Chapter 20
Summary of CoS Configuration Statements

The following sections explain each of the class-of-service (CoS) configuration statements. The statements are organized alphabetically.

adaptive-shaper

Syntax adaptive-shaper *adaptive-shaper-name*;

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

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, assign an adaptive shaper to this interface.

Adaptive shapers enable bandwidth limits on Frame Relay interfaces when the Services Router receives frames containing the backward explicit congestion notification (BECN) bit.

Options *adaptive-shaper-name*—Name of the adaptive shaper.

Usage Guidelines See the *J-series Services Router Configuration Guide*.

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

adaptive-shapers

Syntax

```
adaptive-shapers {
    adaptive-shaper-name {
        trigger type shaping-rate (percent percent | rate);
    }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, define trigger types and associated rates.

Adaptive shapers enable bandwidth limits on Frame Relay interfaces when the Services Router receives frames containing the backward explicit congestion notification (BECN) bit.

Options *adaptive-shaper-name*—Name of the adaptive shaper.

The remaining statements are explained separately.

Usage Guidelines See the *J-series Services Router Configuration Guide*.

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

atm-options

Syntax

```
atm-options {
    linear-red-profiles profile-name {
        high-plp-max-threshold percent;
        low-plp-max-threshold percent;
        queue-depth cells high-plp-threshold percent low-plp-threshold percent;
    }
    plp-to-clp;
    scheduler-maps map-name {
        forwarding-class class-name {
            epd-threshold cells plp1 cells;
            linear-red-profile profile-name;
            priority (high | low);
            transmit-weight (cells number | percent number);
        }
        vc-cos-mode (alternate | strict);
    }
}
```

Hierarchy [edit interfaces *interface-name*]

Description Configure ATM-specific physical interface properties.

The statements are explained separately.

Usage Guidelines See "Configuring CoS on ATM Interfaces" on page 133.

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

See Also shaping on page 230, vci on page 241

atm-scheduler-map

Syntax atm-scheduler-map (*map-name* | default);

Hierarchy Level [edit interfaces *interface-name* unit *logical-unit-number*],
[edit logical-routers *logical-router-name* interfaces *interface-name* unit *logical-unit-number*]

Description Associate a scheduler map with a virtual circuit on a logical interface.

Options *map-name*—Name of scheduler map that you define at the [edit interfaces *interface-name* atm-options scheduler-maps] hierarchy level.

default—The default scheduler mapping.

Usage Guidelines See "Configuring ATM CoS on the Logical Interface" on page 144.

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

See Also scheduler-maps on page 228

buffer-size

Syntax buffer-size (percent *percentage* | remainder | temporal *microseconds*);

Hierarchy Level [edit class-of-service schedulers *scheduler-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify buffer size.

Options percent *percentage*—Buffer size as a percentage of total buffer.

remainder—Remaining buffer available.

temporal *microseconds*—Buffer size as a temporal value. The queueing algorithm starts dropping packets when it queues more than a computed number of bytes. This maximum is computed by multiplying the logical interface speed by the configured temporal value.
Range: The ranges vary by platform as follows:

- For T-series and M320 platforms, 1 through 50,000 microseconds.
- For other M-series routing platforms, 1 through 200,000 microseconds.
- For IQ PICs on T-series and M320 platforms, 1 through 50,000 microseconds.
- For IQ PICs on other M-series routing platforms, 1 through 100,000 microseconds.

Default If you do not include this statement, the default buffer sizes for queues 0 through 7 are 95, 0, 0, 5, 0, 0, 0, and 0 percent.

Usage Guidelines See “RED Congestion Control” on page 20 and “Configuring Schedulers” on page 59, and “Configuring the Scheduler Buffer Size” on page 62.

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

cbr

Syntax cbr *rate*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options vpi *vpi-identifier* shaping],
[edit interfaces at-*fpc/pic/port* unit *logical-unit-number* address *address* family *family* multipoint-destination *address* shaping],
[edit interfaces at-*fpc/pic/port* unit *logical-unit-number* shaping],
[edit logical-routers *logical-router-name* interfaces at-*fpc/pic/port* unit *logical-unit-number* address *address* family *family* multipoint-destination *address* shaping],
[edit logical-routers *logical-router-name* interfaces at-*fpc/pic/port* unit *logical-unit-number* shaping]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM encapsulation only, define a constant bit rate bandwidth utilization in the traffic-shaping profile.

Default Unspecified bit rate (UBR); that is, bandwidth utilization is unlimited.

Options *rate*—Peak rate, in bits per second (bps) or cells per second (cps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). You can also specify a value in cells per second by entering a decimal number followed by the abbreviation c; values expressed in cells per second are converted to bits per second by means of the formula 1 cps = 384 bps.

For ATM1 OC3 interfaces, the maximum available rate is 100 percent of *line-rate*, or 135,600,000 bps. For ATM1 OC12 interfaces, the maximum available rate is 50 percent of *line-rate*, or 271,263,396 bps. For ATM2 IQ interfaces, the maximum available rate is 542,526,792 bps.

Usage Guidelines See "Configuring ATM CoS on the Logical Interface" on page 144.

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

See Also rtvbr on page 224, shaping on page 230, vbr on page 239

class

Syntax
```
class class-name {
    classification-override {
        forwarding-class class-name;
    }
}
```

Hierarchy Level [edit class-of-service forwarding-policy]

Release Information Statement introduced before JUNOS Release 7.4.

Description Configure CoS-based forwarding class.

Options *class-name*—Name of the routing policy class.

The remaining statements are explained separately.

Usage Guidelines See "Overriding the Input Classification" on page 104.

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

class-of-service

Syntax class-of-service { ... }

Hierarchy Level [edit]

Release Information Statement introduced before JUNOS Release 7.4.

Description Configure JUNOS CoS features.

Default If you do not configure any CoS features, all packets are transmitted from output transmission queue 0.

Usage Guidelines See "CoS Configuration" on page 27.

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

classification-override

Syntax
```
classification-override {
    forwarding-class class-name;
}
```

Hierarchy Level [edit class-of-service forwarding-policy class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For IPv4 packets, override the incoming packet classification, assigning all packets sent to a destination prefix to the same output transmission queue.

Usage Guidelines See "Configuring CoS-Based Forwarding" on page 101.

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

See Also policy-statement in the *JUNOS Routing Protocols Configuration Guide*

classifiers

See the following sections:

- classifiers (Application) on page 179
- classifiers (Application for Routing Instances) on page 180
- classifiers (Definition) on page 180

classifiers (Application)

Syntax
```
classifiers {
    type (classifier-name | default);
}
```

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

Release Information Statement introduced before JUNOS Release 7.4.

Description Apply a CoS aggregate behavior classifier to a logical interface. You can apply a default classifier or one that is previously defined.

Options *classifier-name*—Name of the aggregate behavior classifier.

type—Traffic type.
Values: dscp, dscp-ipv6, exp, ieee-802.1, inet-precedence

Usage Guidelines See "Classifying Packets by Behavior Aggregate" on page 45.

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

classifiers (Application for Routing Instances)

Syntax
```
classifiers {
    exp (classifier-name | default);
}
```

Hierarchy Level [edit class-of-service routing-instances]

Release Information Statement introduced before JUNOS Release 7.4.

Description For routing instances with VRF table labels enabled, apply a custom MPLS EXP classifier to the routing instance. You can apply the default MPLS EXP classifier or one that is previously defined.

Options *classifier-name*—Name of the behavior aggregate MPLS EXP classifier.

Usage Guidelines See "Applying MPLS EXP Classifiers to Routing Instances" on page 50.

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

classifiers (Definition)

Syntax
```
classifiers {
    type classifier-name {
      import (classifier-name |default);
      forwarding-class class-name {
          loss-priority level {
            code-points [ aliases ] [ 6-bit-patterns ];
          }
      }
    }
}
```

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

Release Information Statement introduced before JUNOS Release 7.4.

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

Options *classifier-name*—Name of the aggregate behavior classifier.

type—Traffic type.
Values: dscp, dscp-ipv6, exp, ieee-802.1, inet-precedence

The remaining statements are explained separately.

Usage Guidelines See "Applying MPLS EXP Classifiers to Routing Instances" on page 50.

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

code-point

Syntax code-point [*aliases*] [*6-bit-patterns*];

Hierarchy Level [edit class-of-service rewrite-rules *type rewrite-name* forwarding-class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify one or more DSCP code-point aliases or bit sets for association with a forwarding class.

Options *alias*—Name of the DSCP alias.

bits—Value of the code-point bits, in binary code.

Usage Guidelines See "Rewriting Packet Header Information" on page 87.

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

code-point-aliases

Syntax
```
code-point-aliases {
    type {
        alias-name bits;
    }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description Define an alias for a DSCP bit set.

Options *alias-name*—Name of the DSCP alias.

bits—Six-bit value of the code-point bits, in binary code.

type—Traffic type.
Values: dscp, dscp-ipv6, exp, ieee-802.1, inet-precedence

Usage Guidelines See "Defining Code-Point Aliases" on page 29.

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

code-points

See the following sections:

- code-points (Forwarding Class) on page 182
- code-points (Frame Relay DE Bit Loss-Priority Map) on page 182

code-points (Forwarding Class)

Syntax code-points [*aliases*] [*6-bit-patterns*];

Hierarchy Level [edit class-of-service classifiers *type classifier-name* forwarding-class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify one or more DSCP code-point aliases or bit sets for association with a forwarding class.

Options *aliases*—Name of the DSCP alias.

6-bit-patterns—Value of the code-point bits, in binary code.

Usage Guidelines See "Classifying Packets by Behavior Aggregate" on page 45.

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

code-points (Frame Relay DE Bit Loss-Priority Map)

Syntax code-points [*values*];

Hierarchy Level [edit class-of-service loss-priority-maps frame-relay-de *map-name* loss-priority *level*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, associate a set of code-point values with a loss priority.

Options *values*—Code-point values, 0 or 1.

Usage Guidelines See the *J-series Services Router Configuration Guide*.

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

default

Syntax default;

Hierarchy Level [edit class-of-service virtual-channel-groups *group-name virtual-channel-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, specify the default channel. You must configure one of the virtual channels in the group to be the default. Any traffic not explicitly directed to a virtual channel is transmitted by way of this default.

Usage Guidelines See "Configuring Virtual Channels" on page 121.

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

See Also scheduler-map (Virtual Channels) on page 227, shaping-rate (Virtual Channels) on page 233, virtual-channel-group on page 242, virtual-channel-groups on page 243, virtual-channels on page 244

drop-probability

See the following sections:

- drop-probability (Interpolated Value) on page 183
- drop-probability (Percentage) on page 184

drop-probability (Interpolated Value)

Syntax drop-probability [*value*s];

Hierarchy Level [edit class-of-service drop-profiles profile-*name* interpolate]

Release Information Statement introduced before JUNOS Release 7.4.

Description Define up to 64 values for interpolating drop probabilities.

Options [*value*s]—Data points for interpolated packet drop probability.
Range: 0 through 100

Usage Guidelines See "Configuring RED Drop Profiles" on page 85.

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

drop-probability (Percentage)

Syntax drop-probability *percentage*;

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

Release Information Statement introduced before JUNOS Release 7.4.

Description Define drop probability percentage.

Options *percentage*—Probability that a packet will be dropped, expressed as a percentage. A value of 0 means that a packet will never be dropped, and a value of 100 means that all packets will be dropped.
Range: 0 through 100 percent

Usage Guidelines See "Configuring RED Drop Profiles" on page 85.

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

drop-profile

Syntax drop-profile *profile-name*;

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

Release Information Statement introduced before JUNOS Release 7.4.

Description Define drop profiles for RED. When a packet arrives, RED checks the queue fill level. If the fill level corresponds to a nonzero drop probability, the RED algorithm determines whether to drop the arriving packet.

Options *profile-name*—Name of the drop profile.

Usage Guidelines See "Configuring Schedulers" on page 59.

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

drop-profile-map

Syntax
```
drop-profile-map loss-priority (any | high | medium | low) protocol (any | non-tcp | tcp)
        drop-profile profile-name;
```

Hierarchy Level [edit class-of-service schedulers *scheduler-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Define loss priority value for drop profile.

The statements are explained separately.

Usage Guidelines See "Configuring Schedulers" on page 59.

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

drop-profiles

Syntax
```
drop-profiles {
    profile-name {
        fill-level percentage drop-probability percentage;
        interpolate {
            drop-probability [ values ];
            fill-level [ values ]
        }
    }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description Define drop profiles for RED.

For a packet to be dropped, it must match the drop profile. When a packet arrives, RED checks the queue fill level. If the fill level corresponds to a nonzero drop probability, the RED algorithm determines whether to drop the arriving packet.

Options *profile-name*—Name of the drop profile.

The remaining statements are explained separately.

Usage Guidelines See "Configuring RED Drop Profiles" on page 85.

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

dscp

Syntax dscp (*rewrite-name* | default);

Hierarchy Level [edit class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]

Release Information Statement introduced before JUNOS Release 7.4.

Description For IPv4 traffic, apply a Differentiated Services (DiffServ) code point (DSCP) rewrite rule.

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

default—The default mapping.

Usage Guidelines See "Rewriting Packet Header Information" on page 87.

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

See Also dscp-ipv6 on page 186, exp on page 188, exp-push-push-push on page 188, exp-swap-push-push on page 189, ieee-802.1 on page 200, inet-precedence on page 201, rewrite-rules (Definition) on page 221

dscp-ipv6

Syntax dscp-ipv6 (*rewrite-name* | default);

Hierarchy Level [edit class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]

Release Information Statement introduced before JUNOS Release 7.4.

Description For IPv6 traffic, apply a DSCP rewrite rule.

Options *rewrite-name*—Name of a rewrite-rules mapping configured at the [edit class-of-service rewrite-rules dscp-ipv6] hierarchy level.

default—The default mapping.

Usage Guidelines See "Rewriting Packet Header Information" on page 87.

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

See Also dscp on page 186, exp on page 188, exp-push-push-push on page 188, exp-swap-push-push on page 189, ieee-802.1 on page 200, inet-precedence on page 201, rewrite-rules (Definition) on page 221

epd-threshold

Syntax epd-threshold *cells* plp1 *cells*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options scheduler-maps *map-name* forwarding-class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM2 IQ interfaces only, define the EPD threshold on a VC. The EPD threshold is a limit on the number of transmit packets that can be queued. Packets that exceed the limit are discarded.

Default If you do not include either the epd-threshold or the linear-red-profile statement in the forwarding class configuration, the JUNOS software uses an EPD threshold based on the available bandwidth and other parameters.

Options *cells*—Maximum number of cells.
Range: For 1-port and 2-port OC12 interfaces, 1 through 425,984 cells.
For 1-port OC48 interfaces, 1 through 425,984 cells.
For 2-port OC3, DS3, and E3 interfaces, 1 through 212,992 cells.
For 4-port DS3 and E3 interfaces, 1 through 106,496 cells.

plp1 *cells*—Early packet drop threshold value for PLP 1.
Range: For 1-port and 2-port OC12 interfaces, 1 through 425,984 cells.
For 1-port OC48 interfaces, 1 through 425,984 cells.
For 2-port OC3, DS3, and E3 interfaces, 1 through 212,992 cells.
For 4-port DS3 and E3 interfaces, 1 through 106,496 cells.

Usage Guidelines See “Configuring an ATM Scheduler Map” on page 135.

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

See Also linear-red-profile on page 203

exp

Syntax exp (*rewrite-name* | default) protocol *protocol-types*;

Hierarchy Level [edit class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]

Release Information Statement introduced before JUNOS Release 7.4.

Description Apply an MPLS experimental (EXP) rewrite rule.

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

default—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. 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 mpls-inet-both or mpls-inet-both-non-vpn option at the [edit class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules exp *rewrite-rule-name* protocol] hierarchy level.

The remaining statement is explained separately.

Usage Guidelines See "Rewriting Packet Header Information" on page 87.

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

See Also dscp on page 186, dscp-ipv6 on page 186, exp-push-push-push on page 188, exp-swap-push-push on page 189, ieee-802.1 on page 200, inet-precedence on page 201, rewrite-rules (Definition) on page 221

exp-push-push-push

Syntax exp-push-push-push default;

Hierarchy Level [edit class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]

Release Information Statement introduced before JUNOS Release 7.4.

Description For M-series routing platforms, rewrite the EXP bits of all three labels of an outgoing packet, thereby maintaining CoS of an incoming non-MPLS packet.

Options default—Apply the default MPLS EXP rewrite table.

Usage Guidelines See "Rewriting the EXP Bits of All Three Labels of an Outgoing Packet" on page 95.

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

See Also dscp on page 186, dscp-ipv6 on page 186, exp on page 188, exp-swap-push-push on page 189, ieee-802.1 on page 200, inet-precedence on page 201, rewrite-rules (Definition) on page 221

exp-swap-push-push

Syntax exp-swap-push-push default;

Hierarchy Level [edit class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]

Release Information Statement introduced before JUNOS Release 7.4.

Description For M-series routing platforms, rewrite the EXP bits of all three labels of an outgoing packet, thereby maintaining CoS of an incoming MPLS packet.

Options default—Apply the default MPLS EXP rewrite table.

Usage Guidelines See "Rewriting the EXP Bits of All Three Labels of an Outgoing Packet" on page 95.

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

See Also dscp on page 186, dscp-ipv6 on page 186, exp on page 188, exp-push-push-push on page 188, ieee-802.1 on page 200, inet-precedence on page 201, rewrite-rules (Definition) on page 221

fabric

Syntax
```
fabric {
    scheduler-map {
        priority (high | low) scheduler scheduler-name;
    }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description For T-series and M320 platforms only, associate a scheduler with a fabric priority.

The remaining statements are explained separately.

Usage Guidelines See"Associating a Scheduler with a Fabric Priority" on page 82.

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

fill-level

See the following sections:

- fill-level (Interpolated Value) on page 190
- fill-level (Percentage) on page 190

fill-level (Interpolated Value)

Syntax fill-level [*values*];

Hierarchy Level [edit class-of-service drop-profiles *profile-name* interpolate]

Release Information Statement introduced before JUNOS Release 7.4.

Description Define up to 64 values for interpolating queue fill level.

Options [*values*]—Data points for mapping queue fill percentage.
Range: 0 through 100

Usage Guidelines See "Configuring RED Drop Profiles" on page 85.

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

fill-level (Percentage)

Syntax fill-level *percentage*;

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

Release Information Statement introduced before JUNOS Release 7.4.

Description When configuring RED, map the fullness of a queue to a drop probability.

Options *percentage*—How full the queue is, expressed as a percentage. You configure the fill-level and drop-probability statements in pairs. To specify multiple fill levels, include multiple fill-level and drop-probability statements. The values you assign to each statement pair must increase relative to the previous pair's values. This is shown in the "Segmented" graph on page 86.
Range: 0 through 100 percent

Usage Guidelines See "Configuring RED Drop Profiles" on page 85.

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

See Also drop-probability on page 183

forwarding-class

See the following sections:

forwarding-class (ATM2 IQ Scheduler Maps)

Syntax

```
forwarding-class class-name {
    epd-threshold cells plp1 cells;
    linear-red-profile profile-name;
    priority (high | low);
    transmit-weight (cells number | percent number);
}
```

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options scheduler-maps *map-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM2 IQ interfaces only, define forwarding class name and option values.

Options *class-name*—Name of forwarding class.

The statements are explained separately.

Usage Guidelines See "Configuring an ATM Scheduler Map" on page 135.

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

forwarding-class (Classifiers)

Syntax
```
forwarding-class class-name {
    loss-priority level {
        code-points [ aliases ] [ 6-bit-patterns ];
    }
}
```

Hierarchy Level [edit class-of-service classifiers *type classifier-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Define forwarding class name and option values.

Options *class-name*—Name of the forwarding class.

The remaining statements are explained separately.

Usage Guidelines See "Classifying Packets by Behavior Aggregate" on page 45.

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

forwarding-class (Forwarding Policy)

Syntax
```
forwarding-class class-name {
    next-hop [ next-hop-name ];
    lsp-next-hop [ lsp-regular-expression ];
}
```

Hierarchy Level [edit class-of-service forwarding-policy next-hop-map *map-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Define forwarding class name and associated next hops.

Options *class-name*—Name of the forwarding class.

The remaining statement is explained separately.

Usage Guidelines See "Configuring CoS-Based Forwarding" on page 101.

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

forwarding-class (Fragmentation)

Syntax
```
forwarding-class class-name {
    fragment-threshold bytes;
    multilink-class number;
    no-fragmentation;
}
```

Hierarchy Level [edit class-of-service fragmentation-maps]

Release Information Statement introduced before JUNOS Release 7.4.

Description For AS PIC link services IQ interfaces (lsq) only, define a forwarding class name and associated fragmentation properties within a fragmentation map.

The fragment-threshold and no-fragmentation statements are mutually exclusive.

Options *class-name*—Name of the forwarding class.

Default If you do not include this statement, the traffic in forwarding class *class-name* is fragmented.

The remaining statements are explained separately.

Usage Guidelines See "Configuring Fragmentation by Forwarding Class" on page 109.

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

forwarding-class (Interfaces)

Syntax
```
forwarding-class class-name;
```

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

Release Information Statement introduced before JUNOS Release 7.4.

Description Associate a forwarding class configuration or default mapping with a specific interface.

Options *class-name*—Name of the forwarding class.

Usage Guidelines See "Assigning a Forwarding Class to an Interface" on page 36.

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

forwarding-class (Restricted Queues)

Syntax forwarding-class *class-name* queue *queue-number*;

Hierarchy Level [edit class-of-service restricted-queues]

Release Information Statement introduced before JUNOS Release 7.4.

Description For T-series and M320 platforms only, map forwarding classes to restricted queues. You can map up to eight forwarding classes to restricted queues.

Options *class-name*—Name of the forwarding class.

The remaining statement is explained separately.

Usage Guidelines See "Configuring Up to Eight Forwarding Classes" on page 36.

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

forwarding-classes

Syntax
```
forwarding-classes {
    queue queue-number class-name priority (high | low);
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description Associate forwarding class with queue name and number. For T-series and M320 platforms only, you can configure fabric priority queuing by including the priority statement at the [edit class-of-service forwarding-classes queue *queue-number class-name*] hierarchy level.

The statements are explained separately.

Usage Guidelines See "Configuring Forwarding Classes" on page 33 and "Overriding Fabric Priority Queuing" on page 36.

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

forwarding-policy

Syntax

```
forwarding-policy {
    next-hop-map map-name {
        forwarding-class class-name {
            next-hop [ next-hop-name ];
            lsp-next-hop [ lsp-regular-expression ];
        }
    }
    class class-name {
        classification-override {
            forwarding-class class-name;
        }
    }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description Define CoS-based forwarding policy options.

The statements are explained separately.

Usage Guidelines See "Configuring CoS-Based Forwarding" on page 101.

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

fragment-threshold

Syntax fragment-threshold *bytes*;

Hierarchy Level [edit class-of-service fragmentation-maps forwarding-class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For AS PIC link services IQ interfaces (lsq) only, set the fragmentation threshold for an individual forwarding class.

Options *bytes*—Maximum size, in bytes, for multilink packet fragments. Any nonzero value must be a multiple of 64 bytes.
Range: 128 through 16,320 bytes

Default If you do not include this statement, the fragmentation threshold you set at the [edit interfaces *interface-name* unit *logical-unit-number*] or [edit interfaces *interface-name* mlfr-uni-nni-bundle-options] hierarchy level is the default for all forwarding classes. If you do not set a maximum fragment size anywhere in the configuration, packets are fragmented if they exceed the smallest MTU of all the links in the bundle.

Usage Guidelines See "Configuring Fragmentation by Forwarding Class" on page 109.

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

fragmentation-map

Syntax fragmentation-map *map-name*;

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

Release Information Statement introduced before JUNOS Release 7.4.

Description For AS PIC link services IQ interfaces (lsq) only, associate a fragmentation map with a multilink PPP interface or MLFR FRF.16 DLCI.

Options *map-name*—Name of the fragmentation map.

Default If you do not include this statement, traffic in all forwarding classes is fragmented.

The remaining statements are explained separately.

Usage Guidelines See“Configuring Fragmentation by Forwarding Class” on page 109.

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

fragmentation-maps

Syntax
```
fragmentation-maps {
    map-name {
        forwarding-class class-name {
            fragment-threshold bytes;
            multilink-class number;
            no-fragmentation;
        }
    }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description For AS PIC link services IQ interfaces (lsq) only, define fragmentation properties for individual forwarding classes.

Options *map-name*—Name of the fragmentation map.

Default If you do not include this statement, traffic in all forwarding classes is fragmented.

The remaining statements are explained separately.

Usage Guidelines See “Configuring Fragmentation by Forwarding Class” on page 109 and *JUNOS Services Interfaces Configuration Guide*.

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

frame-relay-de

See the following sections:

frame-relay-de (Assigning to an Interface)

Syntax frame-relay-de (*name* | default);

Hierarchy Level [edit class-of-service interfaces *interface-name* unit *logical-unit-number* loss-priority-maps],
[edit class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, assign the loss priority map or the rewrite rule to a logical interface.

Options default—Apply default loss priority map or default rewrite rule. The default loss priority map contains the following settings:

```
loss-priority low code-point 0;
loss-priority high code-point 1;
```

The default rewrite rule contains the following settings:

```
loss-priority low code-point 0;
loss-priority medium-low code-point 0;
loss-priority medium-high code-point 1;
loss-priority high code-point 1;
```

name—Name of loss priority map or rewrite rule to be applied.

Usage Guidelines See "Classifying Frame Relay Traffic" on page 56, "Rewriting Frame Relay Headers" on page 98, and the *J-series Services Router Configuration Guide*.

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

frame-relay-de (Defining Loss Priority)

Syntax
```
frame-relay-de map-name {
    loss-priority level code-points (0 | 1);
}
```

Hierarchy Level [edit class-of-service loss-priority-maps]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, define a Frame Relay discard-eligible bit loss-priority map.

Options *level*—Level of loss priority to be applied based on the specified code points. The level can be low, medium-low, medium-high, or high.

map-name—Name of the loss-priority map.

The remaining statements are explained separately.

Usage Guidelines See "Classifying Frame Relay Traffic" on page 56 and the *J-series Services Router Configuration Guide*.

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

frame-relay-de (Defining Rewrite Rule)

Syntax
```
frame-relay-de rewrite-name {
    import (rewrite-name | default);
    forwarding-class class-name {
      loss-priority level code-point (0 | 1);
    }
}
```

Hierarchy Level [edit class-of-service loss-priority-maps]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, define a Frame Relay discard-eligible bit rewrite rule.

Options *level*—Level of loss priority on which to base the rewrite rule. The loss priority level can be low, medium-low, medium-high, or high.

rewrite-name—Name of the rewrite rule.

The remaining statements are explained separately.

Usage Guidelines See "Rewriting Frame Relay Headers" on page 98 and the *J-series Services Router Configuration Guide*.

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

high-plp-max-threshold

Syntax high-plp-max-threshold *percent*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options linear-red-profiles *profile-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM2 IQ interfaces only, define the drop profile fill-level for the high PLP CoS VC. When the fill level exceeds the defined percentage, all packets are dropped.

Options *percent*—Fill-level percentage when linear random early discard (RED) is applied to cells with PLP.

Usage Guidelines See "Configuring Linear RED Profiles" on page 134.

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

See Also low-plp-max-threshold on page 210, low-plp-threshold on page 210, queue-depth on page 220

high-plp-threshold

Syntax high-plp-threshold *percent*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options linear-red-profiles *profile-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM2 IQ interfaces only, define CoS VC drop profile fill-level percentage when linear RED is applied to cells with high PLP. When the fill level exceeds the defined percentage, packets with high PLP are randomly dropped by RED. This statement is mandatory.

Options *percent*—Fill-level percentage when linear RED is applied to cells with PLP.

Usage Guidelines See "Configuring Linear RED Profiles" on page 134.

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

See Also high-plp-max-threshold on page 199, low-plp-max-threshold on page 210, low-plp-threshold on page 210, queue-depth on page 220

ieee-802.1

Syntax ieee-802.1 (*rewrite-name* | default);

Hierarchy Level [edit class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]

Release Information Statement introduced before JUNOS Release 7.4.

Description Apply a IEEE-802.1 rewrite rule.

Options *rewrite-name*—Name of a rewrite-rules mapping configured at the [edit class-of-service rewrite-rules ieee-802.1] hierarchy level.

default—The default mapping.

Usage Guidelines See "Rewriting Packet Header Information" on page 87.

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

See Also dscp on page 186, dscp-ipv6 on page 186, exp on page 188, exp-push-push-push on page 188, exp-swap-push-push on page 189, inet-precedence on page 201, rewrite-rules (Definition) on page 221

import

See the following sections:

- import (Classifiers) on page 200
- import (Rewrite Rules) on page 201

import (Classifiers)

Syntax import (*classifier-name* | default);

Hierarchy Level [edit class-of-service classifiers *type classifier-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify a default or previously defined classifier.

Options *classifier-name*—Name of the classifier mapping configured at the [edit class-of-service classifiers] hierarchy level.

default—The default classifier mapping.

Usage Guidelines See "Classifying Packets by Behavior Aggregate" on page 45.

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

import (Rewrite Rules)

Syntax import (*rewrite-name* | default);

Hierarchy Level [edit class-of-service rewrite-rules *type rewrite-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify a default or previously defined rewrite-rules mapping to import.

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

default—The default rewrite-rules mapping.

Usage Guidelines See "Rewriting Packet Header Information" on page 87.

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

inet-precedence

Syntax inet-precedence (*rewrite-name* | default);

Hierarchy Level [edit class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules]

Release Information Statement introduced before JUNOS Release 7.4.

Description Apply a IPv4 precedence rewrite rule.

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

default—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.

Usage Guidelines See "Rewriting Packet Header Information" on page 87.

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

See Also dscp on page 186, dscp-ipv6 on page 186, exp on page 188, exp-push-push-push on page 188, exp-swap-push-push on page 189, ieee-802.1 on page 200

interfaces

Syntax

```
interfaces {
    interface-name {
        scheduler-map map-name;
        scheduler-map-chassis map-name;
        unit logical-unit-number {
            adaptive-shaper adaptive-shaper-name;
            classifiers {
                type (classifier-name | default);
            }
            forwarding-class class-name;
            fragmentation-map map-name;
            loss-priority-maps {
                default;
                map-name;
            }
            rewrite-rules {
                type (rewrite-name | default);
            }
            scheduler-map map-name;
            shaping-rate rate;
            virtual-channel-group group-name;
        }
    }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description Configure interface-specific CoS properties for incoming packets. Associate forwarding-class definition and RED mapping with an interface on the routing platform.

Options *interface-name*—Name of the interface.

The remaining statements are explained separately.

Usage Guidelines See “Classifying Packets by Behavior Aggregate” on page 45 and “Rewriting Packet Header Information” on page 87.

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

interpolate

Syntax
```
interpolate {
    drop-probability [ values ];
    fill-level [ values ];
}
```

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

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify values for interpolating relationship between queue fill level and drop probability.

The statements are explained separately.

Usage Guidelines See "Configuring RED Drop Profiles" on page 85.

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

linear-red-profile

Syntax linear-red-profile *profile-name*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options scheduler-maps *map-name* forwarding-class *class-name*]

Description For ATM2 IQ interfaces only, assign a linear RED profile to a specified forwarding class. To define the linear RED profiles, include the linear-red-profiles statement at the [edit interfaces at-*fpc/pic/port* atm-options] hierarchy level.

Default If you do not include either the epd-threshold or the linear-red-profile statement in the forwarding class configuration, the JUNOS software uses an EPD threshold based on the available bandwidth and other parameters.

Options *profile-name*—Name of the linear RED profile.

Usage Guidelines See "Configuring an ATM Scheduler Map" on page 135.

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

See Also epd-threshold on page 187, linear-red-profiles on page 204

linear-red-profiles

Syntax

```
linear-red-profiles profile-name {
    high-plp-threshold percent;
    low-plp-threshold percent;
    queue-depth cells;
}
```

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options]

Description For ATM2 IQ interfaces only, define CoS virtual circuit drop profiles for RED. When a packet arrives, RED checks the queue fill level. If the fill level corresponds to a nonzero drop probability, the RED algorithm determines whether to drop the arriving packet.

Options *profile-name*—Name of the drop profile.

The statements are explained separately.

Usage Guidelines See “Configuring Linear RED Profiles” on page 134.

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

loss-priority

See the following sections:

loss-priority (Classifiers)

Syntax loss-priority *level*;

Hierarchy Level [edit class-of-service classifiers *type classifier-name* forwarding-class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify packet loss priority value for a specific set of code-point aliases and bit patterns.

Options *level* can be one of the following:

high—Packet has high loss priority.

medium—Packet has medium loss priority.

low—Packet has low loss priority.

medium-high—(For J-series Services Routers only) Packet has medium-high loss priority.

medium-low—(For J-series Services Routers only) Packet has medium-low loss priority.

Usage Guidelines See "Classifying Packets by Behavior Aggregate" on page 45 and "Configuring Tricolor Marking" on page 149.

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

loss-priority (Frame Relay DE Bit Loss-Priority Map)

Syntax loss-priority *level* code-points [*values*];

Hierarchy Level [edit class-of-service loss-priority-maps frame-relay-de *map-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, map code points to a loss priority.

Options *level* can be one of the following:

high—Packet has high loss priority.

low—Packet has low loss priority.

medium-high—Packet has medium-high loss priority.

medium-low—Packet has medium-low loss priority.

The remaining statement is explained separately.

Usage Guidelines See "Classifying Frame Relay Traffic" on page 56 and the *J-series Services Router Configuration Guide*.

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

loss-priority (Rewrite Rules)

Syntax loss-priority *level*;

Hierarchy Level [edit class-of-service rewrite-rules *type rewrite-name* forwarding-class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify a loss priority to which to apply a rewrite rule. The rewrite rule sets the code-point aliases and bit patterns for a specific forwarding class and packet loss priority (PLP). The inputs for the map are the forwarding class and the PLP. The output of the map is the code-point alias or bit pattern.

Options *level* can be one of the following:

high—The rewrite rule applies to packets with high PLP.

medium—The rewrite rule applies to packets with medium PLP.

low—The rewrite rule applies to packets with low PLP.

medium-high—(For J-series Services Routers only) The rewrite rule applies to packets with medium-high PLP.

medium-low—(For J-series Services Routers only) The rewrite rule applies to packets with medium-low PLP.

Usage Guidelines See “Rewriting Packet Header Information” on page 87, “Classifying Packets by Behavior Aggregate” on page 45, and “Configuring Tricolor Marking” on page 149.

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

loss-priority (Scheduler Drop Profiles)

Syntax loss-priority (any | high | medium | low);

Hierarchy Level [edit class-of-service schedulers *scheduler-name* drop-profile-map]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify a loss priority to which to apply a drop profile. The drop profile map sets the drop profile for a specific PLP and protocol type. The inputs for the map are the PLP designation and the protocol type. The output is the drop profile.

Options any—The drop profile applies to packets with any PLP.

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

medium—The drop profile applies to packets with medium PLP.

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

Usage Guidelines See "Configuring Schedulers" on page 59 and "Configuring Tricolor Marking" on page 149.

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

See Also protocol (Schedulers) on page 218

loss-priority-maps

See the following sections:

- loss-priority-maps (Assigning to an Interface) on page 209
- loss-priority-maps (Defining) on page 209

loss-priority-maps (Assigning to an Interface)

Syntax
```
loss-priority-maps {
    frame-relay-de (map-name | default);
}
```

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

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, assign the loss priority map to a logical interface.

Options default—Apply default loss priority map. The default map contains the following:

```
loss-priority low code-point 0;
loss-priority high code-point 1;
```

map-name—Name of loss priority map to be applied.

Usage Guidelines See "Classifying Frame Relay Traffic" on page 56 and the *J-series Services Router Configuration Guide*.

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

loss-priority-maps (Defining)

Syntax
```
loss-priority-maps {
    frame-relay-de map-name {
      loss-priority level code-points [ values ];
    }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, map the loss priority of incoming packets based on code point values.

The remaining statements are explained separately.

Usage Guidelines See "Classifying Frame Relay Traffic" on page 56 and the *J-series Services Router Configuration Guide*.

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

low-plp-max-threshold

Syntax low-plp-max-threshold *percent*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options linear-red-profiles *profile-name*]

Description For ATM2 IQ interfaces only, define the drop profile fill-level for the low PLP CoS VC. When the fill level exceeds the defined percentage, all packets are dropped.

Options *percent*—Fill-level percentage when linear RED is applied to cells with PLP.

Usage Guidelines See "Configuring Linear RED Profiles" on page 134.

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

See Also high-plp-max-threshold on page 199, low-plp-threshold on page 210, queue-depth on page 220

low-plp-threshold

Syntax low-plp-threshold *percent*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options linear-red-profiles *profile-name*]

Description For ATM2 IQ interfaces only, define the CoS VC drop profile fill-level percentage when linear RED is applied to cells with low PLP. When the fill level exceeds the defined percentage, packets with low PLP are randomly dropped by RED. This statement is mandatory.

Options *percent*—Fill-level percentage when linear RED is applied to cells with low PLP.

Usage Guidelines See "Configuring Linear RED Profiles" on page 134.

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

See Also high-plp-max-threshold on page 199, high-plp-threshold on page 199, low-plp-max-threshold on page 210, queue-depth on page 220

lsp-next-hop

Syntax lsp-next-hop [*lsp-regular-expression*];

Hierarchy Level [edit class-of-service forwarding-policy next-hop-map *map-name* forwarding-class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify the LSP regular expression to which to map forwarded traffic.

Options *lsp-regular-expression*—Next-hop LSP label.

Usage Guidelines See "Configuring CoS-Based Forwarding" on page 101.

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

max-queues-per-interface

Syntax max-queues-per-interface (4 | 8);

Hierarchy Level (routing matrix) [edit chassis fpc *slot-numbe*r pic *pic-number*],
[edit chassis lcc *number* fpc *slot-number* pic *pic-number*]

Release Information Statement introduced before JUNOS Release 7.4.

Description On M320 and T-series routing platforms, configure eight egress queues on interfaces.

Usage Guidelines See "Enabling Eight Queues on Interfaces" on page 37 and "Enabling Eight Queues on ATM2 IQ Interfaces" on page 137.

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

multilink-class

Syntax multilink-class *number*;

Hierarchy Level [edit class-of-service fragmentation-maps forwarding-class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For AS PIC link services IQ interfaces (lsq) only, map a forwarding class into a multiclass MLPPP (MCML).

The multilink-class statement and no-fragmentation statements are mutually exclusive.

Options *number*—The multilink class assigned to this forwarding class.
Range: 0 through 7
Default: None

Usage Guidelines See "Configuring Fragmentation by Forwarding Class" on page 109 and *JUNOS Services Interfaces Configuration Guide*.

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

next-hop

Syntax next-hop [*next-hop-name*];

Hierarchy Level [edit class-of-service forwarding-policy next-hop-map *map-name* forwarding-class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify the next-hop name or address to which to map forwarded traffic.

Options *next-hop-name*—Next-hop alias or IP address.

Usage Guidelines See "Configuring CoS-Based Forwarding" on page 101.

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

next-hop-map

Syntax

```
next-hop-map map-name {
    forwarding-class class-name {
        next-hop next-hop-name;
        lsp-next-hop [ lsp-regular-expression ];
    }
}
```

Hierarchy Level [edit class-of-service forwarding-policy]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify the map for CoS forwarding routes.

Options *map-name*—Map that defines next-hop routes.

Usage Guidelines See "Configuring CoS-Based Forwarding" on page 101.

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

no-fragmentation

Syntax

```
no-fragmentation;
```

Hierarchy Level [edit class-of-service fragmentation-maps forwarding-class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For AS PIC link services IQ interfaces (lsq) only, set traffic on a queue to be interleaved, rather than fragmented. This statement specifies that no extra fragmentation header is prepended to the packets received on this queue and that static-link load balancing is used to ensure in-order packet delivery.

Static-link load balancing is done based on packet payload. For IPv4 and IPv6 traffic, the link is chosen based on a hash computed from the source address, destination address, and protocol. If the IP payload is TCP or UDP traffic, the hash also includes the source port and destination port. For MPLS traffic, the hash includes all MPLS labels and fields in the payload, if the MPLS payload is IPv4 or IPv6.

Default If you do not include this statement, the traffic in forwarding class *class-name* is fragmented.

Usage Guidelines See "Configuring Fragmentation by Forwarding Class" on page 109 and *JUNOS Services Interfaces Configuration Guide*.

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

per-unit-scheduler

Syntax per-unit-scheduler;

Hierarchy Level [edit interfaces *interface-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Enable association of scheduler map names with logical interfaces.

Usage Guidelines See "Associating the Scheduler Map with an Output Interface" on page 71 or "Applying a Virtual Channel Group to a Logical Interface" on page 124.

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

plp-to-clp

Syntax plp-to-clp;

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options],
[edit interfaces at-*fpc/pic/port* unit *logical-unit-number*],
[edit logical-routers *logical-router-name* interfaces at-*fpc*/*pic*/*port* unit *logical-unit-number*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM2 IQ interfaces only, enable the PLP setting to be copied to the cell-loss priority (CLP) bit.

Default If you omit this statement, the JUNOS software does not copy the PLP setting to the CLP bit.

Usage Guidelines See "Enabling the PLP Setting to Be Copied to the CLP Bit" on page 144.

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

priority

See the following sections:

priority (ATM2 IQ Schedulers)

Syntax priority (high | low);

Hierarchy Level [edit interfaces at-*fpc/pic/port* atm-options scheduler-maps *map-name* forwarding-class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM2 IQ interfaces only, assign queuing priority to a forwarding class.

Options low—Forwarding class has low priority.

high—Forwarding class has high priority.

Usage Guidelines See "Configuring an ATM Scheduler Map" on page 135.

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

priority (Fabric Queues, Schedulers)

Syntax priority (high | low) scheduler *scheduler-name*;

Hierarchy Level [edit class-of-service fabric scheduler-map]

Release Information Statement introduced before JUNOS Release 7.4.

Description For T-series and M320 platforms only, specify the fabric priority with which a scheduler is associated.

For a scheduler that you associate with a fabric priority, you cannot include the buffer-size, transmit-rate, or priority statements at the [edit class-of-service schedulers *scheduler-name*] hierarchy level.

Options low—Scheduler has low priority.

high—Scheduler has high priority.

The remaining statements are explained separately.

Usage Guidelines See "Associating a Scheduler with a Fabric Priority" on page 82.

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

priority (Fabric Priority)

Syntax priority (high | low);

Hierarchy Level [edit class-of-service forwarding-classes queue *queue-number class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For T-series and M320 platforms only, specify packet priority value.

Options low—Forwarding class's fabric queuing has low priority.

high—Forwarding class's fabric queuing has high priority.

Usage Guidelines See "Overriding Fabric Priority Queuing" on page 36.

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

priority (Schedulers)

Syntax priority *priority-level*;

Hierarchy Level [edit class-of-service schedulers *scheduler-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify packet-scheduling priority value.

Options *priority-level* can be one of the following:

- low—Scheduler has low priority.
- medium-low—Scheduler has medium-low priority.
- medium-high—Scheduler has medium-high priority.
- high—Scheduler has high priority. Assigning high priority to a queue prevents the queue from being underserved.
- strict-high—Scheduler has strictly high priority. Configure a high priority queue with unlimited transmission bandwidth available to it. As long as it has traffic to send, the strict-high priority queue receives precedence over low, medium-low, and medium-high priority queues, but not high priority queues. You can configure strict-high priority on only one queue per interface.

Usage Guidelines See "Configuring Priority Scheduling" on page 68.

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

protocol

See the following sections:

protocol (Rewrite Rules)

Syntax protocol *protocol-types*;

Hierarchy Level [edit class-of-service interfaces *interface-name* unit *logical-unit-number* rewrite-rules exp *rewrite-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Apply a rewrite rule to MPLS packets only, and write the code point value to MPLS headers only; or apply a rewrite rule to MPLS and IPv4 packets, and write the code point value to MPLS and IPv4 headers.

Options *protocol-types* can be one of the following:

mpls-any—Apply a rewrite rule to MPLS packets and writes the code point value to MPLS headers.

mpls-inet-both—Apply a rewrite rule to VPN MPLS packets with IPv4 payloads. On T-series and M320 platforms, write the code point value to the MPLS and IPv4 headers. On M-series routing platforms, initialize all ingress MPLS LSP packets with IPv4 payloads with 000 code points for IP precedence and MPLS EXP values.

mpls-inet-both-non-vpn—Apply a rewrite rule to non-VPN MPLS packets with IPv4 payloads. On T-series and M320 platforms, write the code point value to the MPLS and IPv4 headers. On M-series routing platforms, initialize all ingress MPLS LSP packets with IPv4 payloads with 000 code points for IP precedence and MPLS EXP values.

Usage Guidelines See “Rewriting MPLS and IPv4 Packet Headers” on page 92.

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

protocol (Schedulers)

Syntax protocol (any | non-tcp | tcp);

Hierarchy Level [edit class-of-service schedulers *scheduler-name* drop-profile-map]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify the protocol type for the specified scheduler.

Options any—Accept any protocol type.

non-tcp—Accept any protocol type other than TCP-IP.

tcp—Accept only TCP/IP protocol.

Usage Guidelines See “Configuring Schedulers” on page 59.

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

q-pic-large-buffer

Syntax q-pic-large-buffer;

Hierarchy Level [edit chassis fpc *slot-number* pic *pic-number*]

Release Information Statement introduced in JUNOS Release 7.4.

Description Enable configuration of larger delay buffers for slower interfaces (T1, E1, and *N*xDS0 interfaces configured on channelized IQ PICs and Gigabit Ethernet VLANs configured on Gigabit Ethernet IQ PICs).

Usage Guidelines See “Configuring Large Delay Buffers for Slower Interfaces” on page 63.

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

queue

See the following sections:

queue (Global Queues)

Syntax queue *queue-number class-name*;

Hierarchy Level [edit class-of-service forwarding-classes]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify the output transmission queue to which to map all input from an associated forwarding class.

Options *class-name*—Name of forwarding class.

queue-number—Output queue number.
Range: For M-series routing platforms, 0 through 3. For T-series and M320 platforms, 0 through 7. Some T-series PICs are restricted to 0 through 3.

Usage Guidelines See "Configuring Forwarding Classes" on page 33.

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

queue (Restricted Queues)

Syntax queue *queue-number*;

Hierarchy Level [edit class-of-service restricted-queues forwarding-class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For T-series and M320 platforms only, map forwarding classes to restricted queues.

Options *queue-number*—Output queue number.
Range: 0 through 3.

Usage Guidelines See "Configuring Up to Eight Forwarding Classes" on page 36.

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

queue-depth

Syntax queue-depth *cells*;

Hierarchy Level [edit interfaces *interface-name* atm-options linear-red-profiles *profile-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM2 IQ interfaces only, define maximum queue depth in the CoS VC drop profile. Packets are always dropped beyond the defined maximum. This statement is mandatory; there is no default configuration.

Options *cells*—Maximum number of cells the queue can contain.
Range: 1 through 64,000 cells

Usage Guidelines See "Configuring Linear RED Profiles" on page 134.

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

See Also high-plp-threshold on page 199, low-plp-threshold on page 210

restricted-queues

Syntax
```
restricted-queues {
    forwarding-class class-name queue queue-number;
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description For T-series and M320 platforms only, map forwarding classes to restricted queues.

The remaining statements are explained separately.

Usage Guidelines See "Configuring Up to Eight Forwarding Classes" on page 36.

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

rewrite-rules

See the following sections:

- rewrite-rules (Definition) on page 221
- rewrite-rules (Interfaces) on page 222

rewrite-rules (Definition)

Syntax

```
rewrite-rules {
    type rewrite-name {
        import (rewrite-name | default);
        forwarding-class class-name {
            loss-priority level code-point [ aliases ] [ 6-bit-patterns ];
        }
    }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify a rewrite-rules mapping for the traffic that passes through all queues on the interface.

Options *rewrite-name*—Name of a rewrite-rules mapping.

type—Traffic type.
Values: dscp, dscp-ipv6, exp, frame-relay-de (J-series only), ieee-802.1, inet-precedence

The remaining statements are explained separately.

Usage Guidelines See "Rewriting Packet Header Information" on page 87 and "Rewriting Frame Relay Headers" on page 98.

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

rewrite-rules (Interfaces)

Syntax

```
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;
    frame-relay-de (rewrite-name | default);
    ieee-802.1 (rewrite-name | default);
    inet-precedence (rewrite-name | default);
}
```

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

Release Information Statement introduced before JUNOS Release 7.4.

Description Associate a rewrite-rules configuration or default mapping with a specific interface.

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.

Usage Guidelines See "Rewriting Packet Header Information" on page 87 and "Rewriting Frame Relay Headers" on page 98.

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

See Also rewrite-rules (Definition) on page 221

routing-instances

Syntax

```
routing-instances routing-instance-name {
    classifiers {
        exp (classifier-name | default);
    }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description For routing instances with VRF table labels enabled, apply a custom MPLS EXP classifier to the routing instance. You can apply the default MPLS EXP classifier or one that is previously defined.

Options *routing-instance-name*—Name of a routing instance.

classifier-name—Name of the MPLS EXP classifier.

Default If you do not include this statement, the default MPLS EXP classifier is applied to the routing instance.

Usage Guidelines See "Applying MPLS EXP Classifiers to Routing Instances" on page 50.

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

rtvbr

Syntax rtvbr peak *rate* sustained *rate* burst *length*;

Hierarchy Level [edit interfaces *interface-name* atm-options vpi *vpi-identifier* shaping],
[edit interfaces *interface-name* unit *logical-unit-number* address *address* family *family* multipoint-destination *address* shaping],
[edit interfaces *interface-name* unit *logical-unit-number* shaping],
[edit logical-routers *logical-router-name* interfaces *interface-name* unit *logical-unit-number* shaping],
[edit logical-routers *logical-router-name* interfaces *interface-name* unit *logical-unit-number* address *address* family *family* multipoint-destination *address* shaping]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM2 IQ PICs only, define the real-time variable bandwidth utilization in the traffic-shaping profile.

When you configure the real-time bandwidth utilization, you must specify all three options (burst, peak, and sustained). You can specify *rate* in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). You can also specify *rate* in cells per second by entering a decimal number followed by the abbreviation c; values expressed in cells per second are converted to bits per second using the formula 1 cps = 384 bps.

Default If the rtvbr statement is not included, bandwidth utilization is unlimited.

Options burst *length*—Burst length, in cells. If you set the length to 1, the peak traffic rate is used.
Range: 1 through 4000 cells

peak *rate*—Peak rate, in bits per second or cells per second.
Range:
For ATM2 IQ OC3 and OC12 interfaces, 33 Kbps through 542,526,792 bps.
For ATM2 IQ OC48 interfaces, 33 Kbps through 2,170,107,168 bps.
For ATM2 IQ DS3 and E3 interfaces, 33 Kbps through the maximum rate, which depends on the ATM encapsulation and framing you configure. For more information, see the *JUNOS Network Interfaces Configuration Guide*.

sustained *rate*—Sustained rate, in bps or cps.
Range:
For ATM2 IQ OC3 and OC12 interfaces, 33 Kbps through 542,526,792 bps.
For ATM2 IQ OC48 interfaces, 33 Kbps through 2,170,107,168 bps.
For ATM2 IQ DS3 and E3 interfaces, from 33 Kbps through the maximum rate, which depends on the ATM encapsulation and framing you configure. For more information, see the *JUNOS Network Interfaces Configuration Guide*.

Usage Guidelines See “Configuring ATM CoS on the Logical Interface” on page 144.

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

See Also cbr on page 177, vbr on page 239

scheduler

See the following sections:

scheduler (Fabric Queues)

Syntax scheduler *scheduler-name*;

Hierarchy Level [edit class-of-service fabric scheduler-map priority (high | low)]

Release Information Statement introduced before JUNOS Release 7.4.

Description For T-series and M320 platforms only, specify a scheduler to associate with a fabric queue. For fabric CoS configuration, schedulers are restricted to transmit rates and drop profiles.

Options *scheduler-name*—Name of the scheduler configuration block.

Usage Guidelines See "Associating a Scheduler with a Fabric Priority" on page 82.

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

scheduler (Scheduler Map)

Syntax scheduler *scheduler-name*;

Hierarchy Level [edit class-of-service scheduler-maps *map-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Associate a scheduler with a scheduler map.

Options *scheduler-name*—Name of the scheduler configuration block.

Usage Guidelines See "Configuring Schedulers" on page 59.

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

scheduler-map

See the following sections:

scheduler-map (Fabric Queues)

Syntax scheduler-map priority (high | low) scheduler *scheduler-name*;

Hierarchy Level [edit class-of-service fabric]

Release Information Statement introduced before JUNOS Release 7.4.

Description For T-series and M320 platforms only, associate a scheduler with a fabric priority.

The statements are explained separately.

Usage Guidelines See "Associating a Scheduler with a Fabric Priority" on page 82.

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

scheduler-map (Interfaces)

Syntax scheduler-map *map-name;*

Hierarchy Level [edit class-of-service interfaces *interface-name*],
[edit class-of-service interfaces *interface-name* unit *logical-unit-number*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Associate a scheduler map name with an interface.

For channelized OC12 intelligent queuing (IQ), channelized T3 IQ, channelized E1 IQ, and Gigabit Ethernet IQ interfaces only, you can associate a scheduler map name with a logical interface.

Options *map-name*—Name of the scheduler map.

Usage Guidelines See "Configuring Schedulers" on page 59.

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

scheduler-map (Virtual Channels)

Syntax scheduler-map *map-name*;

Hierarchy Level [edit class-of-service virtual-channel-groups *group-name virtual-channel-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, apply a scheduler map to this virtual channel.

Options *map-name*—Name of the scheduler map.

The remaining statements are explained separately.

Usage Guidelines See "Configuring Virtual Channels" on page 121.

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

See Also default on page 183, shaping-rate (Virtual Channels) on page 233, virtual-channel-group on page 242, virtual-channel-groups on page 243, virtual-channels on page 244

scheduler-map-chassis

Syntax scheduler-map-chassis (derived | *map-name);*

Hierarchy Level [edit class-of-service interfaces *type-fpc/pic/**]

Release Information Statement introduced before JUNOS Release 7.4.

Description For IQ interfaces, assign a custom scheduler to the packet forwarding component queues that control the aggregated traffic transmitted into the entire PIC.

Options derived—Sets the chassis queues to derive their scheduling configuration from the associated logical interface scheduling configuration.

map-name—Name of the scheduler map configured at the [edit class-of-service scheduler-maps] hierarchy level.

Default If you do not include this statement, on IQ interfaces the aggregated traffic that is fed from the packet forwarding components into the PIC is automatically queued according to the scheduler configuration for each logical unit in the PIC.

Usage Guidelines See "Scheduling Packet Forwarding Component Queues" on page 72.

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

See Also scheduler-map on page 225

scheduler-maps

See the following sections:

scheduler-maps (For ATM2 IQ Interfaces)

Syntax
```
scheduler-maps map-name {
    forwarding-class (class-name | assured-forwarding | best-effort |
        expedited-forwarding | network-control);
    vc-cos-mode (alternate | strict);
```

Hierarchy Level [edit interfaces *interface-name* atm-options]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM2 IQ interfaces only, define CoS parameters assigned to forwarding classes.

Options *map-name*—Name of the scheduler map.

The remaining statements are explained separately.

Usage Guidelines See "Configuring an ATM Scheduler Map" on page 135.

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

See Also atm-scheduler-map on page 175.

scheduler-maps (For Most Interface Types)

Syntax
```
scheduler-maps {
    map-name {
        forwarding-class class-name scheduler scheduler-name;
    }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify a scheduler map name and associate it with the scheduler configuration and forwarding class.

Options *map-name*—Name of the scheduler map.

The remaining statements are explained separately.

Usage Guidelines See "Configuring Schedulers" on page 59.

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

schedulers

Syntax

```
schedulers {
    scheduler-name {
        buffer-size (seconds | percent percentage | remainder | temporal microseconds);
        drop-profile-map loss-priority (any | high | medium | low)
                protocol (any | non-tcp | tcp) drop-profile profile-name;
        priority priority-level;
        shaping-rate (percent percent | rate);
        transmit-rate (percent percentage | rate | remainder) <exact>;
    }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify scheduler name and parameter values.

Options *scheduler-name*—Name of the scheduler to be configured.

The remaining statements are explained separately.

Usage Guidelines See “Configuring Schedulers” on page 59.

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

shaping

Syntax

```
shaping {
    (cbr rate | rtvbr peak rate sustained rate burst length |
              vbr peak rate sustained rate burst length);
}
```

Hierarchy Level

[edit interfaces *interface-name* atm-options vpi *vpi-identifier*],
[edit interfaces *interface-name* unit *logical-unit-number*],
[edit interfaces *interface-name* unit *logical-unit-number* address *address* family *family* multipoint-destination *address*],
[edit logical-routers *logical-router-name* interfaces *interface-name* unit *logical-unit-number*],
[edit logical-routers *logical-router-name* interfaces *interface-name* unit *logical-unit-number* address *address* family *family* multipoint-destination *address*]

Release Information

Statement introduced before JUNOS Release 7.4.

Description

For ATM encapsulation only, define the traffic-shaping profile.

For ATM2 IQ interfaces, changing or deleting VP tunnel traffic shaping causes all logical interfaces on a VP to be deleted and then re-added.

VP tunnels are not supported on multipoint interfaces.

The statements are explained separately.

Usage Guidelines

See “Configuring ATM CoS on the Logical Interface” on page 144.

Required Privilege Level

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

shaping-rate

See the following sections:

- shaping-rate (Adaptive Shaping) on page 231
- shaping-rate (Applying Packet Scheduling) on page 231
- shaping-rate (Limiting Excess Bandwidth Usage) on page 232
- shaping-rate (Virtual Channels) on page 233

shaping-rate (Adaptive Shaping)

Syntax shaping-rate (percent *percent* | *rate*);

Hierarchy Level [edit class-of-service adaptive-shapers *adaptive-shaper-name* trigger *type*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, define the list of trigger types and associated rates.

Options percent *percentage*—Shaping rate as a percentage of the available interface bandwidth.
Range: 0 through 100 percent

rate—Peak rate, in bits per second (bps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000).
Range: 3200 through 32,000,000,000 bps

Usage Guidelines See the *J-series Services Router Configuration Guide*.

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

See Also trigger on page 237

shaping-rate (Applying Packet Scheduling)

Syntax shaping-rate *rate*;

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

Release Information Statement introduced before JUNOS Release 7.4.

Description For logical interfaces on which you configure packet scheduling, configure traffic shaping by specifying the amount of bandwidth to be allocated to the logical interface.

Options *rate*—Peak rate, in bits per second (bps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000).
Range: 1000 through 32,000,000,000 bps

Default If you do not include this statement, the default logical interface bandwidth is the average of unused bandwidth for the number of logical interfaces that require default bandwidth treatment.

Usage Guidelines See "Associating a Scheduler Map with a DLCI or VLAN" on page 77.

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

shaping-rate (Limiting Excess Bandwidth Usage)

Syntax shaping-rate (percent *percent* | *rate*);

Hierarchy Level [edit class-of-service schedulers *scheduler-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, define a limit on excess bandwidth usage.

The transmit-rate statement at the [edit class-of-service schedulers *scheduler-name*] hierarchy level configures the minimum bandwidth allocated to a queue. The transmission bandwidth can be configured as an exact value or allowed to exceed the configured rate if additional bandwidth is available from other queues. For J-series Services Routers only, you limit the excess bandwidth usage with this statement.

You should configure the shaping rate as an absolute maximum usage and not the additional usage beyond the configured transmit rate.

Options percent *percentage*—Shaping rate as a percentage of the available interface bandwidth.
Range: 0 through 100 percent

rate—Peak rate, in bits per second (bps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000).
Range: 3200 through 32,000,000,000 bps

Default If you do not include this statement, the default shaping rate is 100 percent, which is the same as no shaping at all.

Usage Guidelines See "Associating a Scheduler Map with a DLCI or VLAN" on page 77.

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

shaping-rate (Virtual Channels)

Syntax shaping-rate (percent *percent* | *rate*);

Hierarchy Level [edit class-of-service virtual-channel-groups *group-name virtual-channel-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, define the shaping rates to be associated with the virtual channel.

Options percent *percentage*—Shaping rate as a percentage of the available interface bandwidth.
Range: 0 through 100 percent

rate—Peak rate, in bits per second (bps). You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000).
Range: 3200 through 32,000,000,000 bps

Usage Guidelines See "Configuring Virtual Channels" on page 121.

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

See Also default on page 183, scheduler-map (Virtual Channels) on page 227, virtual-channel-group on page 242, virtual-channel-groups on page 243, virtual-channels on page 244

three-color-policer

Syntax

```
three-color-policer name {
    two-rate {
      (color-aware | color-blind);
      committed-information-rate bps;
      committed-burst-size bytes;
      peak-information-rate bps;
      peak-burst-size bytes;
    }
}
```

Hierarchy Level [edit firewall]

Release Information Statement introduced in JUNOS Release 7.4.

Description Configure a tricolor marking policer.

Options two-rate—Marking is based on the CIR and the PIR.

color-aware—Metering varies by preclassification. Metering can increase a packet's assigned PLP, but cannot decrease it.

color-blind—All packets are evaluated by the CBS. If a packet exceeds the CBS, it is evaluated by the EBS.

committed-information-rate *bps*—Guaranteed bandwidth under normal line conditions, and the average rate up to which packets are marked green.
Range: Not limited

committed-burst-size *bytes*—Maximum number of bytes allowed for incoming packets to burst above the CIR, but still be marked green.
Range: 1500 through 100,000,000 bytes

peak-information-rate *bps*—Maximum achievable rate. Packets that exceed the CIR but are below the PIR are marked yellow. Packets that exceed the PIR are marked red.
Range: Not limited

peak-burst-size *bytes*—Maximum number of bytes allowed for incoming packets to burst above the PIR, but still be marked yellow.
Range: 1500 through 100,000,000 bytes

Usage Guidelines See "Configuring a Tricolor Marking Policer" on page 153.

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

transmit-rate

Syntax transmit-rate (*rate* | percent *percentage* | remainder) <exact>;

Hierarchy Level [edit class-of-service schedulers *scheduler-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description Specify the transmit rate or percentage for a scheduler.

Options exact—Enforce the exact transmission rate. Under sustained congestion, a rate-controlled queue that goes into negative credit fills up and eventually drops packets.

rate—Transmission rate, in bps. You can specify a value in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000).
Range: 3200 through 32,000,000,000 bps

remainder—Use remaining rate available.

percent *percentage*—Percentage of transmission capacity.
Range: 0 through 100 percent

Default If you do not include this statement, the default transmit rates for queues 0 through 7 are 95, 0, 0, 5, 0, 0, 0, and 0 percent.

Usage Guidelines See “Configuring Schedulers” on page 59.

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

transmit-weight

Syntax transmit-weight (cells *number* | percent *number*);

Hierarchy Level [edit interfaces *interface-name* atm-options scheduler-maps *map-name* forwarding-class *class-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM2 IQ interfaces only, assign a transmission weight to a forwarding class.

Default 95 percent for queue 0, 5 percent for queue 3.

Options percent *percent*—Transmission weight of the forwarding class as a percentage of the total bandwidth.
Range: 5 through 100

cells *number*—Transmission weight of the forwarding class as a number of cells.
Range: 0 through 32,000

Usage Guidelines See "Configuring an ATM Scheduler Map" on page 135.

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

tri-color

Syntax tri-color;

Hierarchy Level [edit class-of-service]

Release Information Statement introduced in JUNOS Release 7.4.

Description For IPv4 packets on M320 and T-series platforms with Enhanced II Flexible PIC Concentrators (FPCs), enable two-rate tricolor marking (TCM), as defined in RFC 2698.

Default If you do not include this statement, tricolor marking is not enabled and the medium packet-loss priority (PLP) is not configurable.

Usage Guidelines See "Configuring Tricolor Marking" on page 149.

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

trigger

Syntax trigger *type* shaping-rate (percent *percent* | *rate*);

Hierarchy Level [edit class-of-service adaptive-shapers *adaptive-shaper-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, specify a trigger type and its associated rate.

Options *type*—The type of trigger. Currently, the trigger type can be becn only.

The remaining statement is explained separately.

Usage Guidelines See the *J-series Services Router Configuration Guide*.

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

See Also shaping-rate (Adaptive Shaping) on page 231

unit

Syntax

```
unit logical-unit-number {
    classifiers {
      type (classifier-name | default);
    }
    forwarding-class class-name;
    fragmentation-map map-name;
    loss-priority-maps {
      default;
      map-name;
    }
    rewrite-rules {
      type (rewrite-name | default);
    }
    scheduler-map map-name;
    shaping-rate rate;
    virtual-channel-group group-name;
}
```

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

Release Information Statement introduced before JUNOS 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.

Usage Guidelines See “Classifying Packets by Behavior Aggregate” on page 45 and “Rewriting Packet Header Information” on page 87.

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

vbr

Syntax vbr peak *rate* sustained *rate* burst *length*;

Hierarchy Level [edit interfaces *interface-name* atm-options vpi *vpi-identifier* shaping],
[edit interfaces *interface-name* unit *logical-unit-number* address *address* family *family* multipoint-destination *address* shaping],
[edit interfaces *interface-name* unit *logical-unit-number* shaping],
[edit logical-routers *logical-router-name* interfaces *interface-name* unit *logical-unit-number* address *address* family *family* multipoint-destination *address* shaping],
[edit logical-routers *logical-router-name* interfaces *interface-name* unit *logical-unit-number* shaping]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM encapsulation only, define the variable bandwidth utilization in the traffic-shaping profile.

When you configure the variable bandwidth utilization, you must specify all three options (burst, peak, and sustained). You can specify *rate* in bits per second either as a complete decimal number or as a decimal number followed by the abbreviation k (1000), m (1,000,000), or g (1,000,000,000). You can also specify *rate* in cells per second by entering a decimal number followed by the abbreviation c; values expressed in cells per second are converted to bits per second by means of the formula 1 cps = 384 bps.

Default If the vbr statement is not specified, bandwidth utilization is unlimited.

Options burst *length*—Burst length, in cells. If you set the length to 1, the peak traffic rate is used.
Range: 1 through 4000 cells

peak *rate*—Peak rate, in bits per second or cells per second.
Range: For ATM1 interfaces, 33 Kbps through 135.6 Mbps (ATM OC3); 33 Kbps through 276 Mbps (ATM OC12).
For ATM2 IQ OC3 and OC12 interfaces, 33 Kbps through 542,526,792 bps.
For ATM2 IQ OC48 interfaces, 33 Kbps through 2,170,107,168 bps.
For ATM2 IQ DS3 and E3 interfaces, from 33 Kbps through the maximum rate, which depends on the ATM encapsulation and framing you configure. For more information, see the *JUNOS Network Interfaces Configuration Guide*.

sustained *rate*—Sustained rate, in bits per second or cells per second.
Range: For ATM1 interfaces, 33 Kbps through 135.6 Mbps (ATM OC3); 33 Kbps through 276 Mbps (ATM OC12).
For ATM2 IQ OC3 and OC12 interfaces, 33 Kbps through 542,526,792 bps.
For ATM2 IQ OC48 interfaces, 33 Kbps through 2,170,107,168 bps.
For ATM2 IQ DS3 and E3 interfaces, from 33 Kbps through the maximum rate, which depends on the ATM encapsulation and framing you configure. For more information, see the *JUNOS Network Interfaces Configuration Guide*.

Usage Guidelines See “Configuring ATM CoS on the Logical Interface” on page 144.

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

See Also cbr on page 177, rtvbr on page 224, shaping on page 230

vc-cos-mode

Syntax vc-cos-mode (alternate | strict);

Hierarchy Level [edit interfaces *interface-name* atm-options scheduler-maps *map-name*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM2 IQ interfaces only, specify packet-scheduling priority value for ATM2 IQ VC tunnels.

Options alternate—VC CoS queue has high priority. The scheduling of the queues alternates between the high-priority queue and the remaining queues, so every other scheduled packet is from the high-priority queue.

strict—VC CoS queue has strictly high priority. A queue with strict high priority is always scheduled before the remaining queues. The remaining queues are scheduled in round-robin fashion.

Default: alternate

Usage Guidelines See "Configuring an ATM Scheduler Map" on page 135.

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

vci

Syntax vci *vpi-identifier*.*vci-identifier*;

Hierarchy Level [edit interfaces at-*fpc/pic/port* unit *logical-unit-number*],
[edit interfaces at-*fpc/pic/port* unit *logical-unit-number* family *family* address *address* multipoint-destination *address*],
[edit logical-routers *logical-router-name* interfaces at-*fpc/pic/port* unit *logical-unit-number*],
[edit logical-routers *logical-router-name* interfaces at-*fpc/pic/port* unit *logical-unit-number* family *family* address *address* multipoint-destination *address*]

Release Information Statement introduced before JUNOS Release 7.4.

Description For ATM point-to-point logical interfaces only, configure the virtual circuit identifier (VCI) and virtual path identifier (VPI).

To configure a VPI for a point-to-multipoint interface, specify the VPI in the multipoint-destination statement.

VCIs 0 through 31 are reserved for specific ATM values designated by the ATM Forum.

Options *vci-identifier*—ATM virtual circuit identifier. Unless you configure the interface to use promiscuous mode, this value cannot exceed the largest numbered VC configured for the interface with the maximum-vcs option of the vpi statement.
Range: 0 through 4089 or 0 through 65,535 with promiscuous mode, with VCIs 0 through 31 reserved.

vpi-identifier—ATM virtual path identifier.
Range: 0 through 255
Default: 0

Usage Guidelines See “Configuring ATM CoS on the Logical Interface” on page 144.

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

virtual-channel

Syntax virtual-channel *virtual-channel-name*;

Hierarchy Level [edit firewall family *family-name* filter *filter-name* term *term-name* then]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, select the traffic to be transmitted by way of a particular virtual channel. *virtual-channel-name* must be one of the names that you define at the [edit class-of-service virtual-channels] hierarchy level.

Options *virtual-channel-name*—Name of the virtual channel.

Usage Guidelines See "Configuring Virtual Channels" on page 121.

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

See Also default on page 183, scheduler-map (Virtual Channels) on page 227, shaping-rate (Virtual Channels) on page 233, virtual-channel-groups on page 243, virtual-channels on page 244

virtual-channel-group

Syntax virtual-channel-group *group-name*;

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

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, assign a virtual channel group to a logical interface.

If you apply a virtual channel group to multiple logical interfaces, separate queues are created on each of the interfaces. The same virtual channel names are used on all the interfaces. You can specify the scheduler and shaping rates in the virtual channels in percentages so that you can apply the same virtual channel group to logical interfaces with different available bandwidths.

Options *group-name*—Name of the virtual channel group.

Usage Guidelines See "Configuring Virtual Channels" on page 121.

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

See Also default on page 183, scheduler-map (Virtual Channels) on page 227, shaping-rate (Virtual Channels) on page 233, virtual-channel-groups on page 243, virtual-channels on page 244

virtual-channel-groups

Syntax

```
virtual-channel-groups {
    virtual-channel-group-name {
        virtual-channel-name {
            scheduler-map map-name;
            shaping-rate (percent percent | rate);
            default;
        }
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, associate a virtual channel with a scheduler map and a shaping rate.

Virtual channels and virtual channel groups enable you to direct traffic into a virtual channel and apply bandwidth limits to the channel.

Options *group-name*—Name of the virtual channel group.

The remaining statements are explained separately.

Usage Guidelines See "Configuring Virtual Channels" on page 121.

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

See Also default on page 183, scheduler-map (Virtual Channels) on page 227, shaping-rate (Virtual Channels) on page 233, virtual-channel-group on page 242, virtual-channels on page 244

virtual-channels

Syntax
```
virtual-channels {
    virtual-channel-name;
}
```

Hierarchy Level [edit class-of-service]

Release Information Statement introduced before JUNOS Release 7.4.

Description For J-series Services Routers only, specify a list of virtual channels.

Each virtual channel has eight transmission queues.

Options *virtual-channel-name*—Name of the virtual channel.

Usage Guidelines See "Configuring Virtual Channels" on page 121.

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

See Also default on page 183, scheduler-map (Virtual Channels) on page 227, shaping-rate (Virtual Channels) on page 233, virtual-channel-group on page 242, virtual-channel-groups on page 243