

# Routing Engine Protocol Queue Assignments 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.

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

## Supported Platforms

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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 ix 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 ix defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

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

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

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

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

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

## Documentation Feedback

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

- Online feedback rating system—On any page at the Juniper Networks Technical Documentation site at <http://www.juniper.net/techpubs/index.html>, simply click the stars to rate the content, and use the pop-up form to provide us with information about your experience. Alternately, you can use the online feedback form at <https://www.juniper.net/cgi-bin/docbugreport/>.
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## Requesting Technical Support

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

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

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

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

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

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

## Opening a Case with JTAC

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

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

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

## PART 1

# Overview

- [Routing Engine Protocol Queue Assignments on page 3](#)



## CHAPTER 1

# Routing Engine Protocol Queue Assignments

- [Default Routing Engine Protocol Queue Assignments on page 3](#)
- [Changing the Default Queuing and Marking of Host Outbound Traffic on page 5](#)

### Default Routing Engine Protocol Queue Assignments

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[Table 3 on page 3](#) lists (in alphabetical order) how Routing Engine-sourced traffic is mapped to output queues. The follow caveats apply to [Table 3 on page 3](#):

- For all packets sent to queue 3 over a VLAN-tagged interface, the software sets the 802.1p bit to 110.
- For IPv4 and IPv6 packets, the software copies the IP type-of-service (ToS) value into the 802.1p field independently of which queue the packets are sent out.
- For MPLS packets, the software copies the EXP bits into the 802.1p field.

**Table 3: Routing Engine Protocol Queue Assignments**

Routing Engine Protocol	Queue Assignment
Adaptive Services PIC	TCP tickle (keepalive packets for idle session generated with stateful firewall to probe idle TCP sessions) are sent from queue 0.
Bidirectional Forwarding Detection (BFD) Protocol	Queue 3
Border Gateway Protocol (BGP)	Queue 0
BGP TCP Retransmission	Queue 3
Cisco High-Level Data Link Control (HDLC)	Queue 3
Distance Vector Multicast Routing Protocol (DVMRP)	Queue 3
Frame Relay Local Management Interface (LMI)	Queue 3

Table 3: Routing Engine Protocol Queue Assignments (*continued*)

Routing Engine Protocol	Queue Assignment
Frame Relay Asynchronization permanent virtual circuit (PVC)/data link connection identifier (DLCI) status messages	Queue 3
FTP	Queue 0
Intermediate System-to-Intermediate System (IS-IS) Open Systems Interconnection (OSI)	Queue 3
Internet Group Management Protocol (IGMP) query	Queue 3
IGMP Report	Queue 0
IP version 6 (IPv6) Neighbor Solicitation	Queue 3
IPv6 Neighbor Advertisement	Queue 3
IPv6 Router Advertisement	Queue 0
Label Distribution Protocol (LDP) User Datagram Protocol (UDP) hello	Queue 3
LDP keepalive and Session data	Queue 0
LDP TCP Retransmission	Queue 3
Link Aggregation Control Protocol (LACP)	Queue 3
Link Services (LS) PIC	If link fragmentation and interleaving (LFI) is enabled, all routing protocol packets larger than 128 bytes are transmitted from queue 0. This ensures that VoIP traffic is not affected. Fragmentation is supported on queue 0 only.
Multicast listener discovery (MLD)	Queue 0
Multicast Source Discovery Protocol (MSDP)	Queue 0
MSDP TCP Retransmission	Queue 3
Multilink Frame Relay Link Integrity Protocol (LIP)	Queue 3
Open Shortest Path First (OSPF) protocol data unit (PDU)	Queue 3
Protocol Independent Multicast (PIM)	Queue 3

Table 3: Routing Engine Protocol Queue Assignments (*continued*)

Routing Engine Protocol	Queue Assignment
Real-time performance monitoring (RPM) probe packets	Queue 3
Resource Reservation Protocol (RSVP)	Queue 3
Routing Information Protocol (RIP)	Queue 3
Simple Network Management Protocol (SNMP)	Queue 0
SSH	Queue 0
Telnet	Queue 0
Virtual Router Redundancy Protocol (VRRP)	Queue 3
xnm-clear-text	Queue 0
xnm-ssl	Queue 0

## Changing the Default Queuing and Marking of Host Outbound Traffic

You can modify the default queue assignment (forwarding class) and DSCP bits used in the ToS field of *host outbound traffic* (packets generated by the Routing Engine).

TCP-related packets, such as BGP or LDP, use queue 3 (network control) for retransmitted traffic. Changing the defaults for Routing Engine sourced traffic does not affect transit or incoming traffic. The changes apply to all packets relating to Layer 3 and Layer 2 protocols, but not MPLS EXP bits or IEEE 802.1p bits. This feature applies to all application-level traffic such as FTP or ping operations as well.

This feature is not available on Juniper Networks J Series Services Routers.

The queue selected is global to the routing device. That is, the traffic is placed in the selected queue on all egress interfaces. In the case of a restricted interface, the Routing Engine sourced traffic flows through the restricted queue.

The queue selected must be properly configured on all interfaces.

To change the default queue and DSCP bits for Routing Engine sourced traffic, include the **host-outbound-traffic** statement at the **[edit class-of-service]** hierarchy level:

```
[edit class-of-service]
host-outbound-traffic {
  forwarding-class class-name;
  dscp-code-point value;
}
```

The following example places all Routing Engine sourced traffic into queue 3 (network control) with a DSCP value of 101010:

```
[edit class-of-service]
host-outbound-traffic {
  forwarding-class network-control;
  dscp-code-point 101010;
}
```

**Related  
Documentation**

- *Overview of Forwarding Classes*
- *Default Queue Assignments for Routing Engine Sourced Traffic*
- *Default DSCP and DSCP IPv6 Classifier*

## PART 2

# Configuration

- [Configuration Statements on page 9](#)



## CHAPTER 2

# Configuration Statements

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- [unit](#) on page 26
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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 (Logical Interface)

<b>Syntax</b>	<pre> classifiers {     <i>type</i> (<i>classifier-name</i>   default) family (mpls   inet); } </pre>
<b>Hierarchy Level</b>	[edit class-of-service interfaces <i>interface-name</i> <b>unit</b> <i>logical-unit-number</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Apply a CoS aggregate behavior classifier to a logical interface. You can apply a default classifier or one that is previously defined.
<b>Options</b>	<p><b><i>classifier-name</i></b>—Name of the aggregate behavior classifier.</p> <p><b><i>type</i></b>—Traffic type.</p> <p><b>Values:</b> dscp, dscp-ipv6, exp, ieee-802.1, inet-precedence</p>



**NOTE:** You can only specify a family for the dscp and dscp-ipv6 types.

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


- *Default DSCP and DSCP IPv6 Classifier*
- *Applying Classifiers to Logical Interfaces*

## dscp (Rewrite Rules)

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<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> <b>rewrite-rules</b> ]
<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 <b>rewrite-rules dscp</b>] 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>• <i>Configuring Rewrite Rules</i></li><li>• <i>Applying Rewrite Rules to Output Logical Interfaces</i></li><li>• <a href="#">protocol (Rewrite Rules) on page 23</a></li><li>• <i>Rewriting MPLS and IPv4 Packet Headers</i></li><li>• <i>rewrite-rules (Definition)</i></li></ul>

## dscp-code-point (CoS Host Outbound Traffic)

<b>Syntax</b>	<code>dscp-code-point value;</code>
<b>Hierarchy Level</b>	[edit class-of-service <a href="#">host-outbound-traffic</a> ]
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS 8.5 for SRX1400, SRX3400, SRX3600, SRX5600, and SRX5800 firewalls.</p> <p>Statement introduced before Junos OS 11.4 for EX Series switches.</p> <p>Statement introduced before Junos OS 12.1 for SRX1400, SRX3400, SRX3600, SRX5600, and SRX5800 firewalls.</p> <p>Support for distributed protocol handler traffic introduced in Junos OS Release 13.2.</p>
<b>Description</b>	<p>Specify the value of the DSCP bits in the type of service (ToS) field of host outbound traffic (packets generated by the local Routing Engine) as they are placed in the default or specified output queue on all egress interfaces. This statement does not affect transit traffic or incoming traffic.</p> <p>If you use the <b>ping</b> operational mode command with the <b>tos type-of-service</b> option, the value specified in this configuration statement overrides the DSCP value you specify in the <b>ping</b> command.</p>
<div>  <p><b>NOTE:</b> Any DSCP rewrite rules configured on a 10-Gigabit Ethernet LAN/WAN PIC with SFP+ overwrite this DSCP value.</p> </div>	
<p>For egress interfaces hosted on MX Series routers, M120 routers, or Enhanced III FPCs in M320 routers, both Routing Engine sourced traffic and distributed protocol handler traffic are affected. For all other egress interfaces, only Routing Engine sourced traffic is affected.</p>	
<b>Options</b>	<b>code-point</b> —Six-bit DSCP code point value.
<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="#">Overview of BA Classifier Types</a></li> <li>• <a href="#">Default DSCP and DSCP IPv6 Classifier</a></li> <li>• <a href="#">Changing the Default Queuing and Marking of Host Outbound Traffic on page 5.</a></li> </ul>

## dscp-ipv6 (Class-of-Service)

---

<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> <a href="#">rewrite-rules</a> ]
<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 <b>rewrite-rules dscp-ipv6</b>] 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>	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 Rewrite Rules</a></li><li>• <a href="#">protocol on page 23</a></li><li>• <a href="#">Setting IPv6 DSCP and MPLS EXP Values Independently</a></li><li>• <a href="#">Configuring DSCP Values for IPv6 Packets Entering the MPLS Tunnel</a></li><li>• <a href="#">Applying Rewrite Rules to Output Logical Interfaces</a></li><li>• <a href="#">rewrite-rules (Definition)</a></li></ul>

## exp

<b>Syntax</b>	<code>exp (rewrite-name   default) protocol protocol-types;</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. 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 <code>[edit class-of-service rewrite-rules exp]</code> 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 <code>[edit class-of-service interfaces interface interface-name unit logical-unit-number rewrite-rules exp rewrite-rule-name protocol]</code> 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>• <a href="#">protocol (Rewrite Rules) on page 23</a></li> </ul>

- *rewrite-rules (Definition)*

## forwarding-class (Forwarding Policy)

---

<b>Syntax</b>	<pre>forwarding-class <i>class-name</i> {   discard;   lsp-next-hop [ <i>lsp-regular-expression</i> ];   next-hop [ <i>next-hop-name</i>];   non-lsp-next-hop; }</pre>
<b>Hierarchy Level</b>	[edit class-of-service forwarding-policy next-hop-map <i>map-name</i> ]
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	Define forwarding class name and associated next hops.
<b>Options</b>	<p><i>class-name</i>—Name of the forwarding class.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Overriding the Input Classification</i></li><li>• <i>forwarding-class-default (Forwarding Policy)</i></li></ul>

## host-outbound-traffic (Class-of-Service)

<b>Syntax</b>	<pre> host-outbound-traffic {     forwarding-class <i>class-name</i>;     dscp-code-point <i>value</i>;     ieee-802.1 {         default <i>value</i>;         rewrite-rules;     } } </pre>
<b>Hierarchy Level</b>	[edit class-of-service]
<b>Release Information</b>	<p>Statement introduced in Junos OS Release 8.4.</p> <p>Statement introduced in Junos OS 8.5 for SRX1400, SRX3400, SRX3600, SRX5600, and SRX5800 firewalls.</p> <p>Statement introduced before Junos OS 11.4 for EX Series switches.</p> <p>Support for <b>ieee-802.1</b> statement introduced in Junos OS Release 12.3.</p> <p>Support for distributed protocol handler traffic introduced in Junos OS Release 13.2.</p>
<b>Description</b>	Classify and mark host outbound traffic. This statement does not affect transit traffic or incoming traffic.
<b>Default</b>	If you do not specify a forwarding class or DSCP value, the router uses the default queue and DSCP bit assignments for host outbound traffic.
<b>Options</b>	The remaining statements are explained separately.
<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>Default Queue Assignments for Routing Engine Sourced Traffic</i></li> <li>• <i>Default DSCP and DSCP IPv6 Classifier</i></li> <li>• <a href="#">Changing the Default Queuing and Marking of Host Outbound Traffic on page 5.</a></li> <li>• <i>Configuring a Global Default IEEE 802.1p Value for All Host Outbound Traffic</i></li> <li>• <i>Applying Egress Interface Rewrite Rules to the IEEE 802.1p Field for All Host Outbound Traffic on the Interface</i></li> <li>• <i>Understanding Junos OS CoS Components for EX Series Switches</i></li> </ul>

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

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<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. <code>vlan-tag</code> 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>	<code>rewrite-name</code> —Name of a <code>rewrite-rules</code> mapping configured at the <code>[edit class-of-service rewrite-rules ieee-802.1]</code> hierarchy level.  <code>default</code> —The default mapping.
<b>Required Privilege Level</b>	<code>interface</code> —To view this statement in the configuration. <code>interface-control</code> —To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <i>Configuring Rewrite Rules</i></li><li>• <a href="#">dscp (Rewrite Rules) on page 14</a></li><li>• <a href="#">dscp-ipv6 (Class-of-Service) on page 16</a></li><li>• <a href="#">exp on page 17</a></li><li>• <i>exp-push-push-push</i></li><li>• <i>exp-swap-push-push</i></li><li>• <i>ieee-802.1ad</i></li><li>• <a href="#">inet-precedence on page 21</a></li><li>• <i>rewrite-rules (Definition)</i></li></ul>

## inet-precedence

---

<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> <a href="#">rewrite-rules</a> ]
<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 <b>rewrite-rules 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>• <a href="#">protocol (Rewrite Rules) on page 23</a></li> <li>• <i>rewrite-rules (Definition)</i></li> </ul>

## irb

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**Syntax**    `irb {  
          unit logical-unit-number {  
            classifiers {  
              type (classifier-name | default);  
            }  
            rewrite-rules {  
              dscp (rewrite-name | default);  
              dscp-ipv6 (rewrite-name | default);  
              exp (rewrite-name | default) protocol protocol-types;  
              ieee-802.1 (rewrite-name | default) vlan-tag (outer | outer-and-inner);  
              inet-precedence (rewrite-name | default);  
            }  
          }  
        }`

**Hierarchy Level**    [edit class-of-service interfaces]

**Release Information**    Statement introduced in Junos OS Release 8.4.

**Description**    On the MX Series routers and EX Series switches, you can apply classifiers or rewrite rules to an integrated bridging and routing (IRB) interface. All types of classifiers and rewrite rules are allowed. These classifiers and rewrite rules are independent of others configured on the MX Series router and on EX Series switches.

The 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**    • *CoS Features and Limitations on MX Series Routers*

## protocol (Rewrite Rules)

<b>Syntax</b>	<code>protocol protocol-types;</code>
<b>Hierarchy Level</b>	<p>[edit class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i> rewrite-rules exp <i>rewrite-name</i>],</p> <p>[edit class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i> rewrite-rules dscp <i>rewrite-name</i>],</p> <p>[edit class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i> rewrite-rules dscp-ipv6 <i>rewrite-name</i>],</p> <p>[edit class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i> rewrite-rules inet-prec <i>rewrite-name</i>]</p>
<b>Release Information</b>	<p>Statement introduced before Junos OS Release 7.4.</p> <p>Option for <b>dscp</b> and <b>inet-prec</b> introduced in Junos OS Release 8.4.</p> <p>Option for <b>dscp-ipv6</b> introduced in Junos OS Release 10.4R2.</p>
<b>Description</b>	Apply a rewrite rule to MPLS packets only, and write the CoS value to MPLS headers only; or apply a rewrite rule to MPLS and IPv4 packets, and write the CoS value to MPLS and IPv4 headers.
<b>Options</b>	<p><b>protocol-types</b> can be one of the following:</p> <ul style="list-style-type: none"> <li>• <b>mpls</b>—Apply a rewrite rule to MPLS packets and write the CoS value to MPLS headers.</li> <li>• <b>mpls-inet-both</b>—Apply a rewrite rule to VPN MPLS packets with IPv4 payloads. On M120, M320, MX Series, and T Series routers (except T4000 routers), and EX Series switches, write the CoS value to the MPLS and IPv4 headers. On M Series routers, initialize all ingress MPLS LSP packets with IPv4 payloads with 000 code points for the MPLS EXP value, and the configured rewrite code point for IP precedence.</li> <li>• <b>mpls-inet-both-non-vpn</b>—Apply a rewrite rule to non-VPN MPLS packets with IPv4 payloads. On M120, M320, MX Series, T Series routers, and EX Series switches write the CoS value to the MPLS and IPv4 headers. On M Series routers, initialize all ingress MPLS LSP packets with IPv4 payloads with 000 code points for the MPLS EXP value, and the configured rewrite code point for IP precedence.</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>Rewriting MPLS and IPv4 Packet Headers</i></li> </ul>

## rewrite-rules (Interfaces)

<b>Syntax</b>	<pre>rewrite-rules {   dscp (rewrite-name   default) protocol mpls;   dscp-ipv6 (rewrite-name   default) protocol mpls;   exp (rewrite-name   default) protocol protocol-types;   exp-push-push-push default;   exp-swap-push-push default;   ieee-802.1 (rewrite-name   default) vlan-tag (outer   outer-and-inner);   ieee-802.1ad (rewrite-name   default) vlan-tag (outer   outer-and-inner);   inet-precedence (rewrite-name   default) protocol mpls; }</pre>
<b>Hierarchy Level</b>	<p>[edit class-of-service interfaces <i>interface-name</i>],</p> <p>[edit class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i>]</p>
<b>Release Information</b>	Statement introduced before Junos OS Release 7.4.
<b>Description</b>	<p>Associate a rewrite-rules configuration or default mapping with a specific interface.</p> <p>The [edit class-of-service interfaces <i>interface-name</i>] hierarchy level is not supported on M Series routers.</p> <p>The [edit class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i>] hierarchy level is not supported on ACX Series routers.</p> <p>On an MX Series router and on an EX Series switch, <b>exp-push-push-push</b>, <b>exp-swap-push-push</b>, and <b>frame-relay-de</b> are not supported on an integrated routing and bridging (IRB) interface.</p> <p>On an ACX Series router, only the outer tag is supported for <b>dscp</b>, <b>inet-precedence</b>, and <b>ieee802.1</b>.</p> <p>On M Series routers only, if you include the <b>control-word</b> statement at the [edit protocols <b>l2circuit neighbor address interface <i>interface-name</i></b>] hierarchy level, the software cannot rewrite MPLS EXP bits.</p> <p>For IQ PICs, you can configure only 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.</p> <p>On M320 and T Series routers (except for T4000 routers with Type 5 FPCs), for a single interface, you cannot enable a rewrite rule on a subset of forwarding classes. You must assign a rewrite rule to either none of the forwarding classes or all of the forwarding classes. When you assign a rewrite rule to a subset of forwarding classes, the commit does not fail, and the subset of forwarding classes works as expected. However, the forwarding classes to which the rewrite rule is not assigned are rewritten to all zeros.</p> <p>For example, if you configure a Differentiated Services code point (DSCP) rewrite rule, the bits in the forwarding classes to which you do not assign the rewrite rule are rewritten to 000000. If you configure an IP precedence rewrite rule, the bits in the forwarding classes to which you do not assign the rewrite rule are rewritten to 000.</p>

**Options**    *rewrite-name*—Name of a **rewrite-rules** mapping configured at the **[edit class-of-service rewrite-rules]** hierarchy level.

**default**—The default mapping.

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 Rewrite Rules*
- *rewrite-rules (Definition)*
- *Applying Rewrite Rules to Output Logical Interfaces*

## unit

**Syntax**    `unit logical-unit-number {`  
               `classifiers {`  
                   `type (classifier-name | default) family (mpls | all);`  
               `}`  
               `forwarding-class class-name;`  
               `fragmentation-map map-name;`  
               `input-traffic-control-profile profile-name shared-instance instance-name;`  
               `output-traffic-control-profile profile-name shared-instance instance-name;`  
               `per-session-scheduler;`  
               `rewrite-rules {`  
                   `dscp (rewrite-name | default);`  
                   `dscp-ipv6 (rewrite-name | default);`  
                   `exp (rewrite-name | default) protocol protocol-types;`  
                   `exp-push-push-push default;`  
                   `exp-swap-push-push default;`  
                   `ieee-802.1 (rewrite-name | default) vlan-tag (outer | outer-and-inner);`  
                   `inet-precedence (rewrite-name | default);`  
               `}`  
               `scheduler-map map-name;`  
               `shaping-rate rate;`  
               `}`

**Hierarchy Level**    [edit class-of-service interfaces *interface-name*]

**Release Information**    Statement introduced before Junos OS Release 7.4.

**Description**    Configure a logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

**Options**    *logical-unit-number*—Number of the logical unit.

**Range:**    0 through 16,384

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**    • *Overview of BA Classifier Types*  
                                   • *Configuring Rewrite Rules*

## vlan-tag

---

<b>Syntax</b>	<code>vlan-tag (outer   outer-and-inner);</code>
<b>Hierarchy Level</b>	[edit class-of-service interfaces <i>interface-name</i> unit <i>logical-unit-number</i> rewrite-rules <a href="#">ieee-802.1</a> ( <i>rewrite-name</i>   default)]
<b>Release Information</b>	Statement introduced in Junos OS Release 8.1.
<b>Description</b>	For Gigabit Ethernet IQ2 PICs only, apply this IEEE-802.1 rewrite rule to the outer or outer and inner VLAN tags.
<b>Default</b>	If you do not include this statement, the rewrite rule applies to the outer VLAN tag only.
<b>Options</b>	<p><b>outer</b>—Apply the rewrite rule to the outer VLAN tag only.</p> <p><b>outer-and-inner</b>—Apply the rewrite rule to both the outer and inner VLAN tags.</p>
<b>Required Privilege Level</b>	<p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li><i>Applying IEEE 802.1p Rewrite Rules to Dual VLAN Tags</i></li> </ul>

