JUNIPER NETWORKS

Class-of-Service Properties

Published: 2012-11-27

Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, California 94089
USA
408-745-2000
www.juniper.net

Table of Contents

List of Tables

About the Documentation

Documentation and Release Notes

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

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

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

Supported Platforms

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

- M Series
- T Series
- 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)

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.

Self-Help Online Tools and Resources

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

- Find CSC offerings: http://www.juniper.net/customers/support/
- Search for known bugs: http://www2.juniper.net/kb/
- Find product documentation: http://www.juniper.net/techpubs/
- Find solutions and answer questions using our Knowledge Base: http://kb.juniper.net/
- Download the latest versions of software and review release notes: http://www.juniper.net/customers/csc/software/
- Search technical bulletins for relevant hardware and software notifications: 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

Class of Service

Class of Service Overview

The CoS configuration available for the AS PIC enables you to configure Differentiated Services (DiffServ) code point (DSCP) marking and forwarding-class assignment for packets transiting the AS PIC. You can configure the CoS service alongside the stateful firewall and NAT services, using a similar rule structure. The component structures are described in detail in the Junos OS Class of Service Configuration Guide.

Standards for Differentiated Services are described in the following documents:

- RFC 2474, *Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers*
- RFC 2475, *An Architecture for Differentiated Services*

NOTE: **CoS BA classification is not supported on services interfaces.**

For more information about configuring CoS services, see Class-of-Service Properties.

Restrictions and Cautions for CoS Configuration on Services Interfaces

The following restrictions and cautions apply to CoS configuration on services interfaces:

- The adaptive services interface does not support scheduling, only DiffServ marking and queue assignment. You must configure scheduling at the **[edit class-of-service]** hierarchy level on the output interface or fabric.
- In the default configuration, queues 1 and 2 receive 0 percent bandwidth. If packets will be assigned to these queues, you must configure a scheduling map.
- You must issue a **commit full** command before using custom forwarding-class names in the configuration.

- Only the Junos standard DiffServ names can be used in the configuration. Custom names are not recognized.
- On M Series routers, you can configure rewrite rules that change packet headers and attach the rules to output interfaces. These rules might overwrite the DSCP marking configured on an AS or MultiServices PIC. It is important to keep this adverse effect in mind and use care when creating system-wide configurations.

  For example, knowing that the AS or MultiServices PIC can mark packets with any ToS or DSCP value and the output interface is restricted to only eight DSCP values, rewrite rules on the output interface condense the mapping from 64 to 8 values with overall loss of granularity. In this case, you have the following options:

  - Remove the rewrite rules from the output interface.
  - Configure the output interface to include the most important mappings.

PART 2

Configuration

CHAPTER 2

Configuration Tasks

Configuring CoS Rules

To configure a CoS rule, include the **rule *rule-name*** statement at the **[edit services cos]** hierarchy level:

```
[edit services cos]
rule rule-name {
  match-direction (input | output | input-output);
  term term-name {
    from {
      application-sets set-name;
      applications [ application-names ];
      destination-address (CoS) address;
      destination-prefix-list list-name <except>;
      source-address address;
      source-prefix-list list-name <except>;
    }
    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;
      }
    }
  }
}
```

Each CoS rule consists of a set of terms, similar to a filter configured at the **[edit firewall]** hierarchy level. A term consists of the following:

- **from** statement—Specifies the match conditions and applications that are included and excluded.

- **then** statement—Specifies the actions and action modifiers to be performed by the router software.

The following sections explain how to configure the components of CoS rules:

Configuring Match Direction for CoS Rules

Each rule must include a **match-direction** statement that specifies the direction in which the rule match is applied. To configure where the match is applied, include the **match-direction** statement at the **[edit services cos rule *rule-name*]** hierarchy level:

```
match-direction (input | output | input-output);
```

If you configure **match-direction input-output**, bidirectional rule creation is allowed.

The match direction is used with respect to the traffic flow through the AS or Multiservices PIC. When a packet is sent to the PIC, direction information is carried along with it.

With an interface service set, packet direction is determined by whether a packet is entering or leaving the interface on which the service set is applied.

With a next-hop service set, packet direction is determined by the interface used to route the packet to the AS or Multiservices PIC. If the inside interface is used to route the packet, the packet direction is input. If the outside interface is used to direct the packet to the AS or Multiservices PIC, the packet direction is output. For more information on inside and outside interfaces, see Configuring Service Sets to be Applied to Services Interfaces.

On the AS or Multiservices PIC, a flow lookup is performed. If no flow is found, rule processing is performed. All rules in the service set are considered. During rule processing, the packet direction is compared against rule directions. Only rules with direction information that matches the packet direction are considered.

Configuring Match Conditions In CoS Rules

To configure CoS match conditions, include the **from** statement at the **[edit services cos rule *rule-name* term *term-name*]** hierarchy level:

```
from {
  application-sets set-name;
  applications [ application-names ];
  destination-address (CoS) address;
  destination-prefix-list list-name <except>;
  source-address address;
  source-prefix-list list-name <except>;
}
```

The source address and destination address can be either IPv4 or IPv6. You can use either the source address or the destination address as a match condition, in the same way

that you would configure a firewall filter; for more information, see the Routing Policy Configuration Guide.

Alternatively, you can specify a list of source or destination prefixes by configuring the **prefix-list** statement at the **[edit policy-options]** hierarchy level and then including either the **destination-prefix-list** or **source-prefix-list** statement in the CoS rule. For an example, see Examples: Configuring Stateful Firewall Rules.

If you omit the **from** term, the router accepts all traffic and the default protocol handlers take effect:

- User Datagram Protocol (UDP), Transmission Control Protocol (TCP), and Internet Control Message Protocol (ICMP) create a bidirectional flow with a predicted reverse flow.
- IP creates a unidirectional flow.

You can also include application protocol definitions you have configured at the **[edit applications]** hierarchy level; for more information, see Configuring Application Protocol Properties.

- To apply one or more specific application protocol definitions, include the **applications** statement at the **[edit services cos rule** *rule-name* **term** *term-name* **from]** hierarchy level.
- To apply one or more sets of application protocol definitions you have defined, include the **application-sets** statement at the **[edit services cos rule** *rule-name* **term** *term-name* **from]** hierarchy level.

NOTE: If you include one of the statements that specifies application protocols, the router derives port and protocol information from the corresponding configuration at the **[edit applications]** hierarchy level; you cannot specify these properties as match conditions.

Configuring Actions in CoS Rules

To configure CoS actions, include the **then** statement at the **[edit services cos rule** *rule-name* **term** *term-name***]** hierarchy level:

```
[edit services cos rule rule-name term term-name]
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;
    }
}
```

The principal CoS actions are as follows:

- **dscp**—Causes the packet to be marked with the specified DiffServ code point (DSCP) value or alias.
- **forwarding-class**—Causes the packet to be assigned to the specified forwarding class.

For detailed information about DSCP values and forwarding classes, see "Examples: Configuring CoS on Services Interfaces" on page 13 or the Junos OS Class of Service Configuration Guide.

You can optionally set the configuration to record information in the system logging facility by including the **syslog** statement at the **[edit services cos rule *rule-name* term *term-name* then]** hierarchy level. This statement overrides any **syslog** setting included in the service set or interface default configuration.

For information about some additional CoS actions, see the following sections:

- Configuring Application Profiles for Use as CoS Rule Actions on page 10
- Configuring Reflexive and Reverse CoS Rule Actions on page 11

Configuring Application Profiles for Use as CoS Rule Actions

You can optionally define one or more application profiles for inclusion in CoS actions. To configure application profiles, include the **application-profile** statement at the **[edit services cos]** hierarchy level:

```
[edit services cos]
application-profile profile-name {
    ftp {
        data {
            dscp (alias | bits);
            forwarding-class class-name;
        }
    }
    sip {
        video {
            dscp (alias | bits);
            forwarding-class class-name;
        }
        voice {
            dscp (alias | bits);
            forwarding-class class-name;
        }
    }
}
```

The **application-profile** statement includes two main components and three traffic types: **ftp** with the **data** traffic type and **sip** with the **video** and **voice** traffic types. You can set the appropriate **dscp** and **forwarding-class** values for each component within the application profile.

NOTE: The ftp and sip statements are not supported on Juniper Network MX Series 3D Universal Edge Routers.

You can apply the application profile to a CoS configuration by including it at the **[edit services cos rule *rule-name* term *term-name* then]** hierarchy level.

Configuring Reflexive and Reverse CoS Rule Actions

CoS services are unidirectional. It might be necessary to specify different treatments for flows in opposite directions.

Regardless of whether a packet matches the input, output or input-output direction, flows in both directions are created. A forward, reverse, or forward-and-reverse CoS action is associated with each flow. Bear in mind that the flow in the opposite direction might end up having a CoS action associated with it that you have not specifically configured.

To control the direction in which service is applied, as distinct from the direction in which the rule match is applied, you can configure the (**reflexive | reverse**) statement at the **[edit services cos rule *rule-name* term *term-name* then]** hierarchy level:

```
[edit services cos rule rule-name term term-name then]
(reflexive | reverse) {
  application-profile profile-name;
  dscp (alias | bits);
  forwarding-class class-name;
  syslog;
}
```

The two actions are mutually exclusive:

- **reflexive** causes the equivalent opposing CoS action to be applied to flows in the opposite direction.
- **reverse** allows you to define the CoS behavior for flows in the reverse direction.

If you omit the statement, data flows inherit the CoS behavior of the forward control flow.

Example: Configuring CoS Rules

The following example show a CoS configuration containing two rules, one for input matching on a specified application set and the other for output matching on a specified source address:

```
[edit services]
cos {
  rule my-cos-rule {
    match-direction input-output;
    term term1 {
      from {
        source-address 10.1.3.2/32;
        applications sip;
```

```
        }
        then {
            dscp ef;
            syslog;
        }
    }
    term term2 {
        from {
            destination-address 10.2.3.2;
            applications http;
        }
        then {
            dscp af21;
        }
    }
  }
}
```

Configuring CoS Rule Sets

The **rule-set** statement defines a collection of CoS rules that determine what actions the router software performs on packets in the data stream. You define each rule by specifying a rule name and configuring terms. Then you specify the order of the rules by including the **rule-set** statement at the **[edit services cos]** hierarchy level with a **rule** statement for each rule:

```
rule-set rule-set-name {
    rule rule-name;
}
```

The router software processes the rules in the order in which you specify them in the configuration. If a term in a rule matches the packet, the router performs the corresponding action and the rule processing stops. If no term in a rule matches the packet, processing continues to the next rule in the rule set. If none of the rules matches the packet, the packet is dropped by default.

CHAPTER 3

Example

Examples: Configuring CoS on Services Interfaces

To make settings consistent across Juniper Networks routers, you configure many CoS settings at the **[edit class-of-service]** hierarchy level to be used on services interfaces. When you commit this configuration along with what you configure at the **[edit services cos]** hierarchy level, these properties are applied to the AS or MultiServices PIC.

The following configuration examples at the **[edit class-of-service]** hierarchy level can be applied on services interfaces. For more information, see the Junos OS Class of Service Configuration Guide.

NOTE: The first two configurations, mapping forwarding-class name to forwarding-class ID and mapping forwarding-class name to queue number, are mutually exclusive.

Mapping Forwarding-Class Name to Forwarding-Class ID

Map forwarding-class names to forwarding-class IDs:

```
[edit class-of-service]
forwarding-classes {
   forwarding-class fc0 0;
   forwarding-class fc1 0;
   forwarding-class fc2 1;
   forwarding-class fc3 1;
   forwarding-class fc4 2;
   forwarding-class fc5 2;
   forwarding-class fc6 3;
   forwarding-class fc7 3;
   forwarding-class fc8 4;
   forwarding-class fc9 4;
   forwarding-class fc10 5;
   forwarding-class fc11 5;
   forwarding-class fc12 6;
   forwarding-class fc13 6;
   forwarding-class fc14 7;
   forwarding-class fc15 7;
}
```

Mapping Forwarding-Class Name to Queue Number

Map forwarding-class names to queue numbers:

```
[edit class-of-service]
forwarding-classes {
  queue 0 be;
  queue 1 ef;
  queue 2 af;
  queue 3 nc;
  queue 4 ef1;
  queue 5 ef2;
  queue 6 af1;
  queue 7 nc1;
}
```

Mapping Diffserv Code Point Aliases to DSCP Bits

Map alias names to DSCP bit values. The aliases then can be used instead of the DSCP bits in adaptive services configurations.

```
[edit class-of-service]
code-point-aliases {
  (dscp | dscp-ipv6 | exp | ieee-802.1 | inet-precedence) {
    alias | bits;
  }
}
```

Here is an example:

```
code-point-aliases {
  dscp {
    my1 110001;
    my2 101110;
    be 000001;
    cs7 110000;
  }
}
```

CHAPTER 4

Configuration Statements

application-profile

Syntax

```
application-profile profile-name {
  ftp {
    data {
      dscp (alias | bits);
      forwarding-class class-name;
    }
  }
  sip {
    video {
      dscp (alias | bits);
      forwarding-class class-name;
    }
    voice {
      dscp (alias | bits);
      forwarding-class class-name;
    }
  }
}
```

Hierarchy Level

[edit services cos],
[edit services cos rule *rule-name* term *term-name* then],
[edit services cos rule *rule-name* term *term-name* then (reflexive | reverse)]

Release Information

Statement introduced in Junos OS Release 8.1.

Description

Define or apply a CoS application profile. When you apply a CoS application profile in a CoS rule, terminate the profile name with a semicolon (;).

Options

profile-name—Identifier for the application profile.

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 Application Profiles for Use as CoS Rule Actions on page 10

application-sets (Services CoS)

Syntax applications-sets *set-name*;

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

Release Information Statement introduced in Junos OS Release 8.1.

Description Define one or more target application sets.

Options ***set-name***—Name of the target application set.

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

Related Documentation
- Configuring Match Conditions In CoS Rules on page 8

applications (Services CoS)

Syntax applications [*application-name*];

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

Release Information Statement introduced in Junos OS Release 8.1.

Description Define one or more applications to which the CoS services apply.

Options ***application-name***—Name of the target application.

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

Related Documentation
- Configuring Match Conditions in a CoS Rule
- Configuring Match Conditions In CoS Rules on page 8

destination-address (CoS)

Syntax destination-address (*address* | any-unicast) <except>;

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

Release Information Statement introduced in Junos OS Release 8.1.
address option enhanced to support IPv4 and IPv6 addresses in Junos OS Release 8.5.

Description Specify the destination address for rule matching.

Options ***address***—Destination IPv4 or IPv6 address or prefix value.

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

Related Documentation
- Configuring Match Conditions in a CoS Rule
- Configuring Match Conditions In CoS Rules on page 8

destination-prefix-list (Services CoS)

Syntax destination-prefix-list *list-name* <except>;

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

Release Information Statement introduced in Junos OS Release 8.2.

Description Specify the destination prefix list for rule matching. You configure the prefix list by including the **prefix-list** statement at the **[edit policy-options]** hierarchy level.

Options ***list-name***—Destination prefix list.

except—(Optional) Exclude the specified prefix list from rule matching.

Usage Guidelines See "Configuring Match Conditions In CoS Rules" on page 8.

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

Related Documentation
- Routing Policy Configuration Guide

dscp

Syntax dscp (*alias* | *bits*);

Hierarchy Level
[edit services cos application-profile *profile-name* ftp data],
[edit services cos application-profile *profile-name* sip (video | voice)],
[edit services cos rule *rule-name* term *term-name* then],
[edit services cos rule *rule-name* term *term-name* then (reflexive | reverse)]

Release Information Statement introduced in Junos OS Release 8.1.

Description Define the Differentiated Services code point (DSCP) mapping that is applied to the packets.

Options
alias—Name assigned to a set of CoS markers.

bits—Mapping value in the packet header.

Usage Guidelines See "Configuring Actions in CoS Rules" on page 9.

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

forwarding-class

Syntax forwarding-class *class-name*;

Hierarchy Level
[edit services cos application-profile *profile-name* ftp data],
[edit services cos application-profile *profile-name* sip (video | voice)],
[edit services cos rule *rule-name* term *term-name* then],
[edit services cos rule *rule-name* term *term-name* then (reflexive | reverse)]

Release Information Statement introduced in Junos OS Release 8.1.

Description Define the forwarding class to which packets are assigned.

Options
class-name—Name of the target application.

Usage Guidelines See "Configuring Actions in CoS Rules" on page 9.

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

from (Services CoS)

Syntax

```
from {
  application-sets set-name;
  applications [ application-names ];
  destination-address (CoS) address;
  destination-prefix-list list-name <except>;
  source-address address;
  source-prefix-list list-name <except>;
}
```

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

Release Information Statement introduced in Junos OS Release 8.1.

Description Specify input conditions for a CoS term.

Options For information on match conditions, see the description of firewall filter match conditions in the Routing Policy Configuration Guide.

The remaining statements are explained separately.

Usage Guidelines See "Configuring CoS Rules" on page 7.

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

match-direction

Syntax match-direction (input | output | input-output);

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

Release Information Statement introduced in Junos OS Release 8.1.

Description Specify the direction in which the rule match is applied.

Options **input**—Apply the rule match on the input side of the interface.

output—Apply the rule match on the output side of the interface.

input-output—Apply the rule match bidirectionally.

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

Related Documentation

- Configuring CoS Rules

(reflexive | reverse)

Syntax

```
(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* then]

Release Information Statement introduced in Junos OS Release 8.1.

Description **reflexive**—Applies the equivalent opposing CoS action to flows in the opposite direction.

reverse—Allows you to define CoS behavior for flows in the reverse direction.

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 CoS Rules
- Configuring Reflexive and Reverse CoS Rule Actions on page 11

rule

Syntax

```
rule rule-name {
  match-direction (input | output | input-output);
  term term-name {
    from {
      application-sets set-name;
      applications [ application-names ];
      destination-address (CoS) address;
      destination-prefix-list list-name <except>;
      source-address address;
      source-prefix-list list-name <except>;
    }
    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],
[edit services cos rule-set *rule-set-name*]

Release Information

Statement introduced in Junos OS Release 8.1.

Description

Specify the rule the router uses when applying this service.

Options

rule-name—Identifier for the collection of terms that constitute this rule.

The remaining statements are explained separately.

Usage Guidelines

See "Configuring CoS Rules" on page 7.

Required Privilege Level

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

rule-set (Services CoS)

Syntax

```
rule-set rule-set-name {
    [ rule rule-name ];
}
```

Hierarchy Level [edit services cos]

Release Information Statement introduced in Junos OS Release 8.1.

Description Specify the rule set the router uses when applying this service.

Options ***rule-set-name***—Identifier for the collection of rules that constitute this rule set.

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

Related Documentation

- Configuring CoS Rule Sets

services (COS)

Syntax services cos { ... }

Hierarchy Level [edit]

Release Information Statement introduced in Junos OS Release 8.1.

Description Define the service rules to be applied to traffic.

Options **cos**—Identifier for the class-of-service set of rules statements.

Usage Guidelines See Class-of-Service Properties.

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

sip-text

Syntax

```
sip-text {
  dscp (alias | bits);
  forwarding-class class-name;
}
```

Hierarchy Level [edit services (COS) cos application-profile *profile-name*]

Release Information Statement introduced in Junos OS Release 8.1.

Description Enable a predefined application profile for handling text data packets.

The remaining statements are explained separately.

Usage Guidelines See "Configuring Application Profiles for Use as CoS Rule Actions" on page 10.

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

video

Syntax

```
video {
  dscp (alias | bits);
  forwarding-class class-name;
}
```

Hierarchy Level [edit services (COS) cos application-profile *profile-name* sip]

Release Information Statement introduced in Junos OS Release 9.3.

Description Set the appropriate **dscp** and **forwarding-class** values for SIP video traffic.

The remaining statements are explained separately.

Usage Guidelines See "Configuring Application Profiles for Use as CoS Rule Actions" on page 10.

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

voice

Syntax

```
voice {
  dscp (alias | bits);
  forwarding-class class-name;
}
```

Hierarchy Level [edit services (COS) cos application-profile *profile-name* sip]

Release Information Statement introduced in Junos OS Release 9.3.

Description Set the appropriate **dscp** and **forwarding-class** values for SIP voice traffic.

The remaining statements are explained separately.

Usage Guidelines See "Configuring Application Profiles for Use as CoS Rule Actions" on page 10.

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

source-address (Services CoS)

Syntax source-address *address*;

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

Release Information Statement introduced in Junos OS Release 8.1.
address option enhanced to support IPv4 and IPv6 addresses in Junos OS Release 8.5.

Description Source address for rule matching.

Options ***address***—Source IPv4 or IPv6 address or prefix value.

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

Related Documentation

- Configuring Match Conditions in a CoS Rule
- Configuring Match Conditions In CoS Rules on page 8

source-prefix-list

Syntax source-prefix-list *list-name* <except>;

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

Release Information Statement introduced in Junos OS Release 8.2.

Description Specify the source prefix list for rule matching. You configure the prefix list by including the **prefix-list** statement at the **[edit policy-options]** hierarchy level.

Options ***list-name***—Destination prefix list.

except—(Optional) Exclude the specified prefix list from rule matching.

Usage Guidelines See "Configuring CoS Rules" on page 7.

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

Related Documentation

- Routing Policy Configuration Guide

syslog (Services CoS)

Syntax syslog;

Hierarchy Level [edit services cos rule *rule-name* term *term-name* then],
[edit services cos rule *rule-name* term *term-name* then (reflexive | reverse)]

Release Information Statement introduced in Junos OS Release 8.1.

Description Enable system logging. The system log information from the Adaptive Services or Multiservices PIC is passed to the kernel for logging in the **/var/log** directory. This setting overrides any **syslog** statement setting included in the service set or interface default configuration.

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 on page 9

term (Services CoS)

Syntax

```
term term-name {
  from {
    application-sets set-name;
    applications [ application-names ];
    destination-address (CoS) address;
    destination-prefix-list list-name <except>;
    source-address address;
    source-prefix-list list-name <except>;
  }
  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*]

Release Information Statement introduced in Junos OS Release 8.1.

Description Define the CoS term properties.

Options ***term-name***—Identifier for the term.

The remaining statements are explained separately.

Usage Guidelines See "Configuring CoS Rules" on page 7.

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

then

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 on page 9

PART 3

Administration

CHAPTER 5

CoS Services Operational Mode Commands

show services cos statistics

Syntax

show services cos statistics
<brief | detail | extensive>
<diffserv | forwarding-class>
<interface *interface-name*>
<service-set *service-set-name*>
<summary>

Release Information

Command introduced in Junos OS Release 8.1.

Description

Display the mapping of class-of-service (CoS) code point aliases to corresponding bit patterns and the mapping of forwarding class names to queue numbers as configured in CoS services for the AS PIC.

Options

none—Display all services CoS statistics.

brief | detail | extensive—(Optional) Display the specified level of output.

diffserv | forwarding-class—(Optional) Display only the selected information, either DiffServ codepoints or forwarding classes.

interface *interface-name*—(Optional) Display statistics for the specified interface only.

service-set *service-set-name*—(Optional) Display statistics for the specified service set only.

summary—(Optional) Display summary of statistics on a per-interface basis.

Required Privilege Level

view

List of Sample Output

show services cos statistics on page 33
show services cos statistics brief on page 34
show services cos statistics detail on page 34
show services cos statistics extensive on page 34

Output Fields

Table 3 on page 32 describes the output fields for the **show services cos statistics** command. Output fields are listed in the approximate order in which they appear.

Table 3: show services cos statistics Output Fields

Field Name	Field Description	Level of Output
Interface	Name of interface.	All levels
Service set	Name of service set.	All levels
DSCP	DiffServ code point bit pattern.	All levels
Packets in	Number of packets received.	All levels

Table 3: show services cos statistics Output Fields *(continued)*

Field Name	Field Description	Level of Output
Packets out	Number of packets transmitted.	All levels
Forwarding class	Forwarding class queue number.	All levels

Sample Output

show services cos statistics

```
user@host> show services cos statistics
Interface: sp-1/0/0, Service set: scos
DSCP                Packets in           Packets out
000000                       0                     0
000001                       0                     0
000010                       0                     0
000011                       0                     0
000100                       0                     0
000101                       0                     0
000110                       0                     0
000111                       0                     0
001000                       0                     0
001001                       0                     0
001010                       0                     0
001011                       0                     0
001100                       0                     0
001101                       0                     0
001110                       0                     0
001111                       0                     0
010000                       0                     0
010001                       0                     0
010010                       0                     0
010011                       0                     0
010100                       0                     0
010101                       0                     0
010110                       0                     0
010111                       0                     0
011000                       0                     0
011001                       0                     0
011010                       0                     0
011011                       0                     0
011100                       0                     0
011101                       0                     0
011110                       0                     0
011111                       0                     0
100000                       0                     0
100001                       0                     0
100010                       0                     0
100011                       0                     0
100100                       0                     0
100101                       0                     0
100110                       0                     0
100111                       0                     0
101000                       0                     0
101001                       0                     0
101010                       0                     0
101011                       0                     0
101100                       0                     0
```

```
101101                  0                    0
101110                  0                    0
101111                  0                    0
110000                  0                    0
110001                  0                    0
110010                  0                    0
110011                  0                    0
110100                  0                    0
110101                  0                    0
110110                  0                    0
110111                  0                    0
111000                  0                    0
111001                  0                    0
111010                  0                    0
111011                  0                    0
111100                  0                    0
111101                  0                    0
111110                  0                    0
111111                  0                    0
Forwarding class          Packets in          Packets out
0                                  0                    0
1                                  0                    0
2                                  0                    0
3                                  0                    0
4                                  0                    0
5                                  0                    0
6                                  0                    0
7                                  0                    0
8                                  0                    0
9                                  0                    0
10                                 0                    0
11                                 0                    0
12                                 0                    0
13                                 0                    0
14                                 0                    0
15                                 0                    0
```

show services cos statistics brief The output for the **show services cos statistics brief** command is identical to that for the **show services cos statistics** command.

show services cos statistics detail The output for the **show services cos statistics detail** command is identical to that for the **show services cos statistics** command.

show services cos statistics extensive The output for the **show services cos statistics extensive** command is identical to that for the **show services cos statistics** command.

clear services cos statistics

Syntax clear services cos statistics
<interface *interface-name*>
<service-set *service-set-name*>

Release Information Command introduced in Junos OS Release 8.1.

Description Clear statistics for class-of-service (CoS) code point bit patterns and forwarding classes as configured in CoS services for the AS PIC.

Options **none**—Clear all services CoS statistics.

interface *interface-name*—(Optional) Clear statistics for the specified interface only.

service-set *service-set-name*—(Optional) Clear statistics for the specified service set only.

Required Privilege Level view

List of Sample Output clear services cos statistics on page 35

Output Fields When you enter this command, you are provided feedback on the status of your request.

Sample Output

clear services cos statistics

```
user@host> clear services cos statistics
```

PART 4

Index

Index

S

T

V