

## Understanding CoS Forwarding Classes

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It is helpful to think of forwarding classes as output queues. In effect, the end result of classification is the identification of an output queue for a particular packet. For a classifier to assign an output queue to each packet, it must associate the packet with one of the following forwarding classes:

- expedited-forwarding (ef)—Provides a low loss, low latency, low jitter, assured bandwidth, end-to-end service.
- assured-forwarding (af)—Provides a group of values you can define and includes four subclasses: AF1, AF2, AF3, and AF4, each with two drop probabilities: low and high.
- best-effort (be)—Provides no service profile. Loss priority is typically not carried in a class-of-service (CoS) value.
- network-control (nc)—Supports protocol control and thus is typically high priority.
- multicast best-effort (mcast-be)—Used for high-priority multicast packets.
- multicast assured-forwarding (mcast-af)—Provides two drop profiles, high and low, for multicast packets.
- multicast best-effort (mcast-be)—Provides no service profile for multicast packets.



**NOTE:** The forwarding classes multicast expedited-forwarding, multicast assured-forwarding, and multicast best-effort are applicable only to Juniper Networks EX8200 Ethernet Switches.

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Juniper Networks EX Series Ethernet Switches support up to 16 forwarding classes, thus allowing granular packet classification. For example, you can configure multiple classes of EF traffic such as EF, EF1, and EF2.

EX Series switches support up to eight output queues. Therefore, if you configure more than eight forwarding classes, you must map multiple forwarding classes to single output queues.

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## Default Forwarding Classes

Table 1 shows the four default forwarding classes defined for unicast traffic, and Table 2 shows the three default forwarding classes defined for multicast traffic.



**NOTE:** The default forwarding classes for multicast traffic are applicable only to EX8200 switches.

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If desired, you can rename the forwarding classes associated with the queues supported on your switch. Assigning a new class name to an output queue does not

alter the default classification or scheduling that is applicable to that queue. CoS configurations can be quite complicated, so unless it is required by your scenario, we recommend that you not alter the default class names or queue number associations.

**Table 1: Default Forwarding Classes for Unicast Packets**

Forwarding Class Name	Comments
best-effort (be)	The software does not apply any special CoS handling to packets with 000000 in the DiffServ field. This is a backward compatibility feature. These packets are usually dropped under congested network conditions.
expedited-forwarding (ef)	The software delivers assured bandwidth, low loss, low delay, and low delay variation (jitter) end-to-end for packets in this service class. The software accepts excess traffic in this class, but in contrast to the assured forwarding class, the out-of-profile expedited-forwarding class packets can be forwarded out of sequence or dropped.
assured-forwarding (af)	<p>The software offers a high level of assurance that the packets are delivered as long as the packet flow from the customer stays within a certain service profile that you define.</p> <p>The software accepts excess traffic, but it applies a tail drop profile to determine if the excess packets are dropped and not forwarded.</p> <p>Up to two drop probabilities (low and high) are defined for this service class.</p>
network-control (nc)	<p>The software delivers packets in this service class with a high priority. (These packets are not delay-sensitive.)</p> <p>Typically, these packets represent routing protocol hello or keep alive messages. Because loss of these packets jeopardizes proper network operation, packet delay is preferable to packet discard.</p>

**Table 2: Default Forwarding Classes for Multicast Packets**

Forwarding Class Name	Comments
multicast best-effort (mcast-be)	The software does not apply any special CoS handling to the multicast packets. These packets are usually dropped under congested network conditions.
multicast expedited-forwarding (mcast-ef)	The software delivers assured bandwidth, low loss, low delay, and low delay variation (jitter) end-to-end for multicast packets in this service class. The software accepts excess traffic in this class, but in contrast to the multicast assured forwarding class, out-of-profile multicast expedited-forwarding class packets can be forwarded out of sequence or dropped.
multicast assured-forwarding (mcast-af)	<p>The software offers a high level of assurance that the multicast packets are delivered as long as the packet flow from the customer stays within a certain service profile that you define.</p> <p>The software accepts excess traffic, but it applies a tail drop profile to determine if the excess packets are dropped and not forwarded.</p> <p>Up to two drop probabilities (low and high) are defined for this service class.</p>

The following rules govern queue assignment:

- CoS configurations that specify more queues than the switch can support are not accepted. The commit fails with a detailed message that states the total number of queues available.
- All default CoS configurations are based on queue number. The name of the forwarding class that shows up when the default configuration is displayed is the forwarding class currently associated with that queue.

**Related Topics**

- Understanding JUNOS CoS Components for EX Series Switches
- Example: Configuring CoS on EX Series Switches
- Defining CoS Forwarding Classes (CLI Procedure)
- Defining CoS Forwarding Classes (J-Web Procedure)

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