC Address: 00:00:64:03:01:02
State: Active
Radius Accounting ID: jnpr :3
Session ID: 3
Underlying Session ID: 2
Login Time: 2011-11-30 00:18:35 PST
DHCP Options: len 42
00 08 00 02 0b b8 00 01 00 0a 00 03 00 01 00 00 64 03 01 02
00 06 00 02 00 19 00 19 00 0c 00 00 00 00 00 00 00 00 00 00
00 00

```

#### show subscribers detail (ACI Interface Set Session)

```

user@host> show subscribers detail
Type: VLAN
Logical System: default
Routing Instance: default
Interface: ge-1/0/0
Interface Set: aci-1001-ge-1/0/0.2800
Interface Set Session ID: 0
Underlying Interface: ge-1/0/0.2800
Dynamic Profile Name: aci-vlan-set-profile-2
Dynamic Profile Version: 1
State: Active
Session ID: 1
Agent Circuit ID: aci-ppp-dhcp-20
Login Time: 2012-05-26 01:54:08 PDT

```

#### show subscribers detail (PPPoE Subscriber Session with ACI Interface Set)

```

user@host> show subscribers detail
Type: PPPoE
User Name: ppphint2
IP Address: 10.10.1.5
Logical System: default
Routing Instance: default
Interface: pp0.1073741825
Interface type: Dynamic
Interface Set: aci-1001-demux0.1073741824
Interface Set Type: Dynamic
Interface Set Session ID: 2
Underlying Interface: demux0.1073741824
Dynamic Profile Name: aci-vlan-pppoe-profile
Dynamic Profile Version: 1
MAC Address: 00:00:64:39:01:02
State: Active
Radius Accounting ID: 3
Session ID: 3
Agent Circuit ID: aci-ppp-dhcp-dvlan-50
Login Time: 2012-03-07 13:46:53 PST

```

#### show subscribers extensive

```

user@host> show subscribers extensive
Type: DHCP
User Name: pd-user1
IPv6 Prefix: 2001:db8:db2:ffff:1::/64
Logical System: default
Routing Instance: default

```

```
Interface: ge-3/1/3.2
Interface type: Static
MAC Address: 00:51:ff:ff:00:03
State: Active
Radius Accounting ID: 1
Session ID: 1
Login Time: 2011-08-25 12:12:26 PDT
DHCP Options: len 42
00 08 00 02 00 00 00 01 00 0a 00 03 00 01 00 51 ff ff 00 03
00 06 00 02 00 19 00 19 00 0c 00 00 00 00 00 00 00 00
00 00
IPv6 Address Pool: pd_pool
IPv6 Network Prefix Length: 48
```

#### show subscribers extensive (RPF Check Fail Filter)

```
user@host> show subscribers extensive
...
Type: VLAN
Logical System: default
Routing Instance: default
Interface: ae0.1073741824
Interface type: Dynamic
Dynamic Profile Name: vlan-prof
State: Active
Session ID: 9
VLAN Id: 100
Login Time: 2011-08-26 08:17:00 PDT
IPv4 rpf-check Fail Filter Name: rpf-allow-dhcp
IPv6 rpf-check Fail Filter Name: rpf-allow-dhcpv6
...
```

#### show subscribers extensive (L2TP LNS Subscribers on MX Series Routers)

```
user@host> show subscribers extensive
Type: L2TP
User Name: user1@example.net
IP Address: 10.1.32.58
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: si-5/2/0.1073749824
Interface type: Dynamic
Dynamic Profile Name: dyn-lns-profile2
Dynamic Profile Version: 1
State: Active
Radius Accounting ID: 8001
Session ID: 8001
Login Time: 2011-04-25 20:27:50 IST
IPv4 Input Filter Name: classify-si-5/2/0.1073749824-in
IPv4 Output Filter Name: classify-si-5/2/0.1073749824-out
```

#### show subscribers extensive (IPv4 and IPv6 Dual Stack)

```
user@host> show subscribers extensive
Type: VLAN
Logical System: default
Routing Instance: default
Interface: demux0.1073741824
Interface type: Dynamic
Dynamic Profile Name: svlanProfile
State: Active
```

```

Session ID: 1
Stacked VLAN Id: 0x8100.1001
VLAN Id: 0x8100.1
Login Time: 2011-11-30 00:18:04 PST

Type: PPPoE
User Name: dualstackuser1@EXAMPLE1.com
IP Address: 61.1.1.1
IPv6 Prefix: 2041:1:1::/48
IPv6 User Prefix: 2061:1:1:1::/64
Logical System: default
Routing Instance: ASP-1
Interface: pp0.1073741825
Interface type: Dynamic
Dynamic Profile Name: dualStack-Profile1
MAC Address: 00:00:64:03:01:02
State: Active
Radius Accounting ID: 2
Session ID: 2
Login Time: 2011-11-30 00:18:05 PST
IPv6 Delegated Network Prefix Length: 48
IPv6 Interface Address: 2061:1:1:1::1/64
IPv6 Framed Interface Id: 1:1:2:2
IPv4 Input Filter Name: FILTER-IN-pp0.1073741825-in
IPv4 Output Filter Name: FILTER-OUT-pp0.1073741825-out
IPv6 Input Filter Name: FILTER-IN6-pp0.1073741825-in
IPv6 Output Filter Name: FILTER-OUT6-pp0.1073741825-out

Type: DHCP
IPv6 Prefix: 2041:1:1::/48
Logical System: default
Routing Instance: ASP-1
Interface: pp0.1073741825
Interface type: Static
MAC Address: 00:00:64:03:01:02
State: Active
Radius Accounting ID: jnpr :3
Session ID: 3
Underlying Session ID: 2
Login Time: 2011-11-30 00:18:35 PST
DHCP Options: len 42
00 08 00 02 0b b8 00 01 00 0a 00 03 00 01 00 00 64 03 01 02
00 06 00 02 00 19 00 19 00 0c 00 00 00 00 00 00 00 00 00 00
00 00
IPv6 Delegated Network Prefix Length: 48

```

#### show subscribers extensive (Effective Shaping-Rate)

```

user@host> show subscribers extensive
Type: VLAN
Logical System: default
Routing Instance: default
Interface: demux0.1073741837
Interface type: Dynamic
Interface Set: ifset-1
Underlying Interface: ae1
Dynamic Profile Name: svlan-dhcp-test
State: Active
Session ID: 1
Stacked VLAN Id: 0x8100.201

```

```
VLAN Id: 0x8100.201
Login Time: 2011-11-30 00:18:04 PST
Effective shaping-rate: 31000000k
...
```

#### show subscribers aci-interface-set-name detail (Subscriber Sessions Using Specified ACI Interface Set)

```
user@host> show subscribers aci-interface-set-name aci-1003-ge-1/0/0.4001 detail
Type: VLAN
Logical System: default
Routing Instance: default
Interface: ge-1/0/0.
Underlying Interface: ge-1/0/0.4001
Dynamic Profile Name: aci-vlan-set-profile
Dynamic Profile Version: 1
State: Active
Session ID: 13
Agent Circuit ID: aci-ppp-vlan-10
Login Time: 2012-03-12 10:41:56 PDT

Type: PPPoE
User Name: ppphint2
IP Address: 10.10.1.7
Logical System: default
Routing Instance: default
Interface: pp0.1073741834
Interface type: Dynamic
Interface Set: aci-1003-ge-1/0/0.4001
Interface Set Type: Dynamic
Interface Set Session ID: 13
Underlying Interface: ge-1/0/0.4001
Dynamic Profile Name: aci-vlan-pppoe-profile
Dynamic Profile Version: 1
MAC Address: 00:00:65:26:01:02
State: Active
Radius Accounting ID: 14
Session ID: 14
Agent Circuit ID: aci-ppp-vlan-10
Login Time: 2012-03-12 10:41:57 PDT
```

#### show subscribers agent-circuit-identifier detail (Subscriber Sessions Using Specified ACI Substring)

```
user@host> show subscribers agent-circuit-identifier aci-ppp-vlan detail
Type: VLAN
Logical System: default
Routing Instance: default
Interface: ge-1/0/0.
Underlying Interface: ge-1/0/0.4001
Dynamic Profile Name: aci-vlan-set-profile
Dynamic Profile Version: 1
State: Active
Session ID: 13
Agent Circuit ID: aci-ppp-vlan-10
Login Time: 2012-03-12 10:41:56 PDT

Type: PPPoE
User Name: ppphint2
IP Address: 10.10.1.7
Logical System: default
Routing Instance: default
Interface: pp0.1073741834
```

```

Interface type: Dynamic
Interface Set: aci-1003-ge-1/0/0.4001
Interface Set Type: Dynamic
Interface Set Session ID: 13
Underlying Interface: ge-1/0/0.4001
Dynamic Profile Name: aci-vlan-pppoe-profile
Dynamic Profile Version: 1
MAC Address: 00:00:65:26:01:02
State: Active
Radius Accounting ID: 14
Session ID: 14
Agent Circuit ID: aci-ppp-vlan-10
Login Time: 2012-03-12 10:41:57 PDT

```

#### show subscribers interface extensive

```

user@host> show subscribers interface demux0.1073741826 extensive
Type: VLAN
User Name: test1@test.com
Logical System: default
Routing Instance: testnet
Interface: demux0.1073741826
Interface type: Dynamic
Dynamic Profile Name: profile-vdemux-relay-23qos
MAC Address: 00:00:6e:56:01:04
State: Active
Radius Accounting ID: 12
Session ID: 12
Stacked VLAN Id: 0x8100.1500
VLAN Id: 0x8100.2902
Login Time: 2011-10-20 16:21:59 EST

Type: DHCP
User Name: test1@test.com
IP Address: 172.16.200.6
IP Netmask: 255.255.255.0
Logical System: default
Routing Instance: testnet
Interface: demux0.1073741826
Interface type: Static
MAC Address: 00:00:6e:56:01:04
State: Active
Radius Accounting ID: 21
Session ID: 21
Login Time: 2011-10-20 16:24:33 EST
Service Sessions: 2

Service Session ID: 25
Service Session Name: SUB-QOS
State: Active

Service Session ID: 26
Service Session Name: service-cb-content
State: Active
IPv4 Input Filter Name: content-cb-in-demux0.1073741826-in
IPv4 Output Filter Name: content-cb-out-demux0.1073741826-out

```

#### show subscribers logical-system terse

```

user@host> show subscribers logical-system test1 terse

```

| Interface         | IP Address/VLAN ID | User Name        | LS:RI           |
|-------------------|--------------------|------------------|-----------------|
| demux0.1073741825 | 11.0.0.3           | RETAILER1-CLIENT | test1:retailer1 |
| demux0.1073741826 | 12.0.0.3           | RETAILER2-CLIENT | test1:retailer2 |

#### show subscribers physical-interface count

```
user@host> show subscribers physical-interface ge-1/0/0 count
Total subscribers: 3998, Active Subscribers: 3998
```

#### show subscribers routing-instance inst1 count

```
user@host> show subscribers routing-instance inst1 count
Total Subscribers: 188, Active Subscribers: 183
```

#### show subscribers stacked-vlan-id detail

```
user@host> show subscribers stacked-vlan-id 101 detail
Type: VLAN
Interface: ge-1/2/0.1073741824
Interface type: Dynamic
Dynamic Profile Name: svlan-prof
State: Active
Stacked VLAN Id: 0x8100.101
VLAN Id: 0x8100.100
Login Time: 2009-03-27 11:57:19 PDT
```

#### show subscribers stacked-vlan-id vlan-id detail (Combined Output)

```
user@host> show subscribers stacked-vlan-id 101 vlan-id 100 detail
Type: VLAN
Interface: ge-1/2/0.1073741824
Interface type: Dynamic
Dynamic Profile Name: svlan-prof
State: Active
Stacked VLAN Id: 0x8100.101
VLAN Id: 0x8100.100
Login Time: 2009-03-27 11:57:19 PDT
```

#### show subscribers stacked-vlan-id vlan-id interface detail (Combined Output for a Specific Interface)

```
user@host> show subscribers stacked-vlan-id 101 vlan-id 100 interface ge-1/2/0.* detail
Type: VLAN
Interface: ge-1/2/0.1073741824
Interface type: Dynamic
Dynamic Profile Name: svlan-prof
State: Active
Stacked VLAN Id: 0x8100.101
VLAN Id: 0x8100.100
Login Time: 2009-03-27 11:57:19 PDT
```

#### show subscribers user-name detail

```
user@host> show subscribers user-name larry1 detail
Type: DHCP
User Name: larry1
IP Address: 100.0.0.37
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: ge-1/0/0.1
Interface type: Static
Dynamic Profile Name: foo
```



```

MAC Address: 00:10:94:00:00:01
State: Active
Radius Accounting ID: 1
Session ID: 1
Login Time: 2011-11-07 08:25:59 PST
DHCP Options: len 52
35 01 01 39 02 02 40 3d 07 01 00 10 94 00 00 01 33 04 00 00
00 3c 0c 15 63 6c 69 65 6e 74 5f 50 6f 72 74 20 2f 2f 32 2f
37 2d 30 2d 30 37 05 01 06 0f 21 2c

```

#### show subscribers vlan-id

```

user@host> show subscribers vlan-id 100
Interface IP Address User Name
ge-1/0/0.1073741824
ge-1/2/0.1073741825

```

#### show subscribers vlan-id detail

```

user@host> show subscribers vlan-id 100 detail
Type: VLAN
Interface: ge-1/0/0.1073741824
Interface type: Dynamic
Dynamic Profile Name: vlan-prof-tpid
State: Active
VLAN Id: 100
Login Time: 2009-03-11 06:48:54 PDT

Type: VLAN
Interface: ge-1/2/0.1073741825
Interface type: Dynamic
Dynamic Profile Name: vlan-prof-tpid
State: Active
VLAN Id: 100
Login Time: 2009-03-11 06:48:54 PDT

```

#### show subscribers vpi vci extensive (PPPoE-over-ATM Subscriber Session)

```

user@host> show subscribers vpi 40 vci 50 extensive
Type: PPPoE
User Name: testuser
IP Address: 100.0.0.2
IP Netmask: 255.255.0.0
Logical System: default
Routing Instance: default
Interface: pp0.0
Interface type: Static
MAC Address: 00:00:65:23:01:02
State: Active
Radius Accounting ID: 2
Session ID: 2
ATM VPI: 40
ATM VCI: 50
Login Time: 2012-12-03 07:49:26 PST
IP Address Pool: pool_1
IPv6 Framed Interface Id: 200:65ff:fe23:102

```

## show subscribers summary

---

**Syntax**    show subscribers summary  
              <all>  
              < detail | extensive | terse>  
              <count>  
              <physical-interface *physical-interface-name*>  
              <logical-system *logical-system* pic | port | routing-instance *routing-instance* | slot>

**Release Information**    Command introduced in Junos OS Release 10.2.

**Description**    Display summary information for subscribers.

**Options**    all—(Optional) Display full subscriber summary.

**detail | extensive | terse**—(Optional) Display the specified level of output.

**count**—(Optional) Display the count of total subscribers and active subscribers for any specified option.

**logical-system**—(Optional) Display subscribers whose logical system matches the specified logical system.

**physical-interface-name**—(M120, M320, and MX Series routers only) (Optional) Display a count of subscribers whose physical interface matches the specified physical interface, by subscriber state, client type and LS:RI.

**pic**—(M120, M320, and MX Series routers only) (Optional) Display a count of subscribers by PIC number and the total number of subscribers.

**port**—(M120, M320, and MX Series routers only) (Optional) Display a count of subscribers by port number and the total number of subscribers.

**routing-instance**—(Optional) Display subscribers whose routing instance matches the specified routing instance.

**slot**—(M120, M320, and MX Series routers only) (Optional) Display a count of subscribers by FPC slot number and the total number of subscribers.



**NOTE:** Due to display limitations, logical system and routing instance output values are truncated when necessary.

---

**Required Privilege Level**    view

**Related Documentation**    • [show subscribers on page 788](#)

**List of Sample Output**    [show subscribers summary on page 808](#)

[show subscribers summary all on page 808](#)  
[show subscribers summary physical-interface on page 808](#)  
[show subscribers summary physical-interface pic on page 809](#)  
[show subscribers summary physical-interface port on page 809](#)  
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[show subscribers summary pic \(Aggregated Ethernet Interfaces\) on page 810](#)  
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**Output Fields** Table 71 on page 807 lists the output fields for the **show subscribers** command. Output fields are listed in the approximate order in which they appear.

**Table 71: show subscribers summary Output Fields**

| Field Name                        | Field Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Subscribers by State</b>       | <p>Number of subscribers summarized by state. The summary information includes the following:</p> <ul style="list-style-type: none"> <li>• Init—Number of subscriber currently in the initialization state.</li> <li>• Configured—Number of configured subscribers.</li> <li>• Active—Number of active subscribers.</li> <li>• Terminating—Number of subscribers currently terminating.</li> <li>• Terminated—Number of terminated subscribers.</li> <li>• Total—Total number of subscribers for all states.</li> </ul> |
| <b>Subscribers by Client Type</b> | <p>Number of subscribers summarized by client type. Client types can include DHCP, L2TP, PPP, PPPOE, STATIC-INTERFACE, and VLAN. Also displays the total number of subscribers for all client types (Total).</p>                                                                                                                                                                                                                                                                                                        |
| <b>Subscribers by LS:RI</b>       | <p>Number of subscribers summarized by logical system:routing instance (LS:RI) combination. Also displays the total number of subscribers for all LS:RI combinations (Total).</p>                                                                                                                                                                                                                                                                                                                                       |
| <b>Interface</b>                  | <p>Interface associated with the subscriber. The router or switch displays subscribers whose interface matches or begins with the specified interface.</p> <p>The * character indicates a continuation of addresses for the same session.</p> <p>For aggregated Ethernet interfaces, the output of the <b>summary (pic   port   slot)</b> options prefixes the interface name with <b>ae0:</b>.</p>                                                                                                                     |
| <b>Count</b>                      | <p>Count of subscribers displayed for each PIC, port, or slot when those options are specified with the <b>summary</b> option. For an aggregated Ethernet configuration, the total subscriber count does not equal the sum of the individual PIC, port, or slot counts, because each subscriber can be in more than one aggregated Ethernet link.</p>                                                                                                                                                                   |
| <b>Total Subscribers</b>          | <p>Total number of subscribers for all physical interfaces, all PICS, all ports, or all LS:RI slots.</p>                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>IP Address/VLAN ID</b>         | <p>Subscriber IP address or VLAN ID associated with the subscriber in the form <i>tpid.vlan-id</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>User Name</b>                  | <p>Name of subscriber.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>LS:RI</b>                      | <p>Logical system and routing instance associated with the subscriber.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                              |

## Sample Output

### show subscribers summary

```
user@host> show subscribers summary
```

#### Subscribers by State

|             |     |
|-------------|-----|
| Init        | 3   |
| Configured  | 2   |
| Active      | 183 |
| Terminating | 2   |
| Terminated  | 1   |

|       |     |
|-------|-----|
| TOTAL | 191 |
|-------|-----|

#### Subscribers by Client Type

|      |     |
|------|-----|
| DHCP | 107 |
| PPP  | 76  |
| VLAN | 8   |

|       |     |
|-------|-----|
| TOTAL | 191 |
|-------|-----|

### show subscribers summary all

```
user@host> show subscribers summary all
```

#### Subscribers by State

|             |     |
|-------------|-----|
| Init        | 3   |
| Configured  | 2   |
| Active      | 183 |
| Terminating | 2   |
| Terminated  | 1   |

|       |     |
|-------|-----|
| TOTAL | 191 |
|-------|-----|

#### Subscribers by Client Type

|      |     |
|------|-----|
| DHCP | 107 |
| PPP  | 76  |
| VLAN | 8   |

|       |     |
|-------|-----|
| TOTAL | 191 |
|-------|-----|

#### Subscribers by LS:RI

|                   |    |
|-------------------|----|
| default:default   | 1  |
| default:ri1       | 28 |
| default:ri2       | 16 |
| ls1:default       | 22 |
| ls1:riA           | 38 |
| ls1:riB           | 44 |
| logsysX:routinstY | 42 |

|       |     |
|-------|-----|
| TOTAL | 191 |
|-------|-----|

### show subscribers summary physical-interface

```
user@host> show subscribers summary physical-interface ge-1/0/0
```

#### Subscribers by State

|         |      |
|---------|------|
| Active: | 3998 |
| Total:  | 3998 |

#### Subscribers by Client Type

|       |      |
|-------|------|
| DHCP: | 3998 |
|-------|------|

Total: 3998

Subscribers by LS:RI  
 default:default: 3998  
 Total: 3998

#### show subscribers summary physical-interface pic

```
user@host> show subscribers summary physical-interface ge-0/2/0 pic
Subscribers by State
 Active: 4825
 Total: 4825
```

Subscribers by Client Type  
 DHCP: 4825  
 Total: 4825

Subscribers by LS:RI  
 default:default: 4825  
 Total: 4825

#### show subscribers summary physical-interface port

```
user@host> show subscribers summary physical-interface ge-0/3/0 port
Subscribers by State
 Active: 4825
 Total: 4825
```

Subscribers by Client Type  
 DHCP: 4825  
 Total: 4825

Subscribers by LS:RI  
 default:default: 4825  
 Total: 4825

#### show subscribers summary physical-interface slot

```
user@host> show subscribers summary physical-interface ge-2/0/0 slot
Subscribers by State
 Active: 4825
 Total: 4825
```

Subscribers by Client Type  
 DHCP: 4825  
 Total: 4825

Subscribers by LS:RI  
 default:default: 4825  
 Total: 4825

#### show subscribers summary pic

```
user@host> show subscribers summary pic
Interface Count
ge-1/0 1000
ge-1/3 1000

Total Subscribers: 2000
```

**show subscribers summary pic (Aggregated Ethernet Interfaces)**

```
user@host> show subscribers summary pic
Interface Count
ae0: ge-1/0 801
ae0: ge-1/3 801

Total Subscribers: 801
```

**show subscribers summary port**

```
user@host> show subscribers summary port
Interface Count
ge-1 2000

Total Subscribers: 2000
```

**show subscribers summary slot**

```
user@host> show subscribers summary slot
Interface Count
ge-1 2000

Total Subscribers: 2000
```

**show subscribers summary terse**

```
user@host> show subscribers summary terse
Interface IP Address/VLAN ID User Name LS:RI
ge-1/3/0.1073741824 100 WHOLESALE-CLIENT default:default
demux0.1073741824 100.0.0.10 RETAILER1-CLIENT test1:retailer1
demux0.1073741825 101.0.0.3 RETAILER2-CLIENT test1:retailer2
demux0.1073741826 102.0.0.3 RETAILER2-CLIENT test1:retailer2
```

## PART 8

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