

# Tricolor Marking Policers on EX9200 Switches



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# About the Documentation

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## Documentation and Release Notes

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To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at <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.

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## Supported Platforms

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

- EX Series

## Using the Examples in This Manual

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

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

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

## Merging a Full Example

To merge a full example, follow these steps:

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

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

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

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

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

## Merging a Snippet

To merge a snippet, follow these steps:

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

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

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

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

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

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

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

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

## Documentation Conventions

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

Table 1: Notice Icons

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

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

Table 2: Text and Syntax Conventions

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

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

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

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

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

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

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- 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/>.
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- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>

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

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

## Opening a Case with JTAC

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

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

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



## PART 1

# Overview

- [Tricolor Marking Policers on page 3](#)



## CHAPTER 1

# Tricolor Marking Policers

- [Traffic Policing Overview on page 3](#)
- [Tricolor Marking Architecture on page 7](#)
- [Tricolor Marking Limitations on page 8](#)
- [Policer Support for Aggregated Ethernet Bundle Overview on page 10](#)

## Traffic Policing Overview

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This topic covers the following information:

- [Congestion Management for IP Traffic Flows on page 3](#)
- [Traffic Limits on page 4](#)
- [Traffic Color Marking on page 5](#)
- [Forwarding Classes and PLP Levels on page 6](#)
- [Policer Application to Traffic on page 7](#)

## Congestion Management for IP Traffic Flows

Traffic policing, also known *rate limiting*, is an essential component of network access security that is designed to thwart denial-of-service (DoS) attacks. Traffic policing enables you to control the maximum rate of IP traffic sent or received on an interface and also to partition network traffic into multiple priority levels, also known as *classes of service*. A policer defines a set of traffic rate limits and sets consequences for traffic that does not conform to the configured limits. Packets in a traffic flow that does not conform to traffic limits are either discarded or marked with a different forwarding class or packet loss priority (PLP) level.

With the exception of policers configured to rate-limit aggregate traffic (all protocol families and logical interfaces configured on a physical interface), you can apply a policer to all IP packets in a Layer 2 or Layer 3 traffic flow at a logical interface.

With the exception of policers configured to rate-limit based on physical interface media rate, you can apply a policer to specific IP packets in a Layer 3 traffic flow at a logical interface by using a stateless firewall filter.

You can apply a policer to inbound or outbound interface traffic. Policers applied to inbound traffic help to conserve resources by dropping traffic that does not need to be

routed through a network. Dropping inbound traffic also helps to thwart denial-of-service (DoS) attacks. Policers applied to outbound traffic control the bandwidth used.



**NOTE:** Traffic policers are instantiated on a per-PIC basis. Traffic policing does not work when the traffic for one local policy decision function (L-PDF) subscriber is distributed over multiple Multiservices PICs in an AMS group.

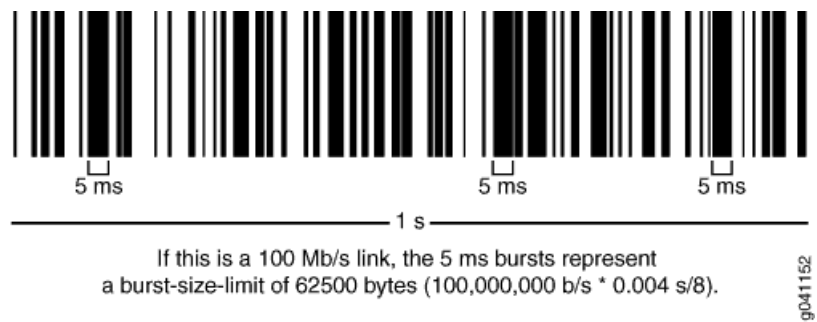
## Traffic Limits

Junos OS policers use a *token bucket algorithm* to enforce a limit on an average transmit or receive rate of traffic at an interface while allowing bursts of traffic up to a maximum value based on the configured bandwidth limit and configured burst size. The token bucket algorithm offers more flexibility than a *leaky bucket algorithm* in that you can allow a specified traffic burst before starting to discard packets or apply a penalty such as packet output-queuing priority or packet-drop priority.

In the token-bucket model, the bucket represents the rate-limiting function of the policer. Tokens are added to the bucket at a fixed rate, but once the specified depth of the bucket is reached, tokens allocated after cannot be stored and used. Each token represents a “credit” for some number of bits, and tokens in the bucket are “cashed in” for the ability to transmit or receive traffic at the interface. When sufficient tokens are present in the bucket, a traffic flow continues unrestricted. Otherwise, packets might be dropped or else re-marked with a lower forwarding class, a higher packet loss priority (PLP) level, or both.

- The rate at which tokens are added to the bucket represents the highest average transmit or receive rate in bits per second allowed for a given service level. You specify this highest average traffic rate as the *bandwidth limit* of the policer. If the traffic arrival rate (or fixed bits-per-second) is so high that at some point insufficient tokens are present in the bucket, then the traffic flow is no longer conforming to the traffic limit. During periods of relatively low traffic (traffic that arrives at or departs from the interface at average rates below the token arrival rate), unused tokens accumulate in the bucket.
- The depth of the bucket in bytes controls the amount of back-to-back bursting allowed. You specify this factor as the *burst-size limit* of the policer. This second limit affects the average transmit or receive rate by limiting the number of bytes permitted in a transmission burst for a given interval of time. Bursts exceeding the current burst-size limit are dropped until there are sufficient tokens available to permit the burst to proceed.

Figure 1: Network Traffic and Burst Rates



As shown in the figure above, a UPC bar code is a good facsimile of what traffic looks like on the line; an interface is either transmitting (bursting at full rate) or it is not. The black lines represent periods of data transmission and the white space represents periods of silence when the token bucket can replenish.

Depending on the type of policer used, packets in a policed traffic flow that surpasses the defined limits might be implicitly set to a higher PLP level, assigned to a configured forwarding class or set to a configured PLP level (or both), or simply discarded. If packets encounter downstream congestion, packets with a **low** PLP level are less likely to be discarded than those with a **medium-low**, **medium-high**, or **high** PLP level.

## Traffic Color Marking

Based on the particular set of traffic limits configured, a policer identifies a traffic flow as belonging to one of either two or three categories that are similar to the colors of a traffic light used to control automobile traffic.

A *two-color-marking* policer categorizes traffic as either conforming to the traffic limits (green) or violating the traffic limits (red):

- **Green**—Two-color-marking policers implicitly set the packets in a green flow to the low PLP level, and you cannot configure any policer actions for conforming traffic.
- **Red**—Two-color-marking policers do not perform any implicit actions on packets in a red flow. Instead, those packets are handled according to the actions specified in the policer configuration. You can configure a two-color-marking policer to simply discard packets if the traffic flow is red. Alternatively, you can configure a two-color-marking policer to handle the packets in a red flow by setting the PLP level to either **low** or **high**, assigning the packets to any forwarding class already configured, or both.

On MX Series, M120, and M320 routers and M7i and M10i routers with the Enhanced CFEB (CFEB-E) and EX Series switches only, you can specify two additional PLP levels for packets in a red flow: **medium-low** or **medium-high**.

*Three-color-marking* policers categorize traffic as conforming to the traffic limits (green), violating the traffic limits (red), or exceeding the traffic limits but within an allowed range (yellow):

- Green—Like two-color-marking policers, three-color-marking policers implicitly set the packets in a green flow to the low PLP level, and you cannot configure any policer actions for conforming traffic.
- Yellow—Unlike two-color-marking policers, three-color-marking policers categorize a second type of nonconforming traffic: yellow.

Single-rate three-color policing categorizes as yellow traffic that exceeds the traffic limits while conforming to a second defined burst-size limit. Two-rate three-color policing categorizes as yellow traffic that exceeds the traffic limits while conforming to both a second defined burst-size limit and a second defined bandwidth limit.

Three-color-marking policers implicitly set the packets in a yellow flow to the medium-high PLP level so that the packets incur a less severe penalty than those in a red flow. You cannot configure any policer actions for yellow traffic.

- Red—Unlike two-color-marking policers, three-color-marking policers implicitly set the packets in a red flow to the high PLP level, which is the highest PLP value. You can also configure a three-color-marking policer to discard the packets in a red flow instead of forwarding them with a high PLP setting.

Two-color-marking policers allows bursts of traffic for short periods, whereas three-color-marking policers allow more sustained bursts of traffic.

## Forwarding Classes and PLP Levels

A packet's forwarding class assignment and PLP level are used by the Junos OS class of service (CoS) features. The Junos OS CoS features include a set of mechanisms that you can use to provide differentiated services when best-effort traffic delivery is insufficient. For router (and switch) interfaces that carry IPv4, IPv6, and MPLS traffic, you can configure CoS features to take in a single flow of traffic entering at the edge of your network and provide different levels of service across the network—internal forwarding and scheduling (queuing) for output—based on the forwarding class assignments and PLP levels of the individual packets.



**NOTE:** Forwarding-class or loss-priority assignments performed by a policer or a stateless firewall filter override any such assignments performed on the ingress by the CoS default IP precedence classification at all logical interfaces or by any configured behavior aggregate (BA) classifier that is explicitly mapped to a logical interface.

Based on CoS configurations, packets of a given forwarding class are transmitted through a specific output queue, and each output queue is associated with a transmission service level defined in a *scheduler*.

Based on other CoS configurations, when packets in an output queue encounter congestion, packets with higher loss-priority values are more likely to be dropped by the

random early detection (RED) algorithm. Packet loss priority values affect the scheduling of a packet without affecting the packet's relative ordering within the traffic flow.

## Policer Application to Traffic

After you have defined and named a policer, it is stored as a template. You can later use the same policer name to provide the same policer configuration each time you want to use it. This eliminates the need to define the same policer values more than once.

You can apply a policer to a traffic flow in either of two ways:

- You can configure a standard stateless firewall filter that specifies the **policer *policer-name*** nonterminating action or the **three-color-policer (single-rate | two-rate) *policer-name*** nonterminating action. When you apply the standard filter to the input or output at a logical interface, the policer is applied to all packets of the filter-specific protocol family that match the conditions specified in the filter configuration.

With this method of applying a policer, you can define specific classes of traffic on an interface and apply traffic rate-limiting to each class.

- You can apply a policer directly to an interface so that traffic rate-limiting applies to all traffic on that interface, regardless of protocol family or any match conditions.

You can configure policers at the queue, logical interface, or Layer 2 (MAC) level. Only a single policer is applied to a packet at the egress queue, and the search for policers occurs in this order:

- Queue level
- Logical interface level
- Layer 2 (MAC) level

### Related Documentation

- *Stateless Firewall Filter Overview.*
- *Traffic Policer Types*
- *Order of Policer and Firewall Filter Operations*
- *Packet Flow Through the Junos OS CoS Process Overview*

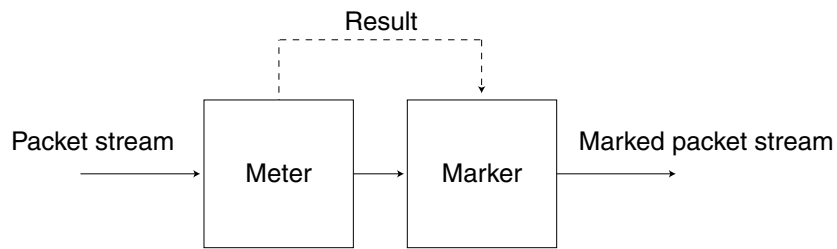
---

## Tricolor Marking Architecture

Policers provide two functions: metering and marking.

The policer meters each packet and passes the packet and the metering result to the marker, as shown in [Figure 2 on page 8](#).

Figure 2: Flow of Tricolor Marking Policer Operation



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The meter operates in two modes. In the color-blind mode, the meter treats the packet stream as uncolored. Any preset loss priorities are ignored. In the color-aware mode, the meter inspects the packet loss priority (PLP) field, which has been set by an upstream device as PLP high, medium-high, medium-low, or low; in other words, the PLP field has already been set by a behavior aggregate (BA) or multifield classifier. The marker changes the PLP of each incoming IP packet according to the results of the meter. For more information, see [“Configuring Two-Rate Tricolor Marking” on page 19](#).

This chapter emphasizes configuration and use of TCM policers. For more information about configuring and using two-color policers (“policers”), see the *Routing Policies, Firewall Filters, and Traffic Policers Feature Guide for Routing Devices*.

Single-rate TCM is so called because traffic is policed according to one rate—the CBR—and two burst sizes: the CBS and EBS. The CBS specifies the usual burst size in bytes and the EBS specifies the maximum burst size in bytes for packets that are admitted to the network. The EBS is greater than or equal to the CBS, and neither can be 0. As each packet enters the network, its bytes are counted. Packets that do not exceed the CBS are marked low PLP. Packets that exceed the CBS but are below the EBS are marked medium-high PLP. Packets that exceed the EBS are marked high PLP.

Two-rate TCM is so called because traffic is policed according to two rates: the CIR and the PIR. The PIR is greater than or equal to the CIR. The CIR specifies the average rate at which bits are admitted to the network and the PIR specifies the maximum rate at which bits are admitted to the network. As each packet enters the network, its bits are counted. Bits in packets that do not exceed the CIR have their packets marked low PLP. Bits in packets that exceed the CIR but are below the PIR have their packets marked medium-high PLP. Bits in packets that exceed the PIR have their packets marked high PLP.

For information about how to use marking policers with BA and multifield classifiers, see [“Using BA Classifiers to Set PLP” on page 29](#) and [“Using Multifield Classifiers to Set Packet Loss Priority” on page 30](#).

## Tricolor Marking Limitations

Tricolor Marking (TCM) has some limitations that must be kept in mind during configuration and operation.

The following limitations apply to TCM:



- When you enable TCM on a 10-port Gigabit Ethernet PIC or a 10-Gigabit Ethernet PIC, for queues 6 and 7 only, the output of the **show interfaces queue *interface-name*** command does not display the number of queued bytes and packets, or the number of bytes and packets dropped due to RED. If you do not configure tricolor marking on the interface, these statistics are available for all queues.
- When you enable TCM, Transmission Control Protocol (TCP)-based configurations for drop profiles are rejected. In other words, you cannot include the **protocol** statement at the **[edit class-of-service schedulers *scheduler-name* drop-profile-map]** hierarchy level. The result is that drop profiles are applied to packets with the specified PLP and any protocol type.
- On Gigabit Ethernet IQ PICs, for IEEE 802.1 rewrite rules, only two loss priorities are supported. Exiting packets with medium-high loss priority are treated as high, and packets with medium-low loss priority are treated as low. In other words rewrite rules corresponding to high and low apply instead of those corresponding to medium-high and medium-low. For IQ PICs, you can only configure one IEEE 802.1 rewrite rule on a physical port. All logical ports (units) on that physical port should apply the same IEEE 802.1 rewrite rule.
- When some PICs with Frame Relay encapsulation mark a packet with high loss priority, the packet is treated as having medium-high loss priority on M320 Multiservice Edge Routers and T Series Core Routers with Enhanced II FPCs and T640 Core Routers with Enhanced Scaling FPC4.
- In a single firewall filter term, you cannot configure both the **loss-priority** action modifier and the **three-color-policer** action modifier. These statements are mutually exclusive.

## Policer Support for Aggregated Ethernet Bundle Overview

Aggregated interfaces support single-rate policers, three-color marking policers, two-rate three-color marking policers, hierarchical policers, and percentage-based policers. By default, policer bandwidth and burst-size applied on aggregated bundles is not matched to the user-configured bandwidth and burst-size.

You can configure interface-specific policers applied on an aggregated Ethernet bundle or an aggregated SONET bundle to match the effective bandwidth and burst-size to user-configured values. The **shared-bandwidth-policer** statement is required to achieve this match behavior.

This capability applies to all interface-specific policers of the following types: single-rate policers, single-rate three-color marking policers, two-rate three-color marking policers, and hierarchical policers. Percentage-based policers match the bandwidth to the user-configured values by default, and do not require shared-bandwidth-policer configuration. The **shared-bandwidth-policer** statement causes a split in burst-size for percentage-based policers.



**NOTE:** This feature is supported on the following platforms: T Series routers (excluding T4000 Type 5 FPCs), M120, M10i, M7i (CFEB-E only), M320 (SFPC only), MX240, MX480, and MX960 with DPC, MIC, and MPC interfaces, and EX Series switches.

The following usage scenarios are supported:

- Interface policers used by the following configuration:  

```
[edit] interfaces (aeX | asX) unit unit-num family family policer [input | output | arp]
```
- Policers and three-color policers (both single-rate three-color marking and two-rate three-color marking) used inside interface-specific filters; that is, filters that have an interface-specific keyword and are used by the following configuration:  

```
[edit] interfaces (aeX | asX) unit unit-num family family filter [input | output]
```
- Common-edge service filters, which are derived from CLI-configured filters and thus inherit interface-specific properties. All policers and three-color policers used by these filters are also affected.

The following usage scenarios are not supported:

- Policers and three-color policers used inside filters that are not interface specific; such a filter is meant to be shared across multiple interfaces.
- Any implicit policers or policers that are part of implicit filters; for example, the default ARP policer applied to an aggregate Ethernet interface. Such a policer is meant to be shared across multiple interfaces.
- Prefix-specific action policers.

To configure this feature, include the **shared-bandwidth-policer** statement at the following hierarchy levels: `[edit firewall policer policer-name]`, `[edit firewall three-color-policer policer-name]`, or `[edit firewall hierarchical-policer policer-name]`.

**Related Documentation**

- [shared-bandwidth-policer on page 74](#)



## PART 2

# Configuration

- [Configuration Tasks for Tricolor Marking Policers on page 15](#)
- [Configuration Tasks for Packet Loss Priority on page 29](#)
- [Configuration Statements for Tricolor Marking Policers on page 35](#)



## CHAPTER 2

# Configuration Tasks for Tricolor Marking Policers

- [Configuring Tricolor Marking on page 15](#)
- [Configuring Single-Rate Tricolor Marking on page 16](#)
- [Configuring Two-Rate Tricolor Marking on page 19](#)
- [Enabling Tricolor Marking on page 22](#)
- [Configuring Tricolor Marking Policers on page 23](#)
- [Applying Tricolor Marking Policers to Firewall Filters on page 24](#)
- [Applying Firewall Filter Tricolor Marking Policers to Interfaces on page 26](#)
- [Applying Layer 2 Policers to Gigabit Ethernet Interfaces on page 27](#)

## Configuring Tricolor Marking

---

You configure marking policers by defining the policer and multiple levels of PLP for classifiers, rewrite rules, random early detection (RED) drop profiles, and firewall filters. To configure marking policers, include the following statements at the **[edit class-of-service]** hierarchy level:

```
[edit class-of-service]
tri-color;
classifiers {
  (dscp | dscp-ipv6 | exp | ieee-802.1 | inet-precedence) classifier-name {
    import classifier-name | default;
    forwarding-class class-name {
      loss-priority (low | medium-low | medium-high | high) code-points [ aliases ]
        [ bit-patterns ];
    }
  }
}
rewrite-rules {
  (dscp | dscp-ipv6 | exp | ieee-802.1 | inet-precedence) rewrite-name {
    import (rewrite-name | default);
    forwarding-class class-name {
      loss-priority (low | medium-low | medium-high | high) code-point (aliases |
        bit-patterns);
    }
  }
}
```

```
}
schedulers {
  scheduler-name {
    drop-profile-map loss-priority (any | low | medium-low | medium-high | high) protocol
    any drop-profile profile-name;
  }
}

[edit firewall]
policer name {
  then loss-priority (low | medium-low | medium-high | high);
}
three-color-policer policer-name {
  action {
    loss-priority high then discard; # Only for IQ2 PICs
  }
  logical-interface-policer;
  single-rate {
    (color-aware | color-blind);
    committed-information-rate bps;
    committed-burst-size bytes;
    excess-burst-size bytes;
  }
  two-rate {
    (color-aware | color-blind);
    committed-information-rate bps;
    committed-burst-size bytes;
    peak-information-rate bps;
    peak-burst-size bytes;
  }
}
filter filter-name {
  <family family> {
    term rule-name {
      then {
        three-color-policer (single-rate | two-rate) policer-name;
      }
    }
  }
}
```

**Related Documentation**

- [Traffic Policing Overview on page 3](#)

---

## Configuring Single-Rate Tricolor Marking

With TCM, you can configure traffic policing according to two separate modes—color-blind and color-aware. In color-blind mode, the current PLP value is ignored. In color-aware mode, the current PLP values are considered by the policer and can only be increased.

- [Configuring Color-Blind Mode for Single-Rate Tricolor Marking on page 17](#)
- [Configuring Color-Aware Mode for Single-Rate Tricolor Marking on page 17](#)



## Configuring Color-Blind Mode for Single-Rate Tricolor Marking

All packets are evaluated by the CBS. If a packet exceeds the CBS, it is evaluated by the EBS. In color-blind mode, the policer supports three loss priorities only: low, medium-high, and high.

In color-blind mode, packets that exceed the CBS but are below the EBS are marked yellow (medium-high). Packets that exceed the EBS are marked red (high), as shown in [Table 3 on page 17](#).

**Table 3: Color-Blind Mode TCM Color-to-PLP Mapping**

Color	PLP	Meaning
Green	low	Packet does not exceed the CBS.
Yellow	medium-high	Packet exceeds the CBS but does not exceed the EBS.
Red	high	Packet exceeds the EBS.

If you are using color-blind mode and you wish to configure an output policer that marks packets to have medium-low loss priority, you must configure a policer at the **[edit firewall policer *policer-name*]** hierarchy level. For example:

```
firewall {
  policer 4PLP {
    if-exceeding {
      bandwidth-limit 40k;
      burst-size-limit 4k;
    }
    then loss-priority medium-low;
  }
}
```

Apply this policer at one or both of the following hierarchy levels:

- **[edit firewall family *family* filter *filter-name* term *rule-name* then policer *policer-name*]**
- **[edit interfaces *interface-name* unit *logical-unit-number* family *family* filter *filter-name*]**

## Configuring Color-Aware Mode for Single-Rate Tricolor Marking

In color-aware mode, the metering treatment the packet receives depends on its classification. Metering can increase a packet's preassigned PLP, but cannot decrease it, as shown in [Table 4 on page 18](#).

Table 4: Color-Aware Mode TCM PLP Mapping

Incoming PLP	Packet Metered Against	Possible Cases	Outgoing PLP
low	CBS and EBS	Packet does not exceed the CBS.	low
		Packet exceeds the CBS but not the EBS.	medium-high
		Packet exceeds the EBS.	high
medium-low	EBS only	Packet does not exceed the CBS.	medium-low
		Packet does not exceed the EBS.	medium-low
		Packet exceeds the EBS.	high
medium-high	EBS only	Packet does not exceed the CBS.	medium-high
		Packet does not exceed the EBS.	medium-high
		Packet exceeds the EBS.	high
high	Not metered by the policer.	All cases.	high

The following sections describe single-rate color-aware PLP mapping in more detail.

#### Effect on Low PLP of Single-Rate Policer

Packets belonging to the green class have already been marked by a classifier with low PLP. The marking policer can leave the packet's PLP unchanged or increase the PLP to medium-high or high. Therefore, these packets are metered against both the CBS and the EBS.

For example, if a BA or multifield classifier marks a packet with low PLP according to the type-of-service (ToS) bits in the IP header, and the two-rate TCM policer is in color-aware mode, the output loss priority is as follows:

- If the rate of traffic flow is less than the CBS, packets remain marked as low PLP.
- If the rate of traffic flow is greater than the CBS but less than the EBS, some of the packets are marked as medium-high PLP, and some of the packets remain marked as low PLP.
- If the rate of traffic flow is greater than the EBS, some of the packets are marked as high PLP, and some of the packets remain marked as low PLP.

#### Effect on Medium-Low PLP of Single-Rate Policer

Packets belonging to the yellow class have already been marked by a classifier with medium-low or medium-high PLP. The marking policer can leave the packet's PLP

unchanged or increase the PLP to high. Therefore, these packets are metered against the EBS only.

For example, if a BA or multifield classifier marks a packet with medium-low PLP according to the ToS bits in the IP header, and the two-rate TCM policer is in color-aware mode, the output loss priority is as follows:

- If the rate of traffic flow is less than the CBS, packets remain marked as medium-low PLP.
- If the rate of traffic flow is greater than the CBS but less than the EBS, packets remain marked as medium-low PLP.
- If the rate of traffic flow is greater than the EBS, some of the packets are marked as high PLP, and some of the packets remain marked as medium-low PLP.

#### **Effect on Medium-High PLP of Single-Rate Policer**

---

Packets belonging to the yellow class have already been marked by a classifier with medium-low or medium-high PLP. The marking policer can leave the packet's PLP unchanged or increase the PLP to high. Therefore, these packets are metered against the EBS only.

For example, if a BA or multifield classifier marks a packet with medium-high PLP according to the ToS bits in the IP header, and the two-rate TCM policer is in color-aware mode, the output loss priority is as follows:

- If the rate of traffic flow is less than the CBS, packets remain marked as medium-high PLP.
- If the rate of traffic flow is greater than the CBS but less than the EBS, packets remain marked as medium-high PLP.
- If the rate of traffic flow is greater than the EBS, some of the packets are marked as high PLP, and some of the packets remain marked as medium-high PLP.

#### **Effect on High PLP of Single-Rate Policer**

---

Packets belonging to the red class have already been marked by a classifier with high PLP. The marking policer can only leave the packet's PLP unchanged. Therefore, these packets are not metered against the CBS or the EBS and all the packets remain marked as high PLP.

## **Configuring Two-Rate Tricolor Marking**

---

With TCM, you can configure traffic policing according to two separate modes—color-blind and color-aware. In color-blind mode, the current PLP value is ignored. In color-aware mode, the current PLP values are considered by the policer and can only be increased.

- [Configuring Color-Blind Mode for Two-Rate Tricolor Marking on page 20](#)
- [Configuring Color-Aware Mode for Two-Rate Tricolor Marking on page 20](#)

## Configuring Color-Blind Mode for Two-Rate Tricolor Marking

All packets are evaluated by the CIR. If a packet exceeds the CIR, it is evaluated by the PIR. In color-blind mode, the policer supports three loss priorities only: low, medium-high, and high.

In color-blind mode, packets that exceed the CIR but are below the PIR are marked yellow (medium-high). Packets that exceed the PIR are marked red (high), as shown in [Table 5 on page 20](#).

**Table 5: Color-Blind Mode TCM Color-to-PLP Mapping**

Color	PLP	Meaning
Green	low	Packet does not exceed the CIR.
Yellow	medium-high	Packet exceeds the CIR but does not exceed the PIR.
Red	high	Packet exceeds the PIR.

If you are using color-blind mode and you want to configure an output policer that marks packets to have medium-low loss priority, you must configure a policer at the **[edit firewall policer *policer-name*]** hierarchy level. For example:

```
firewall {
  policer 4PLP {
    if-exceeding {
      bandwidth-limit 40k;
      burst-size-limit 4k;
    }
    then loss-priority medium-low;
  }
}
```

Apply this policer at one or both of the following hierarchy levels:

- **[edit firewall family *family* filter *filter-name* term *rule-name* then policer *policer-name*]**
- **[edit interfaces *interface-name* unit *logical-unit-number* family *family* filter *filter-name*]**

## Configuring Color-Aware Mode for Two-Rate Tricolor Marking

In color-aware mode, the metering treatment the packet receives depends on its classification. Metering can increase a packet's preassigned PLP, but cannot decrease it, as shown in [Table 6 on page 21](#).

Table 6: Color-Aware Mode TCM Mapping

Incoming PLP	Packet Metered Against	Possible Cases	Outgoing PLP	Outgoing PLP (MPCs Only)
low	CIR and PIR	Packet does not exceed the CIR.	low	low
		Packet exceeds the CIR but not the PIR.	medium-high	medium-high
		Packet exceeds the PIR.	high	high
medium-low	PIR only	Packet does not exceed the CIR.	medium-low	medium-high
		Packet does not exceed the PIR.	medium-low	medium-high
		Packet exceeds the PIR.	high	high
medium-high	PIR only	Packet does not exceed the CIR.	medium-high	medium-high
		Packet does not exceed the PIR.	medium-high	medium-high
		Packet exceeds the PIR.	high	high
high	Not metered by the policer.	All cases.	high	high

The following sections describe color-aware two-rate PLP mapping in more detail.

#### Effect on Low PLP of Two-Rate Policer

Packets belonging to the green class have already been marked by a classifier with low PLP. The marking policer can leave the packet's PLP unchanged or increase the PLP to medium-high or high. Therefore, these packets are metered against both the CIR and the PIR.

For example, if a BA or multifield classifier marks a packet with low PLP according to the ToS bits in the IP header, and the two-rate TCM policer is in color-aware mode, the output loss priority is as follows:

- If the rate of traffic flow is less than the CIR, packets remain marked as low PLP.
- If the rate of traffic flow is greater than the CIR but less than the PIR, some of the packets are marked as medium-high PLP, and some of the packets remain marked as low PLP.
- If the rate of traffic flow is greater than the PIR, some of the packets are marked as high PLP, and some of the packets remain marked as low PLP.

#### Effect on Medium-Low PLP of Two-Rate Policer

Packets belonging to the yellow class have already been marked by a classifier with medium-low or medium-high PLP. The marking policer can leave the packet's PLP

unchanged or increase the PLP to high. Therefore, these packets are metered against the PIR only.

For example, if a BA or multifield classifier marks a packet with medium-low PLP according to the ToS bits in the IP header, and the two-rate TCM policer is in color-aware mode, the output loss priority is as follows:

- If the rate of traffic flow is less than the CIR, packets remain marked as medium-low PLP. (MPCs mark the packets as medium-high.)
- If the rate of traffic flow is greater than the CIR/CBS but less than the PIR, packets remain marked as medium-low PLP. (MPCs mark the packets as medium-high.)
- If the rate of traffic flow is greater than the PIR, some of the packets are marked as high PLP, and some of the packets remain marked as medium-low PLP.

---

#### Effect on Medium-High PLP of Two-Rate Policer

Packets belonging to the yellow class have already been marked by a classifier with medium-low or medium-high PLP. The marking policer can leave the packet's PLP unchanged or increase the PLP to high. Therefore, these packets are metered against the PIR only.

For example, if a BA or multifield classifier marks a packet with medium-high PLP according to the ToS bits in the IP header, and the two-rate TCM policer is in color-aware mode, the output loss priority is as follows:

- If the rate of traffic flow is less than the CIR, packets remain marked as medium-high PLP.
- If the rate of traffic flow is greater than the CIR but less than the PIR, packets remain marked as medium-high PLP.
- If the rate of traffic flow is greater than the PIR, some of the packets are marked as high PLP, and some of the packets remain marked as medium-high PLP.

---

#### Effect on High PLP of Two-Rate Policer

Packets belonging to the red class have already been marked by a classifier with high PLP. The marking policer can only leave the packet's PLP unchanged. Therefore, these packets are not metered against the CIR or the PIR and all the packets remain marked as high PLP.

---

## Enabling Tricolor Marking

By default, TCM is enabled on M120, MX Series, and T4000 routers, and EX Series switches. To enable TCM on other routers, include the **tri-color** statement at the **[edit class-of-service]** hierarchy level:

```
[edit class-of-service]
tri-color;
```

This statement is necessary on the following routers:

- M320 and T Series routers with Enhanced II FPCs
- T640 routers with Enhanced Scaling FPC4s

If you do not include this statement in the configuration on platforms that require it, you cannot configure medium-low or medium-high PLP for classifiers, rewrite rules, drop profiles, or firewall filters.

## Configuring Tricolor Marking Policers

A tricolor marking policer polices traffic on the basis of metering rates, including the CIR, the PIR, their associated burst sizes, and any policing actions configured for the traffic. To configure a tricolor marking policer, include the following statements at the **[edit firewall]** hierarchy level:

```
[edit firewall]
three-color-policer name {
  action {
    loss-priority high then discard; # Only for IQ2 PICs
  }
  logical-interface-policer;
  single-rate {
    (color-aware | color-blind);
    committed-information-rate bps;
    committed-burst-size bytes;
    excess-burst-size bytes;
  }
  two-rate {
    (color-aware | color-blind);
    committed-information-rate bps;
    committed-burst-size bytes;
    peak-information-rate bps;
    peak-burst-size bytes;
  }
}
```

You can configure a tricolor policer to discard high loss priority traffic on a logical interface in the ingress or egress direction. To configure a policer on a logical interface using tricolor marking policing to discard high loss priority traffic, include the **logical-interface-policer** statement and **action** statement.

In all cases, the range of allowable bits-per-second or byte values is 1500 to 100,000,000,000. You can specify the values for bps and bytes either as complete decimal numbers or as decimal numbers followed by the abbreviation **k** (1000), **m** (1,000,000), or **g** (1,000,000,000).

The color-aware policer implicitly marks packets into four loss priority categories:

- Low
- Medium-low

- Medium-high
- High

The color-blind policer implicitly marks packets into three loss priority categories:

- Low
- Medium-high
- High

[Table 7 on page 24](#) describes all the configurable TCM statements.

**Table 7: Tricolor Marking Policer Statements**

Statement	Meaning	Configurable Values
<b>single-rate</b>	Marking is based on the CIR, CBS, and EBS.	—
<b>two-rate</b>	Marking is based on the CIR, PIR, and rated burst sizes.	—
<b>color-aware</b>	Metering depends on the packet's preclassification. Metering can increase a packet's assigned PLP, but cannot decrease it.	—
<b>color-blind</b>	All packets are evaluated by the CIR or CBS. If a packet exceeds the CIR or CBS, it is evaluated by the PIR or EBS.	—
<b>committed-information-rate</b>	Guaranteed bandwidth under normal line conditions and the average rate up to which packets are marked green.	1500 through 100,000,000,000 bps
<b>committed-burst-size</b>	Maximum number of bytes allowed for incoming packets to burst above the CIR, but still be marked green.	1500 through 100,000,000,000 bytes
<b>excess-burst-size</b>	Maximum number of bytes allowed for incoming packets to burst above the CIR, but still be marked yellow.	1500 through 100,000,000,000 bytes
<b>peak-information-rate</b>	Maximum achievable rate. Packets that exceed the CIR but are below the PIR are marked yellow. Packets that exceed the PIR are marked red.	1500 through 100,000,000,000 bps
<b>peak-burst-size</b>	Maximum number of bytes allowed for incoming packets to burst above the PIR, but still be marked yellow.	1500 through 100,000,000,000 bytes

## Applying Tricolor Marking Policers to Firewall Filters

To rate-limit traffic by applying a tricolor marking policer to a firewall filter, include the **three-color-policer** statement:

```
three-color-policer {
  (single-rate | two-rate) policer-name;
}
```



You can include this statement at the following hierarchy levels:

- [edit firewall family *family* filter *filter-name* term *rule-name* then]
- [edit firewall filter *filter-name* term *rule-name* then]

In the **family** statement, the protocol family can be **any**, **ccc**, **inet**, **inet6**, **mpls**, or **vpls**.

You must identify the referenced policer as a **single-rate** or **two-rate** policer, and this statement must match the configured TCM policer. Otherwise, an error message appears in the configuration listing.

For example, if you configure **srTCM** as a single-rate TCM policer and try to apply it as a two-rate policer, the following message appears:

```
[edit firewall]
user@host# show three-color-policer srTCM
single-rate {
    color-aware;
    ...
}
user@host# show filter TESTER
term A {
    then {
        three-color-policer {
            ##
            ## Warning: Referenced two-rate policer does not exist
            ##
            two-rate srTCM;
        }
    }
}
```

### Example: Applying a Two-Rate Tricolor Marking Policer to a Firewall Filter

Apply the **trtcm1-cb** policer to a firewall filter:

```
firewall {
    three-color-policer trtcm1-cb { # Configure the trtcm1-cb policer.
        two-rate {
            color-blind;
            committed-information-rate 1048576;
            committed-burst-size 65536;
            peak-information-rate 10485760;
            peak-burst-size 131072;
        }
    }
}
filter fil { # Configure the fil firewall filter, applying the trtcm1-cb policer.
    term default {
        then {
            three-color-policer {
                two-rate trtcm1-cb;
            }
        }
    }
}
```

**Related Documentation**

- *Routing Policies, Firewall Filters, and Traffic Policers Feature Guide for Routing Devices*

## Applying Firewall Filter Tricolor Marking Policers to Interfaces

To apply a tricolor marking policer to an interface, you must reference the filter name in the interface configuration. To do this, include the **filter** statement:

```
filter {
  input filter-name;
  output filter-name;
}
```

You can include these statements at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number* family *family*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family *family*]

The filter name that you reference should have an attached tricolor marking policer, as shown in “[Applying Tricolor Marking Policers to Firewall Filters](#)” on page 24.

### Example: Applying a Single-Rate Tricolor Marking Policer to an Interface

Apply the **trtcm1-cb** policer to an interface:

```
firewall {
  three-color-policer srtcm1 { # Configure the srtcm1-cb policer.
    single-rate {
      color-blind;
      committed-information-rate 1048576;
      committed-burst-size 65536;
      excess-burst-size 131072;
    }
  }
  filter fil { # Configure the fil firewall filter, applying the srtcm1-cb policer.
    term default {
      then {
        three-color-policer {
          single-rate srtcm1-cb; # The TCM policer must be single-rate.
        }
      }
    }
  }
}
interfaces { # Configure the interface, which attaches the fil firewall filter.
  ge-1/0/0 {
    unit 0 {
      family inet {
        filter {
          input fil;
        }
      }
    }
  }
}
```

## Applying Layer 2 Policers to Gigabit Ethernet Interfaces

To rate-limit traffic by applying a policer to a Gigabit Ethernet interface (or a 10-Gigabit Ethernet interface [*xe-fpc/pic/port*]), include the **layer2-policer** statement with the direction, type, and name of the policer:

```
[edit interfaces ge-fpc/pic/port unit 0]
layer2-policer {
  input-policer policer-name;
  input-three-color policer-name;
  output-policer policer-name;
  output-three-color policer-name;
}
```

The direction (input or output) and type (policer or three-color) are combined into one statement and the policer named must be properly configured.

One input or output policer of either type can be configured on the interface.

### Examples: Applying Layer 2 Policers to a Gigabit Ethernet Interface

Apply color-blind and color-aware two-rate TCM policers as input and output policers to a Gigabit Ethernet interface:

```
ge-1/0/0 {
  unit 0
  layer2-policer {
    input-three-color trTCM1-cb; # Apply the trTCM1-color-blind policer.
    output-three-color trTCM1-ca; # Apply the trTCM1-color-aware policer.
  }
}
```

Apply two-level and color-blind single-rate TCM policers as input and output policers to a Gigabit Ethernet interface:

```
ge-1/0/0 {
  unit 1
  layer2-policer {
    input-policer two-color-policer; # Apply a two-color policer.
    output-three-color srTCM2-cb; # Apply the srTCM1-color-blind policer.
  }
}
```

Apply a color-aware single-rate TCM policer as output policer on a Gigabit Ethernet interface:

```
ge-1/0/0 {
  unit 2
  layer2-policer {
    output-three-color srTCM3-ca { # Apply the srTCM3-color-aware policer.
  }
}
```



## CHAPTER 3

# Configuration Tasks for Packet Loss Priority

- [Using BA Classifiers to Set PLP on page 29](#)
- [Using Multifield Classifiers to Set Packet Loss Priority on page 30](#)
- [Determining Packet Drop Behavior by Configuring Drop Profile Maps for Schedulers on page 31](#)
- [Configuring Rewrite Rules Based on PLP on page 32](#)

## Using BA Classifiers to Set PLP

---

Behavior aggregate (BA) classifiers take action on incoming packets. When TCM is enabled, Juniper Networks M320 Multiservice Edge Routers and T Series Core Routers support four classifier PLP designations: **low**, **medium-low**, **medium-high**, and **high**. To configure the PLP for a classifier, include the following statements at the **[edit class-of-service]** hierarchy level:

```
[edit class-of-service]
classifiers {
  (dscp | dscp-ipv6 | exp | ieee-802.1 | inet-precedence) classifier-name {
    import (classifier-name | default);
    forwarding-class class-name {
      loss-priority (low | medium-low | medium-high | high) code-points [ aliases ]
      [ bit-patterns ];
    }
  }
}
```

The inputs for a classifier are the CoS values. The outputs for a classifier are the forwarding class and the loss priority (PLP). A classifier sets the forwarding class and the PLP for each packet entering the interface with a specific set of CoS values.

For example, in the following configuration, the **assured-forwarding** forwarding class and **medium-low** PLP are assigned to all packets entering the interface with the **101110** CoS values:

```
class-of-service {
  classifiers {
    dscp dscp-cl {
      forwarding-class assured-forwarding {
```

```
        loss-priority medium-low {
            code-points 101110;
        }
    }
}
```

To use this classifier, you must configure the settings for the **assured-forwarding** forwarding class at the **[edit class-of-service forwarding-classes queue *queue-number* assured-forwarding]** hierarchy level. For more information, see *Forwarding Classes Overview*.

---

## Using Multifield Classifiers to Set Packet Loss Priority

Multifield classifiers take action on incoming or outgoing packets, depending whether the firewall rule is applied as an input filter or an output filter. When tricolor marking (TCM) is enabled, Juniper Networks M320 Multiservice Edge Routers and T Series Core Routers support four multifield classifier packet loss priority (PLP) designations: **low**, **medium-low**, **medium-high**, and **high**.

To configure the PLP for a multifield classifier, include the **loss-priority** statement in a policer or firewall filter that you configure at the at the **[edit firewall]** hierarchy level:

```
[edit firewall]
family family-name {
  filter filter-name {
    term term-name {
      from {
        match-conditions;
      }
      then {
        loss-priority (low | medium-low | medium-high | high);
        forwarding-class class-name;
      }
    }
  }
}
```

The inputs (match conditions) for a multifield classifier are one or more of the six packet header fields: destination address, source address, IP protocol, source port, destination port, and DSCP. The outputs for a multifield classifier are the forwarding class and the loss priority (PLP). In other words, a multifield classifier sets the forwarding class and the PLP for each packet entering or exiting the interface with a specific destination address, source address, IP protocol, source port, destination port, or DSCP.

For example, in the following configuration, the forwarding class **expedited-forwarding** and PLP **medium-high** are assigned to all IPv4 packets with the 10.1.1.0/24 or 10.1.2.0/24 source address:

```
firewall {
  family inet {
    filter classify-customers {
      term isp1-customers {
```

```

    from {
      source-address 10.1.1.0/24;
      source-address 10.1.2.0/24;
    }
    then {
      loss-priority medium-high;
      forwarding-class expedited-forwarding;
    }
  }
}
}
}

```

To use this classifier, you must configure the settings for the **expedited-forwarding** forwarding class at the **[edit class-of-service forwarding-classes queue *queue-number* expedited-forwarding]** hierarchy level. For more information, see *Forwarding Classes Overview*.

## Determining Packet Drop Behavior by Configuring Drop Profile Maps for Schedulers

RED drop profiles take action on outgoing packets. When TCM is enabled, M320, MX Series, and T Series routers support four drop-profile map PLP designations: **low**, **medium-low**, **medium-high**, and **high**.

Drop-profile maps associate RED drop profiles with a scheduler. The map examines the current loss priority setting of the packet (**low**, **medium-low**, **medium-high**, or **high**) and assigns a drop profile according to these values. For example, you can specify that all TCP packets with **low** loss priority are assigned a drop profile that you name **low-drop**. You can associate multiple drop-profile maps with a single queue.

The scheduler drop profile defines the drop probabilities across the range of delay-buffer occupancy, thereby supporting the RED process. Depending on the drop probabilities, RED might drop packets aggressively long before the buffer becomes full, or it might drop only a few packets even if the buffer is almost full. For information on how to configure drop profiles, see *Defining Packet Drop Behavior by Configuring RED Drop Profiles*.

By default, the drop profile is mapped to packets with low PLP and any protocol type. To configure how packet loss priorities are mapped to a specified drop profile, include the **drop-profile-map** statement at the **[edit class-of-service schedulers *scheduler-name*]** hierarchy level:

```

[edit class-of-service schedulers scheduler-name ]
  drop-profile-map loss-priority (any | low | medium-low | medium-high | high) protocol
    (any | non-tcp | tcp) drop-profile profile-name;

```

When you configure TCM, the drop-profile map's protocol type must be **any**.

The map sets the drop profile for a specific PLP and protocol type. The inputs for the map are the PLP and the protocol type. The output is the drop profile. In other words, the map sets the drop profile for each packet with a specific PLP and protocol type exiting the interface. For more information about how CoS maps work, see *Mapping CoS Component Inputs to Outputs*.



**NOTE:** On Juniper Network MX Series 3D Universal Edge Routers, T4000 Core Routers, EX Series switches, and PTX Series Packet Transport Routers, you can configure only the `any` option for the `protocol` statement.

As an example, in the following configuration, the **dp** drop profile is assigned to all packets exiting the interface with a medium-low PLP and belonging to any protocol:

```
class-of-service {
  schedulers {
    af {
      drop-profile-map loss-priority medium-low protocol any drop-profile dp;
    }
  }
}
```

To use this drop-profile map, you must configure the settings for the **dp** drop profile at the **[edit class-of-service drop-profiles dp]** hierarchy level. For more information, see *Managing Congestion Using RED Drop Profiles and Packet Loss Priorities*.

For each scheduler, you can configure separate drop profile maps for each loss priority.

You can configure a maximum of 32 different drop profiles.

#### Related Documentation

- *Defining Packet Drop Behavior by Configuring RED Drop Profiles*

## Configuring Rewrite Rules Based on PLP

Rewrite rules take action on outgoing packets. When TCM is enabled, M320 and T Series routers support four rewrite PLP designations: **low**, **medium-low**, **medium-high**, and **high**. To configure the PLP for a rewrite rule, include the following statements at the **[edit class-of-service]** hierarchy level:

```
[edit class-of-service]
rewrite-rules {
  (dscp | dscp-ipv6 | exp | ieee-802.1 | inet-precedence) rewrite-name {
    import (rewrite-name | default);
    forwarding-class class-name {
      loss-priority (low | medium-low | medium-high | high) code-point (alias | bits);
    }
  }
}
```

The inputs for a rewrite rule are the forwarding class and the loss priority (PLP). The output for a rewrite rule are the CoS values. In other words, a rewrite rule sets the CoS values for each packet exiting the interface with a specific forwarding class and PLP.

For example, if you configure the following, the **000000** CoS values are assigned to all packets exiting the interface with the **assured-forwarding** forwarding class and **medium-high** PLP:

```
class-of-service {
```



```
rewrite-rules {  
  dscp dscp-rw {  
    forwarding-class assured-forwarding {  
      loss-priority medium-high code-point 000000;  
    }  
  }  
}
```

To use this classifier, you must configure the settings for the **assured-forwarding** forwarding class at the **[edit class-of-service forwarding-classes queue *queue-number* assured-forwarding]** hierarchy level. For more information, see *Forwarding Classes Overview*.



## CHAPTER 4

# Configuration Statements for Tricolor Marking Policers

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---

## [\[edit class-of-service\] Hierarchy Level](#)

---

```
class-of-service {
  classifiers {
    type classifier-name {
      forwarding-class class-name {
        loss-priority (high | low | medium-high | medium-low) code-points [ aliases bits ];
      }
      import (classifier-name | default);
    }
  }
  code-point-aliases {
    (dscp | dscp-ipv6 | exp | ieee-802.1 | ieee-802.1ad | inet-precedence) {
      alias-name bits;
    }
  }
  drop-profiles {
    profile-name {
      fill-level percentage drop-probability percentage;
      interpolate {
        drop-probability value;
        fill-level value;
      }
    }
  }
  fabric {
    scheduler-map {
      priority (high | low) scheduler scheduler-name;
    }
  }
  forwarding-class-map {
    map-name {
      class class-name queue-num queue-number <restricted-queue queue-number>;
    }
  }
}
```

```

forwarding-classes {
  class class-name policing-priority (normal | premium) queue-num queue-number
    priority (high | low);
  queue queue-number class-name policing-priority (normal | premium) priority (high |
    low);
}
forwarding-policy {
  class class-name {
    classification-override {
      forwarding-class class-name;
    }
  }
  next-hop-map map-name {
    forwarding-class class-name {
      discard;
      lsp-next-hop [ lsp-regular-expressions ];
      next-hop [ next-hop-names ];
      non-lsp-next-hop;
    }
  }
}
fragmentation-maps {
  map-name {
    forwarding-class class-name {
      drop-timeout milliseconds;
      fragment-threshold bytes;
      multilink-class number;
      no-fragmentation;
    }
  }
}
host-outbound-traffic {
  dscp-code-point value;
  forwarding-class class-name;
  ieee-802.1 {
    default value;
    rewrite-rules;
  }
  tcp {
    raise-internet-control-priority;
  }
}
interfaces {
  ... the interfaces subhierarchy appears after the main [edit class-of-service] hierarchy
  ...
}
restricted-queues {
  forwarding-class class-name queue-number;
}
rewrite-rules {
  (dscp | dscp-ipv6 | exp | frame-relay-de | ieee-802.1 | ieee-802.1ad | inet-precedence)
  rewrite-rule {
    forwarding-class class-name {
      loss-priority level code-point (alias | bits);
    }
  }
}

```

```

        import (rewrite-rule | default);
    }
}
routing-instances routing-instance-name {
    classifiers {
        dscp (classifier-name | default);
        dscp-ipv6 (classifier-name | default);
        exp (classifier-name | default);
        ieee-208.1 (classifier-name | default | encapsulated | vlan-tag (inner | outer));
    }
}
scheduler-maps {
    map-name {
        forwarding-class class-name scheduler scheduler-name;
    }
}
schedulers {
    scheduler-name {
        adjust-minimum value;
        adjust-percent value;
        buffer-size (exact | percent percentage | remainder);
        drop-profile-map loss-priority (any | high | low | medium-high | medium-low)
            protocol any;
        excess-priority (high | low | medium-high | medium-low);
        excess-rate (percent percentage | proportion proportion);
        priority (high | low | medium-high | medium-low | strict-high);
        shaping-rate (bps | percent percentage | burst-size size);
        transmit-rate (bps | percent percentage | remainder) <exact | rate-limit>;
    }
}
traceoptions {
    file <files number> <match regular-expression> <size maximum-file-size>
        <world-readable | no-world-readable>;
    flag flag;
    no-remote-trace;
}
traffic-control-profiles {
    profile-name {
        adjust-minimum rate;
        delay-buffer-rate (bps | cps cps | percent percentage);
        excess-rate (percent percentage | proportion value);
        guaranteed-rate (bps | percent percentage) <burst-size bytes>;
        overhead-accounting (frame-mode | cell-mode) <bytes byte-value>;
        scheduler-map map-name;
        shaping-rate (bps | percent percentage) <burst-size bytes>;
    }
}
tri-color;
}

class-of-service {
    interfaces {
        interface-name {
            excess-bandwidth-share (equal | proportional value);
            input-excess-bandwidth-share (equal | proportional value);
            input-scheduler-map map-name;
        }
    }
}

```

```

input-shaping-rate bps;
input-traffic-control-profile profile-name;
output-forwarding-class-map map-name;
output-traffic-control-profile profile-name;
scheduler-map map-name;
scheduler-map-chassis (map-name | derived);
shaping-rate bps;
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-208.1 (classifier-name | default) <vlan-tag (inner | outer)>;
    ieee-208.1ad (classifier-name | default);
    inet-precedence (classifier-name | default);
  }
  forwarding-class class-name;
  input-scheduler-map map-name;
  input-shaping-rate bps;
  input-traffic-control-profile profile-name shared-instance instance-name;
  loss-priority-maps {
    (map-name | default);
  }
  loss-priority-rewrites {
    (map-name | default);
  }
  output-forwarding-class-map map-name;
  output-traffic-control-profile profile-name shared-instance instance-name;
  rewrite-rules {
    dscp (rule-name | default) <protocol mpls>;
    dscp-ipv6 (rule-name | default);
    exp (rule-name | default) <protocol [ mpls-any | mpls-inet-both |
      mpls-inet-both-non-vpn ]>;
    exp-push-push-push default;
    exp-swap-push-push default;
    ieee-802.1 (rewrite-name | default) <vlan-tag (outer | outer-and-inner)>;
    ieee-802.1ad (rewrite-name | default) <vlan-tag (outer | outer-and-inner)>;
    inet-precedence (rewrite-name | default) <protocol mpls>;
  }
  scheduler-map map-name;
  shaping-rate bps;
  translation-table (to-dscp-from-dscp | to-dscp-ipv6-from-dscp-ipv6 |
    to-exp-from-exp | to-inet-precedence-from-inet-precedence) table-name;
}
}
interface-set interface-set-name {
  excess-bandwidth-share (equal | proportional value);
  input-excess-bandwidth-share (equal | proportional value);
  input-traffic-control-profile profile-name;
  input-traffic-control-profile-remaining profile-name;
  internal-node;
  output-traffic-control-profile profile-name;
}

```

```

        output-traffic-control-profile-remaining profile-name;
    }
}

```

**Related Documentation** • *Notational Conventions Used in Junos OS Configuration Hierarchies*

## classifiers (Definition)

**Syntax**

```

classifiers {
    type classifier-name {
        import (classifier-name | default);
        forwarding-class class-name {
            loss-priority level code-points [ aliases ] [ bit-patterns ];
        }
    }
}

```

**Hierarchy Level** [edit class-of-service],  
[edit class-of-service routing-instances *routing-instance-name*]

**Release Information** Statement introduced before Junos OS Release 7.4.  
ieee-802.1ad option introduced in Junos OS Release 9.2.

**Description** Define a CoS behavior aggregate (BA) classifier for classifying packets. You can associate the classifier with a forwarding class or code-point mapping, and import a default classifier or one that is previously defined.



**NOTE:** The [edit class-of-service routing-instances *routing-instance-name*] hierarchy level and the dscp-ipv6 and ieee-802.1ad classifier types are not supported on ACX Series routers.

**Options** *classifier-name*—Name of the aggregate behavior classifier.  
*type*—Traffic type: dscp, dscp-ipv6, exp, ieee-802.1, ieee-802.1ad, inet-precedence.

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

**Related Documentation** • *Understanding How Behavior Aggregate Classifiers Prioritize Trusted Traffic*



## code-points

<b>Syntax</b>	<code>code-points ([ <i>aliases</i> ]   [ <i>bit-patterns</i> ] );</code>
<b>Hierarchy Level</b>	<code>[edit class-of-service classifiers type <i>classifier-name</i> forwarding-class <i>class-name</i> loss-priority <i>level</i>]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 9.2 for SRX Series devices. Statement introduced in Junos OS Release 14.2 for PTX Series Packet Transport Routers.
<b>Description</b>	Specify one or more DSCP code-point aliases or bit sets for association with a forwarding class.
<b>Options</b>	<i>aliases</i> —Name of the DSCP alias.  <i>bit-patterns</i> —Value of the code-point bits, in six-bit binary form.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Understanding How Behavior Aggregate Classifiers Prioritize Trusted Traffic</i></li> <li>• <i>Example: Configuring a Custom DSCP Behavior Aggregate Classifier</i></li> </ul>

## drop-profile (Schedulers)

<b>Syntax</b>	<code>drop-profile <i>profile-name</i>;</code>
<b>Hierarchy Level</b>	<code>[edit class-of-service <a href="#">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)]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers. Statement introduced in Junos OS Release 12.2 for ACX Series Routers.
<b>Description</b>	Define drop profiles for RED. 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.
<b>Options</b>	<i>profile-name</i> —Name of the drop profile.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Determining Packet Drop Behavior by Configuring Drop Profile Maps for Schedulers on page 31</a></li> <li>• <i>Managing Congestion Using RED Drop Profiles and Packet Loss Priorities</i></li> </ul>

## drop-profile-map (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 (Schedulers)</b> <i>profile-name</i> ;
<b>Hierarchy Level</b>	[edit class-of-service <b>schedulers</b> <i>scheduler-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers. Statement introduced in Junos OS Release 12.2 for ACX Series Routers.
<b>Description</b>	Define the loss-priority value for a drop profile.  The statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Default Schedulers Overview</i></li><li>• <a href="#">Determining Packet Drop Behavior by Configuring Drop Profile Maps for Schedulers on page 31</a></li></ul>

## dscp (Multifield Classifier)

<b>Syntax</b>	<code>dscp [0   <i>value</i>];</code>
<b>Hierarchy Level</b>	<code>[edit firewall family <i>family-name</i> filter <i>filter-name</i> term <i>term-name</i> <b>then</b>]</code>
<b>Release Information</b>	Statement introduced in Junos OS Release 7.4.
<b>Description</b>	<p>For M320 and T Series routers, set the DSCP field of incoming or outgoing packets to <b>000000</b>. On the same packets, you can use a behavior aggregate (BA) classifier and a rewrite rule to rewrite the MPLS EXP field.</p> <p>For MX Series routers with MPCs and EX Series switches, the DSCP field can be set from a numeric range.</p> <p>For MX Series routers and EX Series switches, if you configure a firewall filter with a DSCP action or traffic-class action on a DPC, the commit does not fail, but the filter is not applied to the interface, a warning displays, and an entry is made in the syslog.</p>
<b>Options</b>	<b>value</b> —For MX Series routers with MPCs, specify the field of incoming or outgoing packets in the range from <b>0</b> through <b>63</b> .
<b>Required Privilege Level</b>	firewall—To view this statement in the configuration. firewall-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Applying Tricolor Marking Policers to Firewall Filters on page 24</a></li> </ul>

## dscp (Rewrite Rules)

<b>Syntax</b>	<code>dscp (rewrite-name   default) protocol mpls;</code>
<b>Hierarchy Level</b>	[edit class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i> rewrite-rules]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>For IPv4 traffic, apply a Differentiated Services (DiffServ) code point (DSCP) rewrite rule.</p> <p>Logical interfaces do not support multiple <b>dscp</b> rewrite rules for the same protocol.</p> <p>DSCP and DSCP IPv6 rewrite rules are supported on M Series and T Series routers when non-queuing PICs are installed, but are disabled when queuing PICs are installed with the following exceptions:</p> <ul style="list-style-type: none"> <li>On M320 routers, DSCP rewrite is supported on IQ, IQ2, IQE, and IQ2E PICs when used with the Enhanced III FPC.</li> <li>On M120 routers, DSCP rewrite is supported on IQ, IQ2, IQE, and IQ2E PICs.</li> </ul> <p>DSCP and DCSP IPv6 rewrite rules are supported on MIC and MPC interfaces on MX Series routers.</p> <p>DSCP rewrite rules are not supported on T Series routers when IQ, IQ2, IQE, IQ2E, SONET/SDH OC48/STM16 IQE, or PD-5-10XGE-SFPP PICs are installed.</p>
<b>Options</b>	<p><b>rewrite-name</b>—Name of a <b>rewrite-rules</b> mapping configured at the [edit class-of-service rewrite-rules dscp] hierarchy level.</p> <p><b>default</b>—The default mapping.</p> <p><b>protocol mpls</b>—(Optional for ingress MPLS tunnel nodes) For interfaces on MX Series routers or hosted on Enhanced III FPCs in M120 or M320 routers only, rewrite the MPLS EXP bits in the MPLS header independently of the IPv4 DSCP value for IPv4 packets entering an MPLS tunnel.</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>Configuring Rewrite Rules</li> <li>Applying Rewrite Rules to Output Logical Interfaces</li> <li>protocol (Rewrite Rules)</li> <li>Rewriting MPLS and IPv4 Packet Headers</li> <li><a href="#">rewrite-rules (Definition) on page 53</a></li> </ul>

## dscp-ipv6 (CoS Rewrite Rules)

<b>Syntax</b>	<code>dscp-ipv6 (rewrite-name   &lt;default&gt;) protocol mpls;</code>
<b>Hierarchy Level</b>	[edit class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i> rewrite-rules]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Support for <b>protocol mpls</b> option introduced in Junos OS Release 10.4R2.
<b>Description</b>	<p>For IPv6 traffic, apply a DSCP rewrite rule.</p> <p>Logical interfaces do not support multiple <b>dscp-ipv6</b> rewrite rules for the same protocol.</p> <p>DSCP and DSCP IPv6 rewrite rules are supported on M Series and T Series routers when non-queuing PICs are installed, but are disabled when queuing PICs are installed with the following exceptions:</p> <ul style="list-style-type: none"> <li>On M320 routers, DSCP rewrite is supported on IQ, IQ2, IQE, and IQ2E PICs when used with the Enhanced III FPC.</li> <li>On M120 routers, DSCP rewrite is supported on IQ, IQ2, IQE, and IQ2E PICs.</li> </ul> <p>DSCP and DCSP IPv6 rewrite rules are supported on MIC and MPC interfaces on MX Series routers.</p> <p>DSCP rewrite rules are not supported on T Series routers when IQ, IQ2, IQE, IQ2E, SONET/SDH OC48/STM16 IQE, or PD-5-10XGE-SFPP PICs are installed.</p>
<b>Options</b>	<p><b>rewrite-name</b>—Name of a <b>rewrite-rules</b> mapping configured at the [edit class-of-service rewrite-rules dscp-ipv6] hierarchy level.</p> <p><b>default</b>—Default mapping.</p> <p><b>protocol mpls</b>—(Optional for ingress MPLS tunnel nodes) For interfaces on MX Series routers or hosted on Enhanced III FPCs in M120 or M320 routers only, rewrite the MPLS EXP bits in the MPLS header independently of the IPv6 DSCP value for IPv6 packets entering an MPLS tunnel.</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>Configuring Rewrite Rules</li> <li>protocol</li> <li>Setting IPv6 DSCP and MPLS EXP Values Independently</li> <li>Configuring DSCP Values for IPv6 Packets Entering the MPLS Tunnel</li> <li>Applying Rewrite Rules to Output Logical Interfaces</li> <li><a href="#">rewrite-rules (Definition) on page 53</a></li> </ul>

## exp

<b>Syntax</b>	<code>exp (rewrite-name   default) protocol protocol-types;</code>
<b>Hierarchy Level</b>	[edit class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i> rewrite-rules]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced before Junos OS Release 12.2. for ACX series
<b>Description</b>	Apply an MPLS experimental (EXP) rewrite rule.
<b>Options</b>	<p><b>rewrite-name</b>—Name of a <b>rewrite-rules</b> mapping configured at the [edit class-of-service rewrite-rules exp] hierarchy level.</p> <p><b>default</b>—The default mapping.</p> <p>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. This default behavior applies to rewrite rules you configure for MPLS packets with IPv4 payloads. You configure these types of rewrite rules by including the <b>mpls-inet-both</b> or <b>mpls-inet-both-non-vpn</b> option at the [edit class-of-service interfaces <i>interface</i> <i>interface-name</i> unit <i>logical-unit-number</i> rewrite-rules exp <i>rewrite-rule-name</i> protocol] hierarchy level. The IP precedence rewrite rules explanation does not apply to ACX Series Universal Access routers.</p> <p>On interfaces configured on Modular Port Concentrators (MPCs) and Modular Interface Cards (MICs) on MX Series 3D Universal Edge Routers and EX Series switches, we highly recommend that you configure the <b>default</b> option when you configure a behavior aggregate (BA) classifier that does not include a specific rewrite rule for MPLS packets. Doing so ensures that MPLS exp value is rewritten according to the BA classifier rules configured for forwarding or packet loss priority. This does not apply to ACX Series Universal Access routers.</p> <p><b>protocol-types</b>—Specify one or more protocol matching criteria:</p> <ul style="list-style-type: none"> <li>• <b>mpls-any</b>—Apply to MPLS packets, write MPLS header only.</li> <li>• <b>mpls-inet-both</b>—Apply to IPv4 MPLS packets, write MPLS and IPv4 header.</li> <li>• <b>mpls-inet-both-non-vpn</b>—Apply to IPv4 MPLS packets, write MPLS and IPv4 header for only non VPN traffic.</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>• <i>Configuring Rewrite Rules</i></li> <li>• <i>Rewriting the EXP Bits of All Three Labels of an Outgoing Packet</i></li> <li>• <i>Applying Rewrite Rules to Output Logical Interfaces</i></li> <li>• <i>protocol (Rewrite Rules)</i></li> </ul>

- [rewrite-rules \(Definition\)](#) on page 53

## forwarding-class (BA Classifiers)

---

<b>Syntax</b>	<code>forwarding-class <i>class-name</i> {     loss-priority <i>level</i> <i>code-points</i> [ <i>aliases</i> ] [ <i>bit-patterns</i> ]; }</code>
<b>Hierarchy Level</b>	[edit class-of-service classifiers <i>type classifier-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 14.2 for PTX Series Packet Transport Routers.
<b>Description</b>	Define forwarding class name and option values.
<b>Options</b>	<i>class-name</i> —Name of the forwarding class.  The remaining statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Defining Classifiers</a></li> </ul>

## ieee-802.1 (Rewrite Rules on Logical Interface)

---

<b>Syntax</b>	<code>ieee-802.1 (rewrite-name   default) vlan-tag (outer   outer-and-inner);</code>
<b>Hierarchy Level</b>	<code>[edit class-of-service interfaces interface-name unit logical-unit-number rewrite-rules]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. <b>vlan-tag</b> statement introduced in Junos OS Release 8.1.
<b>Description</b>	Apply an IEEE-802.1 rewrite rule. For IQ PICs, you can only configure one IEEE 802.1 rewrite rule on a physical port. All logical ports (units) on that physical port should apply the same IEEE 802.1 rewrite rule.
<b>Options</b>	<b>rewrite-name</b> —Name of a <b>rewrite-rules</b> mapping configured at the <code>[edit class-of-service rewrite-rules ieee-802.1]</code> hierarchy level.  <b>default</b> —The default mapping.
<b>Required Privilege Level</b>	<b>interface</b> —To view this statement in the configuration. <b>interface-control</b> —To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring Rewrite Rules</a></li><li>• <a href="#">dscp (Rewrite Rules) on page 44</a></li><li>• <a href="#">dscp-ipv6 (CoS Rewrite Rules) on page 45</a></li><li>• <a href="#">exp on page 46</a></li><li>• <a href="#">exp-push-push-push</a></li><li>• <a href="#">exp-swap-push-push</a></li><li>• <a href="#">ieee-802.1ad</a></li><li>• <a href="#">inet-precedence (CoS Rewrite Rules) on page 50</a></li><li>• <a href="#">rewrite-rules (Definition) on page 53</a></li></ul>



## import (Classifiers)

---

<b>Syntax</b>	<code>import (classifier-name   default);</code>
<b>Hierarchy Level</b>	<code>[edit class-of-service classifiers type classifier-name]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Specify a default or previously defined classifier.
<b>Options</b>	<p><b>classifier-name</b>—Name of the classifier mapping configured at the <code>[edit class-of-service classifiers]</code> hierarchy level.</p> <p><b>default</b>—The default classifier 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>• <i>Understanding How Behavior Aggregate Classifiers Prioritize Trusted Traffic</i></li> </ul>

## import (Rewrite Rules)

---

<b>Syntax</b>	<code>import (rewrite-name   default);</code>
<b>Hierarchy Level</b>	<code>[edit class-of-service rewrite-rules type rewrite-name]</code>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Specify a default or previously defined <b>rewrite-rules</b> mapping to import.
<b>Options</b>	<p><b>rewrite-name</b>—Name of a rewrite-rules mapping configured at the <code>[edit class-of-service rewrite-rules]</code> hierarchy level.</p> <p><b>default</b>—The default <b>rewrite-rules</b> 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>• <i>Configuring Rewrite Rules</i></li> </ul>

## inet-precedence (CoS Rewrite Rules)

---

<b>Syntax</b>	<code>inet-precedence (<i>rewrite-name</i>   default);</code>
<b>Hierarchy Level</b>	[edit class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i> rewrite-rules]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Apply a IPv4 precedence rewrite rule.
<b>Options</b>	<p><b><i>rewrite-name</i></b>—Name of a <b>rewrite-rules</b> 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>• <i>Configuring Rewrite Rules</i></li><li>• <i>Applying Rewrite Rules to Output Logical Interfaces</i></li><li>• <i>protocol (Rewrite Rules)</i></li><li>• <a href="#">rewrite-rules (Definition) on page 53</a></li></ul>

## loss-priority (Scheduler Drop Profiles)

<b>Syntax</b>	loss-priority (any   high   low   medium-high   medium-low);
<b>Hierarchy Level</b>	[edit class-of-service <a href="#">schedulers</a> <i>scheduler-name</i> <a href="#">drop-profile-map</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers. Statement introduced in Junos OS Release 12.2 for ACX Series Routers.
<b>Description</b>	Specify a loss priority to which to apply a drop 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.
<b>Options</b>	<b>any</b> —The drop profile applies to packets with any PLP.



**NOTE:** On ACX Series Routers, only the **any** option is supported when you configure the **non-tcp** option for [protocol](#).

**high**—The drop profile applies to packets with high PLP.

**low**—The drop profile applies to packets with low 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.

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

<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Default Schedulers Overview</a></li> <li>• <a href="#">Determining Packet Drop Behavior by Configuring Drop Profile Maps for Schedulers on page 31</a></li> <li>• <a href="#">Configuring Schedulers for Priority Scheduling</a></li> <li>• <a href="#">Configuring Tricolor Marking on page 15</a></li> <li>• <a href="#">protocol (Schedulers) on page 52</a></li> </ul>
------------------------------	---

## protocol (Schedulers)

---

<b>Syntax</b>	<code>protocol (any   non-tcp   tcp);</code>
<b>Hierarchy Level</b>	[edit class-of-service <a href="#">schedulers</a> <i>scheduler-name</i> <a href="#">drop-profile-map</a> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1X48 for PTX Series Packet Transport Routers. Statement introduced in Junos OS Release 12.2 for ACX Series Routers.
<b>Description</b>	Specify the protocol type for the specified scheduler.
<b>Options</b>	<b>any</b> —Accept any protocol type.  <b>non-tcp</b> —(ACX Series Routers, M Series and T Series (except T4000) routers only) Accept any protocol type other than TCP/IP.



**NOTE:** On ACX Series Routers, when you configure the **non-tcp** option, only the **any** option is supported for [loss-priority](#).

---

	<b>tcp</b> —(ACX Series Routers, M Series and T Series (except T4000) routers only) Accept TCP/IP protocol type.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring Schedulers</i></li></ul>

## rewrite-rules (Definition)

<b>Syntax</b>	<pre>rewrite-rules {     type <i>rewrite-name</i>{         import (<i>rewrite-name</i>   default);         forwarding-class <i>class-name</i> {             loss-priority <i>level</i> code-point [ <i>aliases</i> ] [ <i>bit-patterns</i> ];         }     } }</pre>
<b>Hierarchy Level</b>	[edit class-of-service]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. ieee-802.1ad option introduced in Junos OS Release 9.2.
<b>Description</b>	Specify a rewrite-rules mapping for the traffic that passes through all queues on the interface.
<b>Options</b>	<p><i>rewrite-name</i>—Name of a rewrite-rules mapping.</p> <p><i>type</i>—Traffic type.</p> <p><b>Values:</b> dscp, dscp-ipv6, exp, ieee-802.1, ieee-802.1ad, inet-precedence</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>Configuring Rewrite Rules</li> </ul>

## schedulers (CoS)

---

<b>Syntax</b>	<pre>schedulers {   scheduler-name {     adjust-minimum <i>rate</i>;     adjust-percent <i>percentage</i>;     buffer-size (<i>seconds</i>   percent <i>percentage</i>   remainder   temporal <i>microseconds</i>);     drop-profile-map loss-priority (any   low   medium-low   medium-high   high) <i>protocol</i>       (any   non-tcp   tcp) drop-profile <i>profile-name</i>;     excess-priority [ low   medium-low   medium-high   high   none];     excess-rate (percent <i>percentage</i>   proportion <i>value</i>);     priority <i>priority-level</i>;     shaping-rate (percent <i>percentage</i>   <i>rate</i>);     transmit-rate (percent <i>percentage</i>   <i>rate</i>   remainder) &lt;exact   rate-limit&gt;;   } }</pre>
<b>Hierarchy Level</b>	[edit class-of-service]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4. Statement introduced in Junos OS Release 12.1X48 for PTX Series routers.
<b>Description</b>	Specify the scheduler name and parameter values.
<b>Options</b>	<p><b><i>scheduler-name</i></b>—Name of the scheduler to be configured.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Schedulers Overview</i></li><li>• <i>Default Schedulers Overview</i></li><li>• <i>Configuring Schedulers</i></li><li>• <i>Configuring a Scheduler</i></li></ul>

## tri-color

<b>Syntax</b>	tri-color;
<b>Hierarchy Level</b>	[edit class-of-service]
<b>Release Information</b>	Statement introduced in Junos OS Release 7.4.
<b>Description</b>	For IPv4 packets on M320, MX Series, T Series routers with Enhanced II Flexible PIC Concentrators (FPCs), and EX Series switches, enable two-rate tricolor marking (TCM), as defined in RFC 2698.
<b>Default</b>	If you do not include this statement, tricolor marking is not enabled and the medium packet loss priority (PLP) is not configurable.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring Tricolor Marking on page 15</a></li> </ul>

## [edit firewall] Hierarchy Level

Several statements in the **[edit firewall]** hierarchy are valid at numerous locations within the hierarchy. .

- [Common Firewall Actions on page 55](#)
- [Common IP Firewall Actions on page 56](#)
- [Common IPv4 and IPv6 Firewall Actions on page 56](#)
- [Common IP Firewall Match Conditions on page 57](#)
- [Common IPv4 Firewall Match Conditions on page 58](#)
- [Common Layer 2 Firewall Match Conditions on page 58](#)
- [Complete \[edit firewall\] Hierarchy on page 60](#)

## Common Firewall Actions

This section lists statements that are valid at the following hierarchy levels, and is referenced at those levels in “[Complete \[edit firewall\] Hierarchy](#)” on page 60 instead of the statements being repeated.

- **[edit firewall family (any | ethernet-switching | inet | inet6) filter *filter-name* term *term-name* then]**
- **[edit firewall filter *filter-name* term *term-name* then]**

The common firewall actions are as follows:

```
count counter-name;
forwarding-class class-name;
```

```

loss-priority (high | low | medium-high | medium-low);
next term;
policer policer-name;
three-color-policer policer-name {
    (single-rate single-rate-policer-name | two-rate two-rate-policer-name);
}

```

## Common IP Firewall Actions

This section lists statements that are valid at the following hierarchy levels, and is referenced at those levels in [“Complete \[edit firewall\] Hierarchy” on page 60](#) instead of the statements being repeated.

- **[edit firewall family inet filter *filter-name* term *term-name* then]**
- **[edit firewall family inet6 filter *filter-name* term *term-name* then]**
- **[edit firewall filter *filter-name* term *term-name* then]**

The common IP firewall actions are as follows:

```

log;
logical-system logical-system-name <routing-instance routing-instance-name>
    <topology topology-name>;
port-mirror;
port-mirror-instance instance-name;
routing-instance routing-instance-name <topology topology-name>;
sample;
service-filter-hit;
syslog;
topology topology-name;

```

## Common IPv4 and IPv6 Firewall Actions

This section lists statements that are valid at the following hierarchy levels, and is referenced at those levels in [“Complete \[edit firewall\] Hierarchy” on page 60](#) instead of the statements being repeated.

- **[edit firewall family inet filter *filter-name* term *term-name* then]**
- **[edit firewall filter *filter-name* term *term-name* then]**

The common IP version 4 (IPv4) and IP version 6 (IPv6) firewall actions are as follows:

```

(accept | discard <accounting collector-name> | reject <administratively-prohibited |
    bad-host-tos | bad-network-tos | fragmentation-needed | host-prohibited |
    host-unknown | host-unreachable | network-prohibited | network-unknown |
    network-unreachable | port-unreachable | precedence-cutoff | precedence-violation |
    protocol-unreachable | source-host-isolated | source-route-failed | tcp-reset>);
ipsec-sa sa-name;
load-balance sa-name;
next-hop-group group-name;
prefix-action action-name;

```



## Common IP Firewall Match Conditions

This section lists statements that are valid at the following hierarchy levels, and is referenced at those levels in “[Complete \[edit firewall\] Hierarchy](#)” on page 60 instead of the statements being repeated.

- **[edit firewall family inet dialer-filter *filter-name* term *term-name* from]** (with the exceptions noted at this level in “[Complete \[edit firewall\] Hierarchy](#)” on page 60)
- **[edit firewall family inet filter *filter-name* term *term-name* from]**
- **[edit firewall family inet6 dialer-filter *filter-name* term *term-name* from]** (with the exceptions noted at this level in “[Complete \[edit firewall\] Hierarchy](#)” on page 60)
- **[edit firewall family inet6 filter *filter-name* term *term-name* from]**
- **[edit firewall filter *filter-name* term *term-name* from]**

The common IP firewall match conditions are as follows:

```

address {
    ip-prefix</prefix-length> <except>;
}
destination-address {
    ip-prefix</prefix-length> <except>;
}
destination-class [ class-names ] | destination-class-except [ class-names ];
(destination-port [ port-names ] | destination-port-except [ port-names ]);
destination-prefix-list {
    list-name <except>;
}
(forwarding-class [ class-names ] | forwarding-class-except [ class-names ]);
 icmp-code [ codes ] | icmp-code-except [ codes ];
 icmp-type [ types ] | icmp-type-except [ types ];
interface interface-name;
(interface-group [ group-names ] | interface-group-except [ group-names ]);
interface-set set-name;
(loss-priority [ priorities ] | loss-priority-except [ priorities ]);
(packet-length [ values ] | packet-length-except [ values ]);
(port [ port-names ] | port-except [ port-names ]);
prefix-list {
    list-name <except>;
}
service-filter-hit;
source-address {
    ip-prefix</prefix-length> <except>;
}
(source-class [ class-names ] | source-class-except [ class-names ]);
(source-port [ port-names ] | source-port-except [ port-names ]);
source-prefix-list {
    list-name <except>;
}
tcp-established;
tcp-flags flag;
tcp-initial;

```

## Common IPv4 Firewall Match Conditions

This section lists statements that are valid at the following hierarchy levels, and is referenced at those levels in “[Complete \[edit firewall\] Hierarchy](#)” on page 60 instead of the statements being repeated.

- `[edit firewall family inet dialer-filter filter-name term term-name from]` (with the exceptions noted at this level in “[Complete \[edit firewall\] Hierarchy](#)” on page 60)
- `[edit firewall family inet filter filter-name term term-name from]`
- `[edit firewall filter filter-name term term-name from]`

The common IPv4 firewall match conditions are as follows:

```
(ah-spi [ values ] | ah-spi-except [ values ]);
(dscp [ code-point-values ] | dscp-except [ code-point-values ]);
(esp-spi [ values ] | esp-spi-except [ values ]);
first-fragment;
fragment-flags flag;
(fragment-offset [ offsets ] | fragment-offset-except [ offsets ]);
(ip-options [ option-names ] | ip-options-except [ option-names ]);
is-fragment;
(precedence [ precedence-names ] | precedence-except [ precedence-names ]);
(protocol [ protocol-names ] | protocol-except [ protocol-names ]);
(ttl [ ttl-values ] | ttl-except [ ttl-values ]);
```

## Common Layer 2 Firewall Match Conditions

This section lists statements that are valid at the following hierarchy levels, and is referenced at those levels in “[Complete \[edit firewall\] Hierarchy](#)” on page 60 instead of the statements being repeated.

- `[edit firewall family ethernet-switching filter filter-name term term-name from]`

The common Layer 2 firewall match conditions are as follows:

```
destination-mac-address {
    mac-address <except>;
}
(destination-port [ port-names ] | destination-port-except [ port-names ]);
(dscp [ code-point-values ] | dscp-except [ code-point-values ]);
(ether-type [ protocol-types ] | ether-type-except [ protocol-types ]);
(forwarding-class [ class-names ] | forwarding-class-except [ class-names ]);
 icmp-code [ codes ] | icmp-code-except [ codes ]);
 icmp-type [ types ] | icmp-type-except [ types ]);
(interface-group [ group-names ] | interface-group-except [ group-names ]);
ip-address {
    ip-prefix</prefix-length> <except>;
}
ip-destination-address {
    ip-prefix</prefix-length> <except>;
}
(ip-precedence [ precedence-names ] | ip-precedence-except [ precedence-names ]);
(ip-protocol [ protocol-names ] | ip-protocol-except [ protocol-names ]);
```

```
ip-source-address ip-prefix </prefix-length>;
(learn-vlan-1p-priority [ priorities ] | learn-vlan-1p-priority [ priorities ]);
(learn-vlan-id [ vlan-ids ] | learn-vlan-id-except [ vlan-ids ]);
(loss-priority [ priorities ] | loss-priority-except [ priorities ]);
(port [ port-names ] | port-except [ port-names ]);
source-mac-address {
    mac-address <except>;
}
(source-port [ port-names ] | source-port-except [ port-names ]);
tcp-flags flag;
(traffic-type [ broadcast known-unicast multicast unknown-unicast ] |
    traffic-type-except [ broadcast known-unicast multicast unknown-unicast ]);
(user-vlan-1p-priority [ priorities ] | user-vlan-1p-priority [ priorities ]);
(user-vlan-id [ vlan-ids ] | user-vlan-id-except [ vlan-ids ]);
(vlan-ether-type [ protocol-types ] | vlan-ether-type-except [ protocol-types ]);
```

## Complete [edit firewall] Hierarchy

```

firewall {
  family (any | ethernet-switching | inet | inet6) {
    ... the family subhierarchies appear after the main [edit firewall] hierarchy ...
  }
  filter filter-name {
    accounting-profile [ profile-names ];
    enhanced-mode;
    interface-shared-with;
    interface-specific;
    physical-interface-policer;
    term term-name {
      filter filter-name;
      from {
        ... statements in Common IP Firewall Match Conditions on page 57 AND
        statements in Common IPv4 Firewall Match Conditions on page 58 ...
      }
      then {
        ... statements in Common Firewall Actions on page 55 AND
        statements in Common IP Firewall Actions on page 56 AND
        statements in Common IPv4 and IPv6 Firewall Actions on page 56 ...
      }
    }
  }
}
hierarchical-policer policer-name {
  aggregate {
    if-exceeding {
      bandwidth-limit bps;
      burst-size-limit bytes;
    }
    then {
      discard;
      forwarding-class class-name;
      loss-priority (high | low | medium-high | medium-low);
    }
  }
  logical-interface-policer;
  physical-interface-policer;
  premium {
    if-exceeding {
      bandwidth-limit bps;
      burst-size-limit bytes;
    }
    then {
      discard;
    }
  }
}
shared-bandwidth-policer;
interface-set interface-set-name {
  interface-name;
}
load-balance-group group-name {
  next-hop-group [ group-names ];
}

```

```

}
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 {
    discard;
    forwarding-class class-name;
    loss-priority (high | low | medium-high | medium-low);
  }
}
three-color-policer policer-name {
  action {
    loss-priority high then discard;
  }
  filter-specific;
  logical-interface-policer;
  physical-interface-policer;
  shared-bandwidth-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;
  }
}
}

firewall {
  family any {
    filter filter-name {
      interface-shared;
      term term-name {
        from {
          (forwarding-class [ class-names ] | forwarding-class-except [ class-names ]);
          interface interface-name;
          interface-set set-name;
          (loss-priority [ priorities ] | loss-priority-except [ priorities ]);
          (packet-length [ values ] | packet-length-except [ values ]);
        }
        then {
          ... statements in Common Firewall Actions on page 55 PLUS ...
          (accept | discard);
        }
      }
    }
  }
}

```

```

    }
  }
}

```

```

firewall {
  family ethernet-switching {
    filter filter-name {
      interface-specific;
      term term-name {
        from {
          destination-address {
            ip-prefix</prefix-length>;
          }
          destination-mac-address {
            mac-address;
          }
          destination-port [ port-names ];
          destination-prefix-list {
            list-name;
          }
          dot1q-tag [ tag-values ];
          dot1q-user-priority [ priority-values ];
          dscp [ code-point-values ];
          ether-type [ protocol-names ];
          fragment-flags flag;
          icmp-code [ codes ];
          icmp-type [ types ];
          interface interface-name;
          is-fragment;
          precedence [ precedence-names ];
          protocol [ protocol-names ];
          source-address {
            ip-prefix</prefix-length>;
          }
          source-mac-address {
            mac-address;
          }
          source-port [ port-names ];
          source-prefix-list {
            list-name;
          }
          tcp-established;
          tcp-flags flag;
          tcp-initial;
          vlan [ vlan-names ];
        }
        then {
          (accept | discard);
          analyzer analyzer-name;
          count counter-name;
          forwarding-class class-name;
          interface interface-name;
          log;

```

```

        loss-priority (high | low);
        policer policer-name;
        syslog;
        vlan vlan-name;
    }
}
}
}
}

firewall {
    family inet {
        dialer-filter filter-name {
            accounting-profile [ profile-names ];
            term term-name {
                from {
                    ... statements in Common IP Firewall Match Conditions on page 57 AND
                    statements in Common IPv4 Firewall Match Conditions on page 58 EXCEPT
                    FOR ...
                    (ah-spi [ values ] | ah-spi-except [ values ]); # NOT valid at this level
                    (destination-class [ class-names ] |
                     destination-class-except [ class-names ]); # NOT valid at this level
                    interface interface-name; # NOT valid at this level
                    (loss-priority [ priorities ] | loss-priority-except [ priorities ]); # NOT valid at
                     this level
                    service-filter-hit; # NOT valid at this level
                    (source-class [ class-names ] | source-class-except [ class-names ]); # NOT
                     valid at this level
                }
            }
            then {
                (ignore | note);
                log;
                sample;
                syslog;
            }
        }
    }
    filter filter-name {
        accounting-profile [ profile-names ];
        interface-specific;
        term term-name {
            filter filter-name;
            from {
                ... statements in Common IP Firewall Match Conditions on page 57 AND
                statements in Common IPv4 Firewall Match Conditions on page 58 ...
            }
            then {
                ... statements in Common Firewall Actions on page 55 AND
                statements in Common IP Firewall Actions on page 56 AND
                statements in Common IPv4 and IPv6 Firewall Actions on page 56 ...
            }
        }
    }
    prefix-action name {
        count;
        destination-prefix-length prefix-length;
    }
}

```

```

filter-specific;
policer policer-name;
source-prefix-length prefix-length;
subnet-prefix-length prefix-length;
}
service-filter filter-name {
  term term-name {
    from {
      address {
        ip-prefix</prefix-length>;
      }
      (ah-spi [ values ] | ah-spi-except [ values ]);
      destination-address {
        ip-prefix</prefix-length>;
      }
      (destination-port [ port-names ] | destination-port-except [ port-names ]);
      destination-prefix-list {
        list-name;
      }
      (esp-spi [ values ] | esp-spi-except [ values ]);
      first-fragment;
      fragment-flags flag;
      (fragment-offset [ offsets ] | fragment-offset-except [ offsets ]);
      (interface-group [ group-names ] | interface-group-except [ group-names ]);
      (ip-options [ option-names ] | ip-options-except [ option-names ]);
      is-fragment;
      (loss-priority [ priorities ] | loss-priority-except [ priorities ]);
      (port [ port-names ] | port-except [ port-names ]);
      prefix-list {
        list-name;
      }
      (protocol [ protocol-names ] | protocol-except [ protocol-names ]);
      source-address {
        ip-prefix</prefix-length>;
      }
      (source-port [ port-names ] | source-port-except [ port-names ]);
      source-prefix-list {
        list-name;
      }
      tcp-flags flag-name;
    }
    then {
      count counter-name;
      log;
      port-mirror;
      sample;
      (service | skip);
    }
  }
}
simple-filter filter-name {
  term term-name {
    from {
      destination-address ip-prefix</prefix-length>;
      destination-port port-name;
      forwarding-class [ class-names ];
    }
  }
}

```



```

        protocol protocol-name;
        source-address ip-prefix < / prefix-length >;
        source-port port-name;
    }
    then {
        forwarding-class class-name;
        loss-priority (high | low | medium-high | medium-low);
        policer policer-name;
    }
}
}
}
}

firewall {
    family inet6 {
        dialer-filter filter-name {
            accounting-profile [ profile-names ];
            term term-name {
                from {
                    ... statements in Common IP Firewall Match Conditions on page 57 PLUS ...
                    (next-header [ protocol-types ] | next-header-except [ protocol-types ]);
                    ... BUT NOT ...
                    (destination-class [ class-names ] |
                     destination-class-except [ class-names ]); # NOT valid at this level
                    (forwarding-class [ class-names ] |
                     forwarding-class-except [ class-names ]); # NOT valid at this level
                    interface interface-name; # NOT valid at this level
                    (interface-group [ group-names ] | interface-group-except [ group-names ]); #
                     NOT valid at this level
                    (loss-priority [ priorities ] | loss-priority-except [ priorities ]); # NOT valid at
                     this level
                    service-filter-hit; # NOT valid at this level
                    (source-class [ class-names ] | source-class-except [ class-names ]); # NOT
                     valid at this level
                    tcp-established; # NOT valid at this level
                    tcp-flags flag; # NOT valid at this level
                    tcp-initial; # NOT valid at this level
                }
                then {
                    (ignore | note);
                    log;
                    sample;
                    syslog;
                }
            }
        }
    }
    filter filter-name {
        accounting-profile [ profile-names ];
        interface-specific;
        term term-name {
            filter filter-name;
            from {
                ... statements in Common IP Firewall Match Conditions on page 57 PLUS ...
                (next-header [ protocol-types ] | next-header-except [ protocol-types ]);
                (traffic-class [ code-point-values ] | traffic-class-except [ code-point-values ]);
            }
        }
    }
}

```

```

    }
    then {
        ... statements in Common Firewall Actions on page 55 AND
        statements in Common IP Firewall Actions on page 56 PLUS ...
        (accept | discard | reject <address-unreachable | administratively-prohibited |
        beyond-scope | fragmentation-needed | no-route | port-unreachable |
        tcp-reset>);
    }
}
}
service-filter filter-name {
    term term-name {
        from {
            address {
                ip-prefix </prefix-length>;
            }
            (ah-spi [ values ] | ah-spi-except [ values ]);
            destination-address {
                ip-prefix </prefix-length>;
            }
            (destination-port [ port-names ] | destination-port-except [ port-names ]);
            destination-prefix-list {
                list-name;
            }
            (esp-spi [ values ] | esp-spi-except [ values ]);
            (interface-group [ group-names ] | interface-group-except [ group-names ]);
            (next-header [ protocol-types ] | next-header-except [ protocol-types ]);
            (port [ port-names ] | port-except [ port-names ]);
            prefix-list {
                list-name;
            }
            source-address {
                ip-prefix </prefix-length>;
            }
            (source-port [ port-names ] | source-port-except [ port-names ]);
            source-prefix-list {
                list-name;
            }
            tcp-flags flag-name;
        }
        then {
            count counter-name;
            log;
            port-mirror;
            sample;
            (service | skip);
        }
    }
}
}
}

```

**Related Documentation** • *Notational Conventions Used in Junos OS Configuration Hierarchies*

## action

<b>Syntax</b>	<pre>action {   loss-priority high then discard; }</pre>
<b>Hierarchy Level</b>	[edit dynamic-profiles <i>profile-name</i> firewall <b>three-color-policer</b> <i>name</i> ], [edit firewall <b>three-color-policer</b> <i>name</i> ], [edit logical-systems <i>logical-system-name</i> firewall <b>three-color-policer</b> <i>name</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.2. Logical systems support introduced in Junos OS Release 9.3. Support at the [edit dynamic-profiles ... <b>three-color-policer</b> ] hierarchy level introduced in Junos OS Release 11.4. 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.

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

**Related Documentation**

- *Three-Color Policer Configuration Overview*
- *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*
- *loss-priority high then discard*

## family (Multifield Classifier)


---

<b>Syntax</b>	<pre>family <i>family-name</i> {     filter <i>filter-name</i> {         term <i>term-name</i> {             ... <i>term_configuration</i> ...         }     } }</pre>
<b>Hierarchy Level</b>	[edit firewall]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Configure a firewall filter for IP version 4 (IPv4) or IP version 6 (IPv6) traffic.
<b>Options</b>	<p><i>family-name</i>—Protocol family:</p> <ul style="list-style-type: none"><li>• <b>ccc</b>—Circuit cross-connect parameters</li><li>• <b>inet</b>—IPv4 parameters</li><li>• <b>inet6</b>—IPv6 protocol parameters</li><li>• <b>iso</b>—OSI ISO protocol parameters</li><li>• <b>mlppp</b>—Multilink PPP protocol parameters</li><li>• <b>mpls</b>—MPLS protocol parameters</li><li>• <b>tcc</b>—Translational cross-connect parameters</li><li>• <b>vpls</b>—Virtual private LAN service parameters.</li></ul> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring Multifield Classifiers</i></li></ul>

## filter (Configuring)

<b>Syntax</b>	<pre>filter <i>filter-name</i> {     accounting-profile <i>name</i>;     enhanced-mode;     fast-lookup-filter;     interface-shared;     interface-specific;     physical-interface-filter;     term <i>term-name</i> {         ... term configuration ...     } }</pre>
<b>Hierarchy Level</b>	<p>[edit firewall family <i>family-name</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> firewall family <i>family-name</i>]</p>
<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><b>physical-interface-filter</b> statement introduced in Junos OS Release 9.6.</p> <p>Support for the <b>interface-shared</b> statement introduced in Junos OS Release 12.2.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
<b>Description</b>	Configure firewall filters.
<b>Options</b>	<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>
<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>• <a href="#">Guidelines for Configuring Firewall Filters</a></li> <li>• <a href="#">Guidelines for Applying Firewall Filters</a></li> <li>• <a href="#">Configuring Multifield Classifiers</a></li> <li>• <a href="#">Using Multifield Classifiers to Set Packet Loss Priority on page 30</a></li> <li>• <a href="#">simple-filter (Configuring)</a></li> </ul>

## logical-interface-policer

<b>Syntax</b>	logical-interface-policer;
<b>Hierarchy Level</b>	<p>[edit dynamic-profiles <i>profile-name</i> firewall <b>policer</b> <i>policer-name</i>],          [edit dynamic-profiles <i>profile-name</i> firewall <b>three-color-policer</b> <i>name</i>],          [edit firewall atm-policer <i>atm-policer-name</i>]          [edit firewall <b>policer</b> <i>policer-name</i>],          [edit firewall policer <i>policer-template-name</i>],          [edit firewall <b>three-color-policer</b> <i>policer-name</i>],          [edit logical-systems <i>logical-system-name</i> firewall <b>policer</b> <i>policer-name</i>],          [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 dynamic-profiles ... <b>policer</b> <i>policer-name</i>] and [edit dynamic-profiles ... <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 style="display: flex; align-items: flex-start;"> <div style="flex: 1; text-align: center; margin-right: 10px;">  </div> <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> </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>• <a href="#">Configuring Tricolor Marking Policers on page 23</a></li> <li>• <a href="#">action on page 67</a></li> <li>• <i>Configuring Gigabit Ethernet Two-Color and Tricolor Policers</i></li> <li>• <i>action</i></li> </ul>

## loss-priority (Firewall Filter)

---

<b>Syntax</b>	loss-priority (high   low);
<b>Hierarchy Level</b>	[edit firewall family <i>family-name</i> filter <i>filter-name</i> term <i>term-name</i> <b>then</b> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Set the loss priority of incoming packets.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring Multifield Classifiers</i></li></ul>

## loss-priority (Simple Firewall Filter)

---

<b>Syntax</b>	loss-priority (high   low   medium);
<b>Hierarchy Level</b>	[edit firewall family <i>family-name</i> simple-filter <i>filter-name</i> term <i>term-name</i> <b>then</b> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 7.6.
<b>Description</b>	Set the loss priority of incoming packets.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring Multifield Classifiers</i></li></ul>

## policer (Configuring)



<b>Syntax</b>	<pre> policer <i>policer-name</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 dynamic-profiles <i>profile-name</i> firewall],  [edit firewall],  [edit logical-systems <i>logical-system-name</i> firewall]</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 dynamic-profiles ... firewall] 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 firewall] 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 <i>class-name</i></b>—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>then</b>—Actions to take on matching packets.</p>



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>• <a href="#">Using Multifield Classifiers to Set Packet Loss Priority on page 30</a></li><li>• <a href="#">filter (Configuring) on page 69</a></li><li>• <i>priority (Schedulers)</i></li></ul>

## shared-bandwidth-policer (Configuring)

<b>Syntax</b>	shared-bandwidth-policer;
<b>Hierarchy Level</b>	<p>[edit firewall <b>policer</b> <i>policer-name</i>]</p> <p>[edit firewall <b>three-color-policer</b> <i>policer-name</i>]</p> <p>[edit firewall hierarchical-policer <i>policer-name</i>]</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 11.2.</p> <p>Support for MX Series MPC and MIC interfaces added in Junos OS Release 12.1.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
<b>Description</b>	<p>Policer instances share bandwidth. This enables configuration of interface-specific policers applied on an aggregated Ethernet bundle or an aggregated SONET bundle to match the effective bandwidth and burst-size to user-configured values. This feature is supported on the following platforms: T Series routers, M120, M10i, M7i (CFEB-E only), M320 (SFPC only), MX240, MX480, and MX960 with DPC, MIC, and MPC interfaces and EX Series switches.</p>
	<p> <b>NOTE:</b> This statement is not supported on T4000 Type 5 FPCs.</p>
	<p> <b>NOTE:</b> This statement is not supported if the AE interface is part of IRB.</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="#">Policer Support for Aggregated Ethernet Bundle Overview on page 10</a></li> </ul>

## term (Normal Filter)

<b>Syntax</b>	<pre> term <i>term-name</i> {     from {         <i>match-conditions</i>;     }     then {         forwarding-class <i>class-name</i>;         loss-priority (high   low);         three-color-policer {             (single-rate   two-rate) <i>policer-name</i>;         }     } } </pre>
<b>Hierarchy Level</b>	[edit firewall family <i>family-name</i> <b>filter</b> <i>filter-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Define a firewall filter term.
<b>Options</b>	<p><b>from</b>—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 use to make a match.</p> <p><b>term-name</b>—Name that identifies the term. 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>then</b>—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. For CoS, only the actions listed are allowed. These 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>Configuring Multifield Classifiers</li> </ul>

## then (Services CoS)

---

**Syntax**    then {  
              application-profile *profile-name*;  
              dscp (*alias* | *bits*);  
              forwarding-class *class-name*;  
              syslog;  
              (reflexive | reverse) {  
                  application-profile *profile-name*;  
                  dscp (*alias* | *bits*);  
                  forwarding-class *class-name*;  
                  syslog;  
              }  
          }

**Hierarchy Level**    [edit services cos rule *rule-name* term *term-name*]

**Release Information**    Statement introduced in Junos OS Release 8.1.

**Description**    Define the CoS term actions.

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 Actions in a CoS Rule*  
                                  • *Configuring Actions in CoS Rules*

## three-color-policer (Applying)

<b>Syntax</b>	three-color-policer { (single-rate   two-rate) <i>policer-name</i> ; }
<b>Hierarchy Level</b>	[edit firewall family <i>family-name</i> filter <i>filter-name</i> term <i>term-name</i> then] [edit logical-systems <i>logical-system-name</i> firewall family <i>family-name</i> <b>filter</b> <i>filter-name</i> term <i>term-name</i> then]
<b>Release Information</b>	Statement introduced in Junos OS Release 7.4. <b>single-rate</b> statement added in Junos OS Release 8.2. Logical systems support introduced in Junos OS Release 9.3. Statement introduced in Junos OS Release 12.3R2 for EX Series switches.
<b>Description</b>	For M320 and T Series routers with Enhanced II Flexible PIC Concentrators (FPCs) and the T640 router with Enhanced Scaling FPC4, apply a tricolor marking policer.
<b>Options</b>	<b>single-rate</b> —Named tricolor policer is a single-rate policer.  <b>two-rate</b> —Named tricolor policer is a two-rate policer.  <b><i>policer-name</i></b> —Name of a tricolor policer.
<b>Required Privilege Level</b>	firewall—To view this statement in the configuration. firewall-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Applying Tricolor Marking Policers to Firewall Filters on page 24</a></li> <li>• <i>Firewall Filter Nonterminating Actions</i></li> <li>• <i>Three-Color Policer Configuration Overview</i></li> </ul>

## three-color-policer (Configuring)

<b>Syntax</b>	<pre> three-color-policer <i>policer-name</i>   <i>uid</i> {   action {     loss-priority high then discard;   }   filter-specific;   logical-interface-policer;   physical-interface-policer;   shared-bandwidth-policer;   single-rate {     (color-aware   color-blind);     committed-burst-size <i>bytes</i>;     committed-information-rate <i>bps</i>;     excess-burst-size <i>bytes</i>;   }   two-rate {     (color-aware   color-blind);     committed-burst-size <i>bytes</i>;     committed-information-rate <i>bps</i>;     peak-burst-size <i>bytes</i>;     peak-information-rate <i>bps</i>;   } } </pre>
<b>Hierarchy Level</b>	[edit dynamic-profiles <i>profile-name</i> firewall], [edit firewall], [edit logical-systems <i>logical-system-name</i> firewall]
<b>Release Information</b>	<p>Statement introduced before Junos OS Release 7.4.</p> <p>The <b>action</b> and <b>single-rate</b> statements added in Junos OS Release 8.2.</p> <p>Logical systems support introduced in Junos OS Release 9.3.</p> <p>Support at the [edit dynamic-profiles ... firewall] hierarchy level introduced in Junos OS Release 11.4.</p>
<b>Description</b>	Configure a three-color policer.
<b>Options</b>	<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 dynamic-profiles] hierarchy level, you must assign a variable UID as the policer name.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	firewall—To view this statement in the configuration. firewall-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>Statement Hierarchy for Configuring Policers</li> <li>Configuring Tricolor Marking Policers on page 23</li> <li>Three-Color Policer Configuration Guidelines</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*

## [edit interfaces] Hierarchy Level

The following statement hierarchy can also be included at the [edit logical-systems *logical-system-name*] hierarchy level.

```

interfaces {
  interface-name {
    ... the "interface-name" subhierarchy appears after the main [edit interfaces] hierarchy
    level ...
  }
  interface-set interface-set-name {
    interface interface-name {
      (unit unit-number | vlan-tags-outer vlan-tag);
    }
  }
  irb {
    accounting-profile name;
    description text;

    (gratuitous-arp-reply | no-gratuitous-arp-reply);
    hold-time up milliseconds down milliseconds;
    mtu bytes;
    no-gratuitous-arp-request;

    traceoptions {
      flag flag;
    }
    (traps | no-traps);
    unit logical-unit-number {
      accounting-profile name;
      bandwidth rate;
      description text;
      disable;
      encapsulation type;
      family inet {
        accounting {
          destination-class-usage;
          source-class-usage {
            input;
            output;
          }
        }
      }
      address ipv4-address {
        arp ip-address (mac | multicast-mac) mac-address <publish>;
      }
    }
  }
}

```

```

broadcast address;
preferred;
primary;
vrrp-group group-id {
    (accept-data | no-accept-data);
    advertise-interval seconds;
    advertisements-threshold number;
    authentication-key key;
    authentication-type authentication;
    fast-interval milliseconds;
    (preempt | no-preempt) {
        hold-time seconds;
    }
    priority number;
    track {
        interface interface-name {
            bandwidth-threshold bits-per-second priority-cost priority;
            priority-cost priority;
        }
        priority-hold-time seconds;
        route prefix/prefix-length routing-instance instance-name priority-cost priority;
    }
    virtual-address [ addresses ];
    vrrp-inherit-from vrrp-group;
}
}
filter {
    input filter-name;
    output filter-name;
}
mtu bytes;
no-neighbor-learn;
no-redirects;
primary;
rpf-check {
    fail-filter filter-name;
    mode {
        loose;
    }
}
}
targeted-broadcast {
    forward-and-send-to-re;
    forward-only;
}
}
family inet6 {
    accounting {
        destination-class-usage;
        source-class-usage {
            input;
            output;
        }
    }
}
}
address address {
    eui-64;
    ndp ip-address (mac | multicast-mac) mac-address <publish>;
}

```



```

preferred;
primary;
vrrp-inet6-group group-id {
    accept-data | no-accept-data;
    advertisements-threshold number;
    authentication-key key;
    authentication-type authentication;
    fast-interval milliseconds;
    inet6-advertise-interval milliseconds;
    preempt | no-preempt {
        hold-time seconds;
    }
    priority number;
    track {
        interface interface-name {
            bandwidth-threshold bandwidth priority-cost number;
            priority-cost number;
        }
        priority-hold-time seconds;
        route ip-address/mask routing-instance instance-name priority-cost cost;
    }
    virtual-inet6-address [addresses];
    virtual-link-local-address ipv6-address;
    vrrp-inherit-from {
        active-group group-number;
        active-interface interface-name;
    }
}
}
(dad-disable | no-dad-disable);
filter {
    input filter-name;
    output filter-name;
}
mtu bytes;
nd6-stale-time seconds;
no-neighbor-learn;
no-redirects;
policer {
    input policer-name;
    output policer-name;
}
rpf-check {
    fail-filter filter-name;
    mode {
        loose;
    }
}
}
family iso {
    address interface-address;
    mtu bytes;
}
family mpls {
    filter {
        input filter-name;

```

```

        output filter-name;
    }
    mtu bytes;
    policer {
        input policer-name;
        output policer-name;
    }
}
native-inner-vlan-id vlan-id;
proxy-arp (restricted | unrestricted);
(traps | no-traps);
vlan-id-list [vlan-id's];
vlan-id-range [vlan-id-range];
}
}
traceoptions {
    file <filename> <files number> <match regular-expression> <size maximum-file-size>
        <world-readable | no-world-readable>;
    flag flag <disable>;
    no-remote-trace;
}
}

interfaces {
    interface-name {
        disable;
        accounting-profile name;
        aggregated-ether-options {
            ethernet-switch-profile {
                tag-protocol-id [ hexadecimal-identifiers ];
            }
            (flow-control | no-flow-control);
            lacp {
                (active | passive);
                admin-key key;
                fast-failover;
                link-protection {
                    disable;
                    (revertive | non-revertive);
                }
                periodic (fast | slow);
                system-id mac-address;
                system-priority priority;
            }
            (link-protection | no-link-protection);
            link-speed (100m | 1g | 8g | 10g | 40g | 50g | 80g | 100g | oc192);
            logical-interface-fpc-redundancy;
            (loopback | no-loopback);
            mc-ae {
                chassis-id chassis-id;
                events {
                    iccp-peer-down {
                        force-icl-down;
                        prefer-status-control-active;
                    }
                }
            }
        }
    }
}

```

```

    mc-ae-id mc-ae-id;
    mode (active-active | active-standby);
    redundancy-group group-id;
    status-control (active | standby);
}
minimum-links number;
rebalance-periodic {
    start-time time;
    interval number;
}
source-address-filter {
    mac-address;
}
(source-filtering | no-source-filtering);
}
auto-configure {
    remove-when-no-subscribers;
    stacked-vlan-ranges {
        access-profile profile-name;
        authentication {
            password password-string;
            username-include {
                circuit-type;
                delimiter delimiter-character;
                domain-name domain-name-string;
                interface-name;
                mac-address;
                option-82 ( circuit-id | remote-id);
                radius-realm radius-realm-string;
                user-prefix user-prefix-string;
            }
        }
    }
    dynamic-profile profile-name {
        accept (any | dhcp-v4 | dhcp-v6 | inet | inet6);
        ranges (any | low-tag-high-tag), (any | low-tag-high-tag);
    }
}
vlan-ranges {
    access-profile profile-name;
    authentication {
        password password-string;
        username-include {
            circuit-type;
            delimiter delimiter-character;
            domain-name domain-name-string;
            interface-name;
            mac-address;
            option-82;
            radius-realm radius-realm-string;
            user-prefix user-prefix-string;
        }
    }
    dynamic-profile profile-name {
        accept (any | dhcp-v4 | dhcp-v6 | inet | inet6);
        ranges (any | low-tag)—(any | high-tag);
    }
}

```

```

    }
    override tag vlan-tag dynamic-profile profile name;
  }
encapsulation (ethernet-bridge | ethernet-vpls | extended-vlan-bridge |
  extended-vlan-vpls | flexible-ethernet-services | vlan-vpls);
ether-options {
  802.3ad {
    aex;
    (backup | primary);
    lacp {
      force-up;
      port-priority
    }
  }
}
asynchronous-notification;
(auto-negotiation | no-auto-negotiation);
ethernet-switch-profile {
  ethernet-policer-profile {
    input-priority-map {
      ieee802.1p premium [ values ];
    }
    output-priority-map {
      classifier {
        premium {
          forwarding-class class-name {
            loss-priority (high | low);
          }
        }
      }
    }
  }
  policer cos-policer-name {
    aggregate {
      bandwidth-limit bps;
      burst-size-limit bytes;
    }
    premium {
      bandwidth-limit bps;
      burst-size-limit bytes;
    }
  }
  tag-protocol-id;
}
(mac-learn-enable | no-mac-learn-enable);
}
(flow-control | no-flow-control);
ignore-l3-incompletes;
link-mode (automatic | full-duplex | half-duplex);
(loopback | no-loopback);
keepalives <interval seconds> <down-count number> <up-count number>;
speed (1g | 10m | 100m | 10m-100m | auto-negotiation);
source-address-filter {
  mac-address;
}
source-filtering | no-source-filtering;
}
flexible-vlan-tagging;

```

```

(gratuitous-arp-reply | no-gratuitous-arp-reply);
hold-time (up milliseconds | down milliseconds);
interface-transmit-statistics;
(keepalives <down-count number> <interval seconds> <up-count number> |
 no-keepalives);
layer2-policer {
    apply-groups [ group-names ];
    apply-groups-except [ group-names ];
}
link-mode (automatic | full-duplex);
mac mac-address;
mtu bytes;
multi-chassis-protection peer-ip-address {
    interface interface-name;
}
native-vlan-id number;
no-gratuitous-arp-request;
optics-options {
    alarm low-light-alarm {
        (link-down | syslog);
    }
    warning low-light-warning {
        (link-down | syslog);
    }
    wavelength nm;
}
passive-monitor-mode;
per-unit-scheduler;
speed (10m | 100m | 1g | auto | oc3 | oc12 | oc48);
stacked-vlan-tagging;
traceoptions {
    flag flag;
}
transmit-bucket {
    overflow discard;
    rate percentage;
    threshold bytes;
}
(traps | no-traps);
unidirectional;
vlan-tagging;
}

interface-name {
    unit logical-unit-number {
        disable;
        accept-source-mac {
            mac-address mac-address {
                policer {
                    input policer-name;
                    output policer-name;
                }
            }
        }
    }
}
accounting-profile name;

```

```

advisory-options {
    downstream-rate rate;
    upstream-rate rate;
}
arp-resp (restricted|unrestricted);
bandwidth rate;
clear-dont-fragment-bit;
copy-tos-to-outer-ip-header;
demux-destination family;
encapsulation (vlan-bridge | vlan-vpls);
epd-threshold cells plp1 cells;
filter filter-name;
inner-vlan-id-range start start-id end end-id;
input-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
}
interface-shared-with psd numerical-index;
layer2-policer {
    input-hierarchical-policer policer-name;
    input-policer policer-name;
    input-three-color policer-name;
    output-policer policer-name;
    output-three-color policer-name;
}
multi-chassis-protection peer-ip-address {
    interface interface-name;
}
native-inner-vlan-id number;
output-vlan-map {
    (pop | pop-pop | pop-swap | push | push-push | swap | swap-push | swap-swap);
    inner-tag-protocol-id tpid;
    inner-vlan-id number;
    tag-protocol-id tpid;
    vlan-id number;
}
peer-interface interface-name;
peer-unit unit-number;
plp-to-clp;
proxy-arp <restricted | unrestricted>;
rpm {
    (client | server);
    twamp-server;
}
swap-by-poppush;
vlan-id number;
vlan-id-list [ vlan-id vlan-id vlan-id ];
vlan-id-range number-number;
vlan-tags (inner <tpid.>vlan-id | inner-list [vlan-id vlan-id vlan-id ] |
    inner-range <tpid.>vlan-id vlan-id) outer <tpid.>vlan-id;
}

unit logical-unit-number {

```

```

family ethernet-switching {
  filter {
    group filter-group-number;
    (input filter-name | input-list [ filter-names ]);
    (output filter-name | output-list [ filter-names ]);
    (inner-vlan-id-list [ vlan-ids ] | vlan-id number | vlan-id-list [ number
      number-number ]);
    interface-mode (access | trunk);
    policer {
      input policer-name;
      output policer-name;
    }
    vlan-rewrite {
      translate old-vlan-id new-vlan-id;
    }
    vlan {
      members [ all vlan-identifiers ];
    }
  }
}
family inet {
  filter {
    group filter-group-number;
    (input filter-name | input-list [ filter-names ]);
    (output filter-name | output-list [ filter-names ]);
  }
  input-hierarchical-policer policer-name;
  mac-validate (loose | strict);
  mtu bytes;
  no-neighbor-learn;
  no-redirects;
  policer {
    arp policer-template-name;
    input policer-name;
    output policer-name;
  }
  primary;
  receive-options-packets;
  receive-ttl-exceeded;
  rpf-check {
    fail-filter filter-name;
    mode loose;
  }
  sampling {
    (input | output | input output);
  }
  simple-filter {
    input filter-name;
  }
  targeted-broadcast {
    forward-and-send-to-re;
    forward-only;
  }
  unnumbered-address interface-name <destination address>
    <destination-profile profile-name> <preferred-source-address address>;
}

```

```

family inet6 {
  address ipv6-address {
    destination destination-address;
    eui-64;
    ndp ipv6-address <l2-interface interface-name> <(mac mac-address |
      multicast-mac multicast-mac-address) <publish>>;
    preferred;
    primary;
    vrrp-inet6-group group-number {
      (accept-data | no-accept-data);
      fast-interval milliseconds;
      inet6-advertise-interval seconds;
      (no-preempt; | ... the following preempt statement ...)
      preempt {
        hold-time seconds;
      }
      priority number;
      track {
        interface interface-name {
          bandwidth-threshold bits-per-second priority-cost priority;
          priority-cost priority;
        }
        priority-hold-time seconds;
        route ip-address-prefix/prefix-length routing-instance instance-name
          priority-cost priority;
      }
      virtual-inet6-address [ addresses ];
      virtual-link-local-address ipv6-address;
      vrrp-inherit-from {
        active-group group-number;
        active-interface interface-name;
      }
    }
  }
  (dad-disable | no-dad-disable);
  filter {
    group filter-group-number;
    (input filter-name | input-list [ filter-names ]);
    (output filter-name | output-list [ filter-names ]);
  }
  input-hierarchical-policer policer-name;
  mtu bytes;
  nd6-stale-time seconds;
  no-neighbor-learn;
  policer {
    input policer-name;
    output policer-name;
  }
  rpf-check {
    fail-filter filter-name;
    mode loose;
  }
  sampling {
    (input | output | input output);
  }
}

```



```

        unnumbered-address interface-name preferred-source-address address;
    }

    family iso {
        address iso-address;
        mtu bytes;
    }

    family mlfr-end-to-end {
        bundle logical-interface-name;
    }

    family mpls {
        filter {
            group filter-group-number;
            (input filter-name | input-list [ filter-names ]);
            (output filter-name | output-list [ filter-names ]);
        }
        input-hierarchical-policer policer-name;
        maximum-labels maximum-labels;
        mtu bytes;
        policer {
            input policer-name;
            output policer-name;
        }
    }

    family vpls {
        core-facing;
        filter {
            group filter-group-number;
            (input filter-name | input-list [ filter-names ]);
            (output filter-name | output-list [ filter-names ]);
        }
        policer {
            input policer-name;
            output policer-name;
        }
    }
}
}
}

```

#### Related Documentation

- *Notational Conventions Used in Junos OS Configuration Hierarchies*

## filter (Applying to an Interface)

---

<b>Syntax</b>	<pre>filter {     input <i>filter-name</i>;     output <i>filter-name</i>; }</pre>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <b>family</b> <i>family</i> ], [edit logical-systems <i>logical-system-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 before Junos OS Release 7.4.
<b>Description</b>	Apply a filter to an interface. You can also use filters for encrypted traffic. When you configure filters, you can configure the family <b>inet</b> , <b>inet6</b> , <b>mpls</b> , or <b>vppls</b> only.
<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>
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>simple-filter</i></li><li>• <i>Applying Firewall Filter Tricolor Marking Policers to Interfaces</i></li><li>• <i>Example: Classifying Packets Based on Their Destination Address</i></li><li>• <i>Example: Configuring and Verifying a Complex Multifield Filter</i></li><li>• <i>Example: Writing Different DSCP and EXP Values in MPLS-Tagged IP Packets</i></li><li>• <i>Example: Configuring a Simple Filter</i></li><li>• <i>Example: Configuring a Logical Bandwidth Policer</i></li><li>• <i>Configuring Two-Color Policers and Shaping Rate Changes</i></li></ul>

## input-policer

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<b>Syntax</b>	<code>input-policer <i>policer-name</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">layer2-policer</a> ] [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">layer2-policer</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.2. Statement introduced in Junos OS Release 12.3R2 for EX Series switches.
<b>Description</b>	Apply a single-rate two-color policer to the Layer 2 input traffic at the logical interface. The <b>input-policer</b> and <b>input-three-color</b> statements are mutually exclusive.
<b>Options</b>	<b><i>policer-name</i></b> —Name of the single-rate two-color policer that you define at the <b>[edit firewall]</b> hierarchy level.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Two-Color and Three-Color Policers at Layer 2</i></li> <li>• <a href="#">Applying Layer 2 Policers to Gigabit Ethernet Interfaces on page 27</a></li> <li>• <i>Configuring a Gigabit Ethernet Policer</i></li> <li>• <a href="#">input-three-color on page 92</a></li> <li>• <a href="#">layer2-policer on page 93</a></li> <li>• <a href="#">logical-interface-policer on page 70</a></li> <li>• <a href="#">output-policer on page 94</a></li> <li>• <a href="#">output-three-color on page 95</a></li> </ul>

## input-three-color

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<b>Syntax</b>	<code>input-three-color <i>policer-name</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">layer2-policer</a> ] [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">layer2-policer</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.2. Statement introduced in Junos OS Release 12.3R2 for EX Series switches.
<b>Description</b>	Apply a single-rate or two-rate three-color policer to the Layer 2 input traffic at the logical interface. The <b>input-three-color</b> and <b>input-policer</b> statements are mutually exclusive.
<b>Options</b>	<b><i>policer-name</i></b> —Name of the single-rate or two-rate three-color policer.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Two-Color and Three-Color Policers at Layer 2</a></li><li>• <a href="#">Applying Layer 2 Policers to Gigabit Ethernet Interfaces on page 27</a></li><li>• <a href="#">Configuring a Gigabit Ethernet Policer</a></li><li>• <a href="#">input-policer on page 91</a></li><li>• <a href="#">layer2-policer on page 93</a></li><li>• <a href="#">logical-interface-policer on page 70</a></li><li>• <a href="#">output-policer on page 94</a></li><li>• <a href="#">output-three-color on page 95</a></li></ul>

## layer2-policer

<b>Syntax</b>	<pre> layer2-policer {     input-policer <i>policer-name</i>;     input-three-color <i>policer-name</i>;     output-policer <i>policer-name</i>;     output-three-color <i>policer-name</i>; } </pre>
<b>Hierarchy Level</b>	<p>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</p> <p>[edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>],</p>
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.2.</p> <p>Statement introduced in Junos OS Release 12.3R2 for EX Series switches.</p>
<b>Description</b>	<p>For 1-Gigabit Ethernet and 10-Gigabit Ethernet IQ2 and IQ2-E interfaces on M Series, MX Series, and T Series routers, and for aggregated Ethernet, Gigabit Ethernet, and 10-Gigabit Ethernet interfaces on EX Series switches, apply Layer 2 logical interface policers. The following policers are supported:</p> <ul style="list-style-type: none"> <li>• Two-color</li> <li>• Single-rate tricolor marking (srTCM)</li> <li>• Two-rate tricolor marking (trTCM)</li> </ul> <p>Two-color and tricolor policers are configured at the <b>[edit firewall]</b> hierarchy level.</p>
<b>Options</b>	<p><b>input-policer <i>policer-name</i></b>—Two-color input policer to associate with the interface. This statement is mutually exclusive with the <b>input-three-color</b> statement.</p> <p><b>input-three-color <i>policer-name</i></b>—Tricolor input policer to associate with the interface. This statement is mutually exclusive with the <b>input-policer</b> statement.</p> <p><b>output-policer <i>policer-name</i></b>—Two-color output policer to associate with the interface. This statement is mutually exclusive with the <b>output-three-color</b> statement.</p> <p><b>output-three-color <i>policer-name</i></b>—Tricolor output policer to associate with the interface. This statement is mutually exclusive with the <b>output-policer</b> statement.</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="#">Applying Layer 2 Policers to Gigabit Ethernet Interfaces on page 27</a></li> <li>• <a href="#">Configuring Gigabit Ethernet Two-Color and Tricolor Policers</a></li> </ul>

## output-policer

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<b>Syntax</b>	<code>output-policer <i>policer-name</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">layer2-policer</a> ], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">layer2-policer</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.2. Statement introduced in Junos OS Release 12.3R2 for EX Series switches.
<b>Description</b>	Apply a single-rate two-color policer to the Layer 2 output traffic at the logical interface. The <b>output-policer</b> and <b>output-three-color</b> statements are mutually exclusive.
<b>Options</b>	<b><i>policer-name</i></b> —Name of the single-rate two-color policer that you define at the [edit <b>firewall</b> ] hierarchy level.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Two-Color and Three-Color Policers at Layer 2</i></li><li>• <a href="#">Applying Layer 2 Policers to Gigabit Ethernet Interfaces on page 27</a></li><li>• <i>Configuring a Gigabit Ethernet Policer</i></li><li>• <a href="#">input-policer on page 91</a></li><li>• <a href="#">input-three-color on page 92</a></li><li>• <a href="#">layer2-policer on page 93</a></li><li>• <a href="#">logical-interface-policer on page 70</a></li><li>• <a href="#">output-three-color on page 95</a></li></ul>

## output-three-color

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<b>Syntax</b>	<code>output-three-color <i>policer-name</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">layer2-policer</a> ] [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> <a href="#">layer2-policer</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.2. Statement introduced in Junos OS Release 12.3R2 for EX Series switches.
<b>Description</b>	Apply a single-rate or two-rate three-color policer to the Layer 2 output traffic at the logical interface. The <b>output-three-color</b> and <b>output-policer</b> statements are mutually exclusive.
<b>Options</b>	<i>policer-name</i> —Name of the single-rate or two-rate three-color policer.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Two-Color and Three-Color Policers at Layer 2</i></li> <li>• <a href="#">Applying Layer 2 Policers to Gigabit Ethernet Interfaces on page 27</a></li> <li>• <i>Configuring a Gigabit Ethernet Policer</i></li> <li>• <a href="#">input-three-color on page 92</a></li> <li>• <a href="#">input-policer on page 91</a></li> <li>• <a href="#">layer2-policer on page 93</a></li> <li>• <a href="#">logical-interface-policer on page 70</a></li> <li>• <a href="#">output-policer on page 94</a></li> </ul>

