



# Configuring Marking

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This chapter describes how to configure the marking features on the Cisco NX-OS device that you can use to define the class of traffic to which the packet belongs.

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## Finding Feature Information

Your software release might not support all the features documented in this module. For the latest caveats and feature information, see the Bug Search Tool at <https://tools.cisco.com/bugsearch/> and the release notes for your software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "New and Changed Information" chapter or the Feature History table in this chapter.

## Information About Marking

Marking is a method that you use to modify the QoS fields of the incoming and outgoing packets. The QoS fields that you can mark are CoS in Layer 2, and IP precedence and Differentiated Service Code Point (DSCP) in Layer 3. The QoS group and discard class are two labels local to the system that you can assign intermediate marking values. You can use these two labels to determine the final values marked in a packet.

You can use marking commands in traffic classes that are referenced in a policy map. The marking features that you can configure are listed in the table below.

Table 1: Configurable Marking Features

Marking Feature	Description
DSCP	Layer 3 DSCP. <b>Note</b> If you manipulate this <b>dscp value</b> , you cannot manipulate <b>discard class</b> values, and vice-versa.
IP precedence	Layer 3 IP precedence. <b>Note</b> IP precedence uses only the lower three bits of the type of service (ToS) field. The device overwrites the first three bits of the ToS field to 0.
CoS	Layer 2 class of service (CoS).
QoS group	Locally significant QoS values that can be manipulated and matched within the system. The range is from 1 to 126.
Discard class	Locally significant values that can be matched and manipulated within the system. The range is from 0 to 63.  If you manipulate this <b>discard class</b> value, you cannot manipulate <b>dscp values</b> and vice-versa.
Ingress and egress ports	Status of the marking applies to incoming or outgoing packets.
Using table maps	Method to use table maps for marking.

Unless noted as a restriction, you can apply marking features to both incoming and outgoing packets.

## Prerequisites for Marking

Marking has the following prerequisites:

- You must be familiar with [Using Modular QoS CLI](#)
- You are logged on to the switch.
- You are in the correct VDC. A VDC is a logical representation of a set of system resources. You can use the **switchto vdc** command with a VDC number.

## Guidelines and Limitations

Marking has the following configuration guidelines and limitations:

- The **set cos** command can only be used in ingress policies when no other **set** commands are used for the same packet for egress.
- The **set qos-group** command can only be used in ingress policies.
- The **set discard-class** command can only be used in ingress policies.
- When PIM is enabled on the switch virtual interface (SVI), you cannot mark the Layer 2 switched multicast traffic on that VLAN.
- Egress QoS policies on Layer 2 ports are not supported on VDCs of any module type.
- A VLAN configuration with an egress QoS policy is not supported on VDCs that consist of F1 modules or any module plus an F1 module. However, a VLAN configuration with an egress QoS policy is supported on VDCs of the following module types:
  - M1 and/or M2 plus an F2e
  - M1
  - M2 and F3
  - M3 and F3
  - F2 and/or F2e
  - F3
- Egress policies on VLAN configurations do not support set match on CoS.
- Egress policies on VLAN configurations do not support set QoS group or discard class.
- Proxy-routed marking from F1 and/or F2e modules to M modules is not supported on the Layer 2 ingress port. However, marking that is applied under the VLAN is supported on the Layer 2 ingress port.
- To achieve scalability with remarking QoS policy on large number of interfaces, disable the QoS statistics on policy level. Enter the **no qos statistics** command, which disables global statistics, or enter the **service-policy type qos output DSCP no-stats** command per policy. The scalability configuration will not exist if policers are used.

## Configuring Marking

You can combine one or more of the marking features in a policy map to control the setting of QoS values. You can then apply policies to either incoming or outgoing packets on an interface.

Do not press Enter after you use the **set** command and before you add the rest of the command. If you press Enter directly after entering the **set** keyword, you will be unable to continue to configure with the QoS configuration.

## Configuring DSCP Marking



**Note** If you configure this value, you cannot configure the discard-class value (see the “Configuring Discard Class Marking” section).

You can set the DSCP value in the six most significant bits of the DiffServ field of the IP header to a specified value. You can enter numeric values from 0 to 60, in addition to the standard DSCP values shown in the table below.

**Table 2: Standard DSCP Values**

Value	List of DSCP Values
af11	AF11 dscp (001010)—decimal value 10
af12	AF12 dscp (001100)—decimal value 12
af12	AF13 dscp (001110)—decimal value 14
af21	AF21 dscp (010010)—decimal value 18
af22	AF22 dscp (010100)—decimal value 20
af23	AF23 dscp (010110)—decimal value 22
af31	AF31 dscp (011010)—decimal value 26
af31	AF40 dscp (011100)—decimal value 28
af33	AF33 dscp (011110)—decimal value 30
af41	AF41 dscp (100010)—decimal value 34
af42	AF42 dscp (100100)—decimal value 36
af43	AF43 dscp (100110)—decimal value 38
cs1	CS1 (precedence 1) dscp (001000)—decimal value 8
cs2	CS2 (precedence 2) dscp (010000)—decimal value 16
cs3	CS3 (precedence 3) dscp (011000)—decimal value 24
cs4	CS4 (precedence 4) dscp (100000)—decimal value 32
cs5	CS5 (precedence 5) dscp (101000)—decimal value 40
cs6	CS6 (precedence 6) dscp (110000)—decimal value 48

Value	List of DSCP Values
cs7	CS7 (precedence 7) dscp (111000)—decimal value 56
default	Default dscp (000000)—decimal value 0
ef	EF dscp (101110)—decimal value 46

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 2</b>	switch(config)# <b>policy-map</b> [ <b>type qos</b> ] [ <b>match-first</b> ] { <i>qos-policy-map-name</i>   <b>qos-dynamic</b> }	Creates or accesses the policy map named <i>qos-policy-map-name</i> , and then enters policy-map mode. The policy-map name can contain alphabetic, hyphen, or underscore characters, is case sensitive, and can be up to 40 characters.
<b>Step 3</b>	switch(config-pmap)# <b>class</b> [ <b>type qos</b> ] { <i>class-map-name</i>   <b>qos-dynamic</b>   <b>class-default</b> } [ <b>insert-before</b> <i>before-class-map-name</i> ]	Creates a reference to class-map-name, and enters policy-map class configuration mode. The class is added to the end of the policy map unless <b>insert-before</b> is used to specify the class to insert before. Use the <b>class-default</b> keyword to select all traffic that is not currently matched by classes in the policy map.
<b>Step 4</b>	switch(config-pmap-c-qos)# <b>set dscp</b> <i>dscp-value</i>	Sets the DSCP value to <i>dscp-value</i> . Standard values are shown in the table above.  When the QoS policy is applied on the VLAN configuration level, the DSCP value derives the CoS value for bridged and routed traffic from the 3 most significant DSCP bits.

### Example

This example shows how to display the policy-map configuration:

```
switch# show policy-map policy1
```

## Configuring IP Precedence Marking

You can set the value of the IP precedence field in bits 0–2 of the IPv4 type of service (ToS) field of the IP header.



**Note** The device rewrites the last 3 bits of the ToS field to 0 for packets that match this class.

The table below shows the precedence values.

**Table 3: Precedence Values**

Value	List of Precedence Values
0-7	IP precedence value
critical	Critical precedence (5)
flash	Flash precedence (3)
flash-override	Flash override precedence (4)
immediate	Immediate precedence (2)
internet	Internetwork control precedence (6)
network	Network control precedence (7)
priority	Priority precedence (1)
routine	Routine precedence (0)

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 2</b>	switch(config)# <b>policy-map</b> [type qos] [match-first] {qos-policy-map-name   qos-dynamic}	Creates or accesses the policy map named <i>qos-policy-map-name</i> , and then enters policy-map mode. The policy-map name can contain alphabetic, hyphen, or underscore characters, is case sensitive, and can be up to 40 characters.
<b>Step 3</b>	switch(config-pmap-qos)# <b>class</b> [type qos] {class-map-name   qos-dynamic   class-default} [insert-before before-class-map-name]	Creates a reference to class-map-name, and enters policy-map class configuration mode. The class is added to the end of the policy map unless <b>insert-before</b> is used to specify the class to insert before. Use the <b>class-default</b> keyword to select all traffic that is not currently matched by classes in the policy map.
<b>Step 4</b>	switch(config-pmap-c-qos)# <b>set precedence</b> precedence-value	Sets the IP precedence value to <i>precedence-value</i> . The value can range from 0 to 7. You can enter one of the values shown in the table above.

**Example**

This example shows how to display the policy-map configuration:

```
switch# show policy-map policy1
```

## Configuring CoS Marking

You can set the value of the CoS field in the high-order three bits of the VLAN ID Tag field in the IEEE 802.1Q header.

**Procedure**

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 2</b>	switch(config)# <b>policy-map</b> [type qos] [match-first] {qos-policy-map-name   qos-dynamic}	Creates or accesses the policy map named <i>qos-policy-map-name</i> , and then enters policy-map mode. The policy-map name can contain alphabetic, hyphen, or underscore characters, is case sensitive, and can be up to 40 characters.
<b>Step 3</b>	switch(config-pmap-qos)# <b>class</b> [type qos] {class-map-name   qos-dynamic   class-default} [insert-before before-class-map-name]	Creates a reference to class-map-name, and enters policy-map class configuration mode. The class is added to the end of the policy map unless <b>insert-before</b> is used to specify the class to insert before. Use the <b>class-default</b> keyword to select all traffic that is not currently matched by classes in the policy map.
<b>Step 4</b>	switch(config-pmap-c-qos)# <b>set cos</b> <i>cos-value</i>	Sets the CoS value to <i>cos-value</i> . The value can range from 0 to 7.

**Example**

This example shows how to display the policy-map configuration:

```
switch# show policy-map policy1
```

## Configuring QoS Group Marking

You can set the value of the internal label QoS group, which is only locally significant. You can reference this value in subsequent policy actions or classify traffic that is referenced in egress policies by using the **match qos-group** class-map command.



**Note** You can set the QoS group only in ingress policies.

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 2</b>	switch(config)# <b>policy-map</b> [type qos] [match-first] {qos-policy-map-name   qos-dynamic}	Creates or accesses the policy map named <i>qos-policy-map-name</i> , and then enters policy-map mode. The policy-map name can contain alphabetic, hyphen, or underscore characters, is case sensitive, and can be up to 40 characters.
<b>Step 3</b>	switch(config-pmap-qos)# <b>class</b> [type qos] {class-map-name   qos-dynamic   class-default} [insert-before before-class-map-name]	Creates a reference to class-map-name, and enters policy-map class configuration mode. The class is added to the end of the policy map unless <b>insert-before</b> is used to specify the class to insert before. Use the <b>class-default</b> keyword to select all traffic that is not currently matched by classes in the policy map.
<b>Step 4</b>	switch(config-pmap-c-qos)# <b>set qos-group</b> qos-group-value	Sets the QoS group value to <i>qos-group-value</i> . The value can range from 1 to 126.

### Example

This example shows how to display the policy-map configuration:

```
switch# show policy-map policy1
```

## Configuring Discard Class Marking

If you configure this value, you cannot configure the DSCP value. See the “Configuring DSCP Marking” section.

You can set the value of the internal label discard class, which is locally significant only. You can reference this value in subsequent policy actions or classify traffic that is referenced in egress policies by using the **match discard-class** class-map command.



**Note** You can set the discard class only in ingress policies.



**Procedure**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	<code>switch# configure terminal</code>	Enters global configuration mode.
<b>Step 2</b>	<code>switch(config)# policy-map [type qos] [match-first] {qos-policy-map-name   qos-dynamic}</code>	Creates or accesses the policy map named <i>qos-policy-map-name</i> , and then enters policy-map mode. The policy-map name can contain alphabetic, hyphen, or underscore characters, is case sensitive, and can be up to 40 characters.
<b>Step 3</b>	<code>switch(config-pmap-qos)# class [type qos] {class-map-name   qos-dynamic   class-default} [insert-before before-class-map-name]</code>	Creates a reference to class-map-name, and enters policy-map class configuration mode. The class is added to the end of the policy map unless <b>insert-before</b> is used to specify the class to insert before. Use the <b>class-default</b> keyword to select all traffic that is not currently matched by classes in the policy map.
<b>Step 4</b>	<code>switch(config-pmap-c-qos)# set discard-class qos-group-value</code>	Sets the discard class value to <i>discard-class-value</i> . The value can range from 0 to 63.  <b>Note</b> For information on using table maps with marking, see the “Configuring Marking Using Table Maps” section.

**Example**

This example shows how to display the policy-map configuration:

```
switch# show policy-map policy1
```

## Configuring Ingress and Egress Marking

You can apply the marking instructions in a QoS policy map to ingress or egress packets by attaching that QoS policy map to an interface. To select ingress or egress, you specify either the **input** or **output** keyword in the **service-policy** command. For detailed instructions, see the “Attaching and Detaching a QoS Policy Action” section.

## Configuring DSCP Port Marking

You can set the DSCP value for each class of traffic defined in a specified ingress policy map.

The default behavior of the device is to preserve the DSCP value or to trust DSCP. To make the port untrusted, change the DSCP value. Unless you configure a QoS policy and attach that policy to specified interfaces, the DSCP value is preserved.

**Note**

- You can attach only one policy type qos map to each interface in each direction.
- The DSCP value is trust on the Layer 3 port of a Cisco NX-OS device.
- If the default policy-map policy is used, DSCP maps to a relevant CoS value and the queuing works correctly.
- If a customer policy is used, you must manually set the DSCP value to map to a CoS value so that the traffic is queued to the correct queue.

**Procedure**

	<b>Command or Action</b>	<b>Purpose</b>
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 2</b>	switch(config)# <b>policy-map</b> [type qos] [match-first] {qos-policy-map-name   qos-dynamic}	Creates or accesses the policy map named <i>qos-policy-map-name</i> , and then enters policy-map mode. The policy-map name can contain alphabetic, hyphen, or underscore characters, is case sensitive, and can be up to 40 characters.
<b>Step 3</b>	switch(config-pmap-qos)# <b>class</b> [type qos] {class-map-name   qos-dynamic   class-default} [insert-before before-class-map-name]	Creates a reference to class-map-name, and enters policy-map class configuration mode. The class is added to the end of the policy map unless <b>insert-before</b> is used to specify the class to insert before. Use the <b>class-default</b> keyword to select all traffic that is not currently matched by classes in the policy map.
<b>Step 4</b>	switch(config-pmap-c-qos)# <b>set dscp</b> <i>dscp-value</i>	Sets the DSCP value to <i>dscp-value</i> . Valid values are shown in <a href="#">Table 2: Standard DSCP Values, on page 4</a> .
<b>Step 5</b>	switch(config-pmap-c-qos)# <b>exit</b>	Returns to policy-map configuration mode.
<b>Step 6</b>	switch(config-pmap-qos)# <b>class</b> [type qos] {class-map-name   qos-dynamic   class-default} [insert-before before-class-map-name]	Creates a reference to class-map-name, and enters policy-map class configuration mode. The class is added to the end of the policy map unless <b>insert-before</b> is used to specify the class to insert before. Use the <b>class-default</b> keyword to select all traffic that is not currently matched by classes in the policy map.
<b>Step 7</b>	switch(config-pmap-c-qos)# <b>set dscp</b> <i>dscp-value</i>	Sets the DSCP value to <i>dscp-value</i> . Valid values are shown in <a href="#">Table 2: Standard DSCP Values, on page 4</a> .
<b>Step 8</b>	switch(config-pmap-c-qos)# <b>exit</b>	Returns to policy-map configuration mode.

	Command or Action	Purpose
<b>Step 9</b>	switch(config-pmap-qos)# <b>class</b> [ <b>type qos</b> ] { <i>class-map-name</i>   <b>qos-dynamic</b>   <b>class-default</b> } [ <b>insert-before</b> <i>before-class-map-name</i> ]	Creates a reference to class-map-name, and enters policy-map class configuration mode. The class is added to the end of the policy map unless <b>insert-before</b> is used to specify the class to insert before. Use the <b>class-default</b> keyword to select all traffic that is not currently matched by classes in the policy map.
<b>Step 10</b>	switch(config-pmap-c-qos)# <b>set dscp</b> <i>dscp-value</i>	Sets the DSCP value to <i>dscp-value</i> . Valid values are shown in <a href="#">Table 2: Standard DSCP Values, on page 4</a> .
<b>Step 11</b>	switch(config-pmap-c-qos)# <b>exit</b>	Returns to policy-map configuration mode.
<b>Step 12</b>	switch(config)# <b>interface ethernet</b> { <i>slot/port</i> }	Enters interface mode to configure the Ethernet interface.
<b>Step 13</b>	switch(config-if)# <b>service-policy</b> [ <b>type qos</b> ] { <b>input</b>   <b>output</b> } { <i>policy-map-name</i>   <b>qos-dynamic</b> } [ <b>no-stats</b> ]	Adds <i>policy-map-name</i> to the input packets of the interface. You can attach only one input policy and one output policy to an interface.

### Example

This example shows how to display the policy-map configuration:

```
switch# show policy-map policy1
```

## Configuring Table Maps for Use in Marking

You can use the system-defined table maps to define the mapping of values from one variable to another from a source QoS field to a destination QoS field. For the list of system-defined table maps, see “Using Modular QoS CLI.” The source and destination fields are determined by the context of the table map in the set and police commands. For information about table maps, see the “Configuring Marking Using Table Maps” section.

The system-defined table maps are not configurable. To display the current values, enter the **show table map** command.

Use the **default** command to define the destination value of unmapped source values. By default, unmapped values are copied to the destination value, so that the destination value is the same as the source value. The ignore variable for the **default** command is no longer supported.



**Note** You can use only one of the system-defined table maps in this procedure. For information on the system-defined table maps, see “Using Modular QoS CLI.”

## Configuring Marking Using Table Maps

You can use the system-defined table maps to perform marking in the **set** and **police** policy map class commands.



**Note** For the list of system-defined table maps, see “Using Modular QoS CLI.”

A source field and destination field are specified in the command that maps to the source and destination values supplied in the referenced table map. The QoS fields that can be used in these commands are listed in the table below.

**Table 4: QoS Table Map Fields**

QoS Table Map Field	Description
CoS	Class of service field in the 802.1Q header.
DSCP	Differentiated Services Code Point in the IP header.
IP precedence	Bits 0–2 of the IPv4 ToS field.
Discard class	Locally significant values that can be matched and manipulated within the system. The range is from 0 to 63.

By using the system-defined table maps, you cannot change unlike values, but you can only change one value to another when it is the same variable. You can use the markdown system-defined table maps for the **exceed** or **violate** action of the **police** command by using the same syntax as the set command.



**Note** The internal label QoS group is not supported through table maps.



**Note** Marking down in the police command requires the use of a table map.

For information on the police command, see “Configuring Policing.”

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	switch# <b>configure terminal</b>	Enters global configuration mode.
<b>Step 2</b>	switch(config)# <b>policy-map</b> [ <b>type qos</b> ] [ <b>match-first</b> ] { <i>qos-policy-map-name</i>   <b>qos-dynamic</b> }	Creates or accesses the policy map named <i>qos-policy-map-name</i> , and then enters policy-map mode. The policy-map name can contain alphabetic, hyphen, or underscore characters, is case sensitive, and can be up to 40 characters.

	Command or Action	Purpose
<b>Step 3</b>	switch(config-pmap-qos)# <b>class</b> [ <b>type qos</b> ] { <i>class-map-name</i>   <b>qos-dynamic</b>   <b>class-default</b> } [ <b>insert-before</b> <i>before-class-map-name</i> ]	Creates a reference to class-map-name, and enters policy-map class configuration mode. The class is added to the end of the policy map unless <b>insert-before</b> is used to specify the class to insert before. Use the <b>class-default</b> keyword to select all traffic that is not currently matched by classes in the policy map.
<b>Step 4</b>	switch(config-pmap-c-qos)# <b>set</b> { <b>cos</b>   <b>dscp</b>   <b>discard-class</b>   <b>precedence</b>   <b>discard-class</b> } { <b>cos</b>   <b>dscp</b>   <b>discard-class</b>   <b>precedence</b>   <b>discard-class</b> } <i>table-map-name</i>	Sets the first packet field to the value of the second packet field based on the mapping values specified in the referenced <i>table-map-name</i> .  <b>Note</b> The table-map-name must be the name of one of the system-defined table maps, which are not configurable, listed in “Using Modular QoS CLI.” You cannot use the name of a user-defined table in this procedure.
<b>Step 5</b>	switch(config-pmap-c-qos)# <b>exit</b>	Returns to policy-map configuration mode.

**Example**

This example shows how to display the policy1 policy-map configuration:

```
switch# show policy-map policy1
```

## Verifying the Marking Configuration

To display the marking configuration information, perform one of the following tasks:

Command	Purpose
<b>show table-map</b>	Displays all table maps.
<b>show policy-map</b>	Displays all policy maps.

## Configuration Examples for Marking

The following example shows how to configure marking:

```
configure terminal
policy-map type qos untrust_dcsp
class class-default
```

```
set dscp 0
policy-map type queuing untrust_1Gport_policy
class type queuing 2q4t-in-q-default
set cos 0
policy-map type queuing untrust_10Gport_policy
class type queuing 8q2t-in-q-default
set cos 0
```

## Feature History for Marking

The table below summarizes the new and changed features for this document and shows the releases in which each feature is supported. Your software release might not support all the features in this document. For the latest caveats and feature information, see the Bug Search Tool at <https://tools.cisco.com/bugsearch/> and the release notes for your software release.

*Table 5: Feature History for Marking*

Feature Name	Release	Feature Information
set cos command	5.0(3)	Support for set cos command in ingress policies.