JUNIPER NETWORKS

Junos® OS

CoS on Circuit Emulation ATM MICs

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The information in this document is current as of the date on the title page.

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Supported Platforms

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

- MX Series

Using the Examples in This Manual

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

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

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

Merging a Full Example

To merge a full example, follow these steps:

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

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

   ```
   system {
     scripts {
       commit {
         file ex-script.xsl;
       }
     }
   }
   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.xsl; }
   ```

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
Bold text like this	Represents text that you type.	To enter configuration mode, type the**configure** command: user@host> **configure**
`Fixed-width text like this`	Represents output that appears on the terminal screen.	`user@host>` **show chassis alarms** `No alarms currently active`

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

Convention	Description	Examples
Italic text like this	• Introduces or emphasizes important new terms. • Identifies book names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS System Basics Configuration Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# **set system domain-name** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• To configure a stub area, include the **stub** statement at the **[edit protocols ospf area area-id]** hierarchy level. • The console port is labeled **CONSOLE**.
< > (angle brackets)	Enclose optional keywords or variables.	**stub <default-metric** ***metric*****>;**
| (pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	**broadcast | multicast** **(*string1* | *string2* | *string3*)**
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	**rsvp { # Required for dynamic MPLS only**
[ ] (square brackets)	Enclose a variable for which you can substitute one or more values.	**community name members [** ***community-ids*** **]**

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

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

Documentation Feedback

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, 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)

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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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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:

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- 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: 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

CHAPTER 1

CoS on Circuit Emulation ATM MICs

CoS on Circuit Emulation ATM MICs Overview

The following class-of-service features are supported on Circuit Emulation ATM MICs:

- Traffic shaping and scheduling—Traffic shaping determines the maximum amount of traffic that can be transmitted on an interface.

  You can configure three different categories of ATM service: constant bit rate (**cbr**), non-real-time variable bit rate (**nrvbr**), and real-time variable bit rate (**rtvbr**). The service category works in conjunction with ATM cell parameters **peak-rate**, **sustained-rate**, and **max burst-size** to impose traffic shaping, transmit rate, shaping rate, and default excess rate for an ATM queue.

- Policing—Policing, or rate limiting, enables you to limit the amount of traffic that passes into or out of the interface. It works with firewall filters to thwart denial-of-service (DoS) attacks.

  Networks police traffic by limiting the input or output transmission rate of a class of traffic on the basis of user-defined criteria. The ATM policer controls the maximum rate of traffic sent from or received on the interface on which it is applied.

  To apply limits to the traffic flow, configure the **cdvt** and **peak-rate** parameters within the policer. Define the **policing-action** parameter as **discard**, **discard-tag**, and **count** to set a consequence for the packets that exceed these limits. The consequence is usually a higher loss priority so that if the packets encounter downstream congestion, they are discarded first.

Related Documentation

- Configuring CoS on Circuit Emulation ATM MICs on page 7

PART 2

Configuration

CHAPTER 2

Configuration Tasks

Configuring CoS on Circuit Emulation ATM MICs

On MX Series routers, you can configure the following class-of-service features on Circuit Emulation ATM MICs:

- Traffic shaping and scheduling—Traffic shaping determines the maximum amount of traffic that can be transmitted on an interface.
- Policing—Policing, or rate limiting, enables you to limit the amount of traffic that passes into or out of the interface. It works with firewall filters to thwart denial-of-service (DoS) attacks.

To configure a traffic shaping and scheduling profile on a Circuit Emulation ATM MIC:

1. Configure the traffic shaping and scheduling profile and specify the service category that determines the traffic shaping parameter for the ATM queue at the ATM MIC.

   [edit class-of-service traffic-control-profile *traffic-control-profile-name*]
   user@host# set atm-service (cbr | rtvbr| nrtvbr)

2. Configure the transmit rate, shaping rate, and default excess rate for the ATM queue.

   [edit class-of-service traffic-control-profile *traffic-control-profile-name*]
   user@host# set peak-rate *peak-rate*
   user@host# set sustained-rate *rate*
   user@host# set max-burst-size *cells*

To configure an ATM policer for a Circuit Emulation ATM MIC:

1. Create a policer for each cell in the ATM packet. A policer defines the maximum traffic that can flow through an interface and further determines the actions to be taken when the traffic exceeds the defined limits.

   [edit firewall]
   user@host# set atm-policer *atm-policer-name*

2. Define the policer parameters. Configure the **atm-service** option. Apply limits to the traffic flow by configuring the **cdvt** and **peak-rate** parameters within the policer and define the **policing-action** parameter to set a consequence for the packets that exceed the traffic limits.

```
[edit firewall atm-policer atm-policer-name]
user@host# set logical-interface-policer
user@host# set atm-service (cbr | rtvbr | nrtvbr | ubr)
user@host# set cdvt rate
user@host# set peak-rate rate
user@host# set policing-action (discard | discard-tag | count)
```

3. Apply the traffic-shaping profile at the interface level.

```
[edit interfaces at-fpc/pic/port unit unit-number]
user@host# set class-of-service interfaces output-traffic-control-profile
  traffic-control-profile-name
```

4. Apply the policer at the interface level.

```
[edit interfaces at-fpc/pic/port unit unit-number]
user@host# set atm-policer input-atm-policer atm-policer-name
```

You can verify the configuration by using the **show class-of-service traffic-control-profile** ***traffic-control-profile-name*** command.

Related Documentation

- ATM Support on Circuit Emulation PICs Overview
- CoS on Circuit Emulation ATM MICs Overview on page 3

CHAPTER 3

Configuration Statements

[edit firewall] Hierarchy Level

The following CoS statements can be configured at the **[edit firewall]** hierarchy level. This is not a comprehensive list of statements available at the **[edit firewall]** hierarchy level.

```
[edit firewall]
  atm-policer policer-name {
    cdvt rate;
    logical-interface-policer;
    max-burst-size max-burst-size;
    peak-rate rate;
    policing-action (discard | discard-tag | count);
    sustained-rate rate;
  }
family family-name {
  filter filter-name {
    term term-name {
      from {
        match-conditions;
      }
      then {
        dscp 0;
        forwarding-class class-name;
        loss-priority (high | low);
        three-color-policer {
          (single-rate | two-rate) policer-name;
        }
      }
    }
  }
  simple-filter filter-name {
    term term-name {
      from {
        match-conditions;
      }
      then {
        forwarding-class class-name;
        loss-priority (high | low | medium);
```

```
        }
      }
    }
}
policer policer-name {
    logical-bandwidth-policer;
    shared-bandwidth-policer ;
    if-exceeding {
        bandwidth-limit rate;
        bandwidth-percent number;
        burst-size-limit bytes;
    }
    then {
        policer-action;
        }
    }
three-color-policer policer-name {
    action {
        loss-priority high then discard;
    }
    logical-interface-policer;
    shared-bandwidth-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;
    }
}
```

cdvt

Syntax cdvt *rate*;

Hierarchy Level [edit firewall atm-policer *atm-policer-name*]

Release Information Statement introduced in Junos OS Release 12.1.

Description (MX Series routers) Define the Cell Delay/Variation Tolerance (CDVT) rate on a clear-channel multirate circuit emulation MIC.

Options *rate*—CDVT rate in microseconds.

Range: 1 through 1,800,000,000

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

Related Documentation

- cbr rate
- show class-of-service traffic-control-profile

logical-interface-policer

Syntax logical-interface-policer;

Hierarchy Level [edit dynamic-profiles *profile-name* firewall policer *policer-name*],
[edit dynamic-profiles *profile-name* firewall three-color-policer *name*],
[edit firewall atm-policer*atm-policer-name*]
[edit firewall policer *policer-name*],
[edit firewall policer *policer-template-name*],
[edit firewall three-color-policer *policer-name*],
[edit logical-systems *logical-system-name* firewall policer *policer-name*],
[edit logical-systems *logical-system-name* firewall three-color-policer *name*]

Release Information Statement introduced before Junos OS Release 7.4.
Support at the **[edit firewall three-color-policer *policer-name*]** hierarchy level introduced in Junos OS Release 8.2.
Logical systems support introduced in Junos OS Release 9.3.
Support at the **[edit dynamic-profiles ... policer *policer-name*]** and **[edit dynamic-profiles ... three-color-policer *name*]** hierarchy levels introduced in Junos OS Release 11.4.

Description Configure a logical interface policer.

NOTE: 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.

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

Related Documentation

- Two-Color and Three-Color Logical Interface Policers
- Traffic Policer Types
- Configuring Tricolor Marking Policers
- action
- Configuring Gigabit Ethernet Two-Color and Tricolor Policers
- action

max-burst-size

Syntax max-burst-size *max-burst-size*;

Hierarchy Level [edit class-of-service traffic-control-profiles *traffic-control-profile-name*],
[edit firewall atm-policer *atm-policer-name*]

Release Information Statement introduced in Junos OS Release 12.1.

Description (MX Series routers) Define ATM maximum burst size on ATM MICs in cells.

Options *cells*—ATM maximum burst size in cells.

Range: 1 through 4000 cells

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

Related Documentation

- show class-of-service traffic-control-profile

peak-rate

Syntax peak-rate *rate*;

Hierarchy Level [edit class-of-service traffic-control-profiles *traffic-control-profile-name*]

Release Information Statement introduced in Junos OS Release 12.1.

Description (MX Series routers) Define ATM peak cell rate on ATM MICs in cells per second by entering a decimal number followed by the abbreviation c; where 1 cps = 384 bps.

Options *rate*—ATM peak rate in cells per second.

Range: 61 cps through 353,206 cps.

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

Related Documentation

- show class-of-service traffic-control-profile

policing-action

Syntax policing-action (discard | discard-tag | count);

Hierarchy Level [edit firewall atm-policer *policer-name*]

Release Information Statement introduced in Junos OS Release 12.1.

Description Configure the policing action to be taken when the traffic exceeds the limits set for the policer.

This action is associated with the ATM policer only if policing is enabled on the ATM interface.

Options

discard—Discard traffic at ingress that exceeds the rate limit. These packets are discarded but not counted.

discard-tag—Discard and tag packets at ingress that exceed the rate limit. These packets are discarded and counted.

count—Count all the packets that are received at ingress.

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

Related Documentation

- show class-of-service traffic-control-profile

sustained-rate

Syntax sustained-rate *rate*;

Hierarchy Level [edit class-of-service traffic-control-profiles *traffic-control-profile-name*]
[edit firewall atm-policer*atm-policer-name*]

Release Information Statement introduced in Junos OS Release 12.1.

Description (MX Series routers) Define ATM sustained cell rate on ATM MICs in cells per second by entering a decimal number followed by the abbreviation c; where 1 cps = 384 bps.

Options *rate*—ATM sustained rate in cells per second.

Range: 61 cps through 353,206 cps.

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

Related Documentation

- show class-of-service traffic-control-profile

PART 3

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