

# Class of Service for MPLS 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<sup>®</sup> 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 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.

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>
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> <b>show chassis alarms</b>  No alarms currently active

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

Convention	Description	Examples
<i>Italic text like this</i>	<ul style="list-style-type: none"> <li>Introduces or emphasizes important new terms.</li> <li>Identifies book 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 System Basics Configuration 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>
<b>Text like this</b>	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 ospf area area-id] hierarchy level.</li> <li>The console port is labeled <b>CONSOLE</b>.</li> </ul>
< > (angle brackets)	Enclose optional keywords or variables.	<b>stub &lt;default-metric metric&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>  <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)	Enclose a variable for which you can substitute one or more values.	<b>community name members [ community-ids ]</b>
Indentation and braces ( { } )	Identify 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.	
<b>J-Web GUI Conventions</b>		
<b>Bold text like this</b>	Represents J-Web 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>
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select <b>Protocols&gt;Ospf</b> .

## Documentation Feedback

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We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can send your comments to [techpubs-comments@juniper.net](mailto:techpubs-comments@juniper.net), or fill out the documentation feedback form at <https://www.juniper.net/cgi-bin/docbugreport/>. If you are using e-mail, be sure to include the following information with your comments:

- Document or topic name
- URL or page number
- Software release version (if applicable)

## Requesting Technical Support

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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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- 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: <https://www.juniper.net/alerts/>

- 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

- [CoS for MPLS on page 3](#)



## CHAPTER 1

# CoS for MPLS

- [CoS for MPLS Overview on page 3](#)

## CoS for MPLS Overview

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When IP traffic enters a label-switched path (LSP) tunnel, the ingress routing device marks all packets with a class-of-service (CoS) value, which is used to place the traffic into a transmission priority queue. On the routing device, each interface has up to eight transmit queues. The CoS value is encoded as part of the Multiprotocol Label Switching (MPLS) header and remains in the packets until the MPLS header is removed when the packets exit from the egress routing device. The routing devices within the LSP utilize the CoS value set at the ingress routing device. The CoS value is encoded by means of the CoS bits (also known as the EXP or experimental bits).

MPLS class of service works in conjunction with the routing device's general CoS functionality. If you do not configure any CoS features, the default general CoS settings are used. For MPLS class of service, you might want to prioritize how the transmit queues are serviced by configuring weighted round-robin, and to configure congestion avoidance using random early detection (RED).

The next-hop label-switching router (LSR) uses the default classification shown in [Table 3 on page 3](#).

**Table 3: LSR Default Classification**

Code Point	Forwarding Class	Loss Priority
000	best-effort	low
001	best-effort	high
010	expedited-forwarding	low
011	expedited-forwarding	high
100	assured-forwarding	low

**Table 3: LSR Default Classification (*continued*)**

Code Point	Forwarding Class	Loss Priority
101	assured-forwarding	high
110	network-control	low
111	network-control	high



## PART 2

# Configuration

- [Configuration Task on page 7](#)



## CHAPTER 2

# Configuration Task

- [Configuring CoS for MPLS Traffic on page 7](#)

### Configuring CoS for MPLS Traffic

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To configure CoS for MPLS packets in an LSP, include the **class-of-service** statement with the appropriate CoS value:

```
class-of-service cos-value;
```

If you do not specify a CoS value, the IP precedence bits from the packet's IP header are used as the packet's CoS value.

You can include this statement at the following hierarchy levels:

- [edit protocols mpls]
- [edit protocols mpls interface *interface-name* label-map *label-value*]
- [edit protocols mpls label-switched-path *path-name*]
- [edit protocols mpls label-switched-path *path-name* primary *path-name*]
- [edit protocols mpls label-switched-path *path-name* secondary *path-name*]
- [edit protocols mpls static-path *prefix*]
- [edit protocols rsvp interface *interface-name* link-protection]
- [edit protocols rsvp interface *interface-name* link-protection bypass *destination*]
- [edit logical-systems *logical-system-name* protocols mpls]
- [edit logical-systems *logical-system-name* protocols mpls label-switched-path *path-name*]
- [edit logical-systems *logical-system-name* protocols mpls label-switched-path *path-name* primary *path-name*]
- [edit logical-systems *logical-system-name* protocols mpls label-switched-path *path-name* secondary *path-name*]
- [edit logical-systems *logical-system-name* protocols mpls static-path *prefix*]
- [edit logical-systems *logical-system-name* protocols mpls interface *interface-name* label-map *label-value*]

- [edit logical-systems *logical-system-name* protocols rsvp interface *interface-name* link-protection ]
- [edit logical-systems *logical-system-name* protocols rsvp interface *interface-name* link-protection bypass *destination*]

The **class-of-service** statement at the [edit protocols mpls label-switched-path] hierarchy level assigns an initial EXP value for the MPLS shim header of packets in the LSP. This value is initialized at the ingress routing device only and overrides the rewrite configuration established for that forwarding class. However, the CoS processing (weighted round robin [WRR] and RED) of packets entering the ingress routing device is not changed by the **class-of-service** statement on an MPLS LSP. Classification is still based on the behavior aggregate (BA) classifier at the [edit class-of-service] hierarchy level or the multifield classifier at the [edit firewall] hierarchy level.

We recommend configuring all routing devices along the LSP to have the same input classifier for EXP, and, if a rewrite rule is configured, all routing devices should have the same rewrite configuration. Otherwise, traffic at the next LSR might be classified into a different forwarding class, resulting in a different EXP value being written to the EXP header.

For more information, see the Junos OS MPLS Applications Configuration Guide.