Send document comments to nexus7k-docfeedback@cisco.com.

CHAPTER 5

Configuring Mutation Mapping

This chapter describes how to configure the mutation of packet values used to define traffic classes.

This chapter includes the following sections:

Information About Mutation Mapping

Mutation mapping is a method of modifying a QoS field in all packets on an interface. On ingress, mutation mapping occurs before traffic classification and all other actions. On egress, mutation mapping occurs after traffic classification and before the other actions. You can apply mutation mapping to packet fields CoS, DSCP, or IP precedence, or to the internal field discard class.

You cannot configure system-defined mutation maps. You can only configure those maps that modify the same source and destination variable.

You use a hierarchical policy map to configure mutation mapping. In the mutation mapping policy map you specify the field to mutate and the policy map to apply with the mutation.

Note The device supports hierarchical policies only for mutation mapping.

Mutation Mapping in Sequence of Traffic Actions

The sequence of QoS actions on ingress traffic is as follows:

1. Queuing and scheduling
2. Mutation

Send document comments to nexus7k-docfeedback@cisco.com.

3. Classification
4. Marking
5. Policing

The sequencing of QoS actions on egress traffic is as follows:

1. Classification
2. Marking
3. Policing
4. Mutation
5. Queuing and scheduling

Note Mutation happens much closer to the beginning of the traffic actions on the ingress packets, and any further classification and policing is based on the changed QoS values. Mutation happens at the end of the traffic actions on the egress packets, right before queuing and scheduling.

Licensing Requirements for Mutation Mapping

The following table shows the licensing requirements for this feature:

Product	License Requirement
NX-OS	QoS requires no license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the NX-OS licensing scheme, see the *Cisco Nexus 7000 Series NX-OS Licensing Guide, Release 4.2*.

However, using VDCs requires an Advanced Services license.

Prerequisites for Mutation Mapping

Mutation mapping has the following prerequisites:

- You must be familiar with Chapter 2, "Using Modular QoS CLI."
- You are logged on to the switch.
- You are in the correct virtual device context (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

Use the following guidelines to configure mutation mapping:

- You use a hierarchical policy for mutation mapping. Hierarchical policies are not supported for any other use.
- The device supports only one level of hierarchy.

Send document comments to nexus7k-docfeedback@cisco.com.

- You can configure up to 14 table maps for use in ingress interfaces and up to 15 table maps for use in egress interfaces.
- Before you delete a referenced policy map, you must first remove all references to that policy map.
- You can use only like parameters (for example, cos- cos) when you create a mutation map. Mutation maps with dissimilar types (for example, cos-dscp) are not supported.

Configuring Mutation Mapping

To configure mutation mapping, you create a hierarchical policy map that uses the **class-default** traffic class to capture all packets and apply mutation mapping to them. You use the **service-policy** command to specify the policy map to apply with mutation mapping.

Note You can set only similar values when you create a mutation map. For example, you can set cos-cos or dscp-dscp; you cannot set cos-dscp or dscp-precedence.

To configure mutation mapping, follow these steps:

Step 1 Create the policy map to apply in the mutation mapping hierarchical policy. For information about configuring policy maps, see Chapter 6, "Configuring Policing" or Chapter 7, "Configuring Queuing and Scheduling."

Step 2 Create the table map to use in the mutation mapping hierarchical policy. For information about configuring table maps, see the "Configuring Marking Using Table Maps" section on page 4-13.

Step 3 Configure the mutation mapping hierarchical policy as described in this section.

Step 4 Apply the service policy to the interface. For information about attaching policies to interfaces, see Chapter 2, "Using Modular QoS CLI."

SUMMARY STEPS

1. **config t**
2. **policy-map** [**type qos**] [**match-first**] {*qos-policy-map-name* | **qos-dynamic**}
3. **class class-default**
4. **set** {**cos** | **discard-class** | **dscp** | **precedence**} {**cos** | **discard-class** | **dscp** | **precedence**} **table** *table-map-name*
5. **service-policy** [**type qos**] {*policy-map-name* | **qos-dynamic**} [**no-stats**]
6. **show policy-map** [**type** {**qos** | **queuing**}] [*policy-map-name* | **qos-dynamic**]
7. **copy running-config startup-config**

Send document comments to nexus7k-docfeedback@cisco.com.

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t switch(config)#	Enters configuration mode.
Step 2	**policy-map** [**type qos**] [**match-first**] [*policy-map-name* | **qos-dynamic**] **Example:** switch(config)# policy-map policy1 switch(config-pmap-qos)#	Creates or accesses the specified policy map 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.
Step 3	**class class-default** **Example:** switch(config-pmap-qos)# class class-default switch(config-pmap-c-qos)#	Configures **class-default** to capture all traffic in this policy map.
Step 4	**set** {**cos** | **discard-class** | **dscp** | **precedence**} {**cos** | **discard-class** | **dscp** | **precedence**} **table** *table-map-name* **Example:** switch(config-pmap-c-qos)# set dscp dscp table dscp_mutation switch(config-pmap-c-qos)#	Sets the first packet field to the value of the second packet field based on the mapping values in the specified table map. For mutation mapping, both fields must have the same value. The specified table map must already exist. **Note** You can only set like fields when in mutation mapping (for example, dscp-dscp). The example shows how to use mutation mapping on the DSCP field based on the mapping values in table map dscp_mutation.
Step 5	**service-policy** [**type qos**] {*policy-map-name* | **qos-dynamic**} [**no-stats**] **Example:** switch(config-pmap-c-qos)# service-policy testpolicy switch(config-pmap-c-qos)#	Defines the policy map to apply with the mutation map. The specified policy map must already exist and cannot contain a **service-policy** command. **Note** Classification within this service policy is based on the mutated value, not on the original value in the packet. **Note** The service-policy command can only be used for mutation mapping.
Step 6	**show policy-map** [**type** {**qos** | **queuing**}] [*policy-map-name*] | **qos-dynamic**] **Example:** switch(config-pmap-c-qos)# show policy-map policy1	(Optional) Displays information about all configured policy maps or the specified policy map.
Step 7	**copy running-config startup-config** **Example:** switch(config-pmap-c-qos)# copy running-config startup-config	(Optional) Saves the running configuration to the startup configuration.

Send document comments to nexus7k-docfeedback@cisco.com.

Verifying the Mutation Mapping Configuration

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

Command	Purpose
show policy-map [**type** {**qos** | **queuing**}] [*policy-map-name* | **qos-dynamic**]	Displays information about all configured policy maps or the specified policy map.

For detailed information about the fields in the output from these commands, see the *Cisco Nexus 7000 Series NX-OS Quality of Service Command Reference, Release 4.2*.

Example Configuration

The following example shows a mutation configuration:

Note If the child service policy (in this example, child_qos_policy) is not configured in the parent policy map (in this example, parent_policy_for_mutation), all packets will be changed according to the mutation map.

```
class-map type qos match-all dscp0-12
   match dscp 0-12
   match protocol dhcp

  class-map type qos match-all dscp13-60
   match dscp 13-60

  table-map mutate_dscp
   default copy
   from 0 to 0
   from 1 to 1
   from 2 to 1
   from 63 to 46

  policy-map type qos child_policy
   class dscp0-12
    police cir 10 mbps bc 200 ms pir 20 mbps be 200 ms conform transmit exceed set dscp
dscp table mutate_dscp violate drop
   class dscp13-63
    police cir 20 mbps bc 200 ms pir 40 mbps be 200 ms conform transmit exceed set dscp
dscp table mutate_dscp violate drop
   class class-default
    police cir 5 mbps bc 200 ms conform transmit violate drop

  policy-map type qos parent_policy_for_mutation
   class class-default
    set dscp dscp table mutate_dscp
    service-policy type qos child_qos_policy
```

Send document comments to nexus7k-docfeedback@cisco.com.

Feature History for Mutation

Table 5-1 lists the release history for this feature.

Table 5-1 Feature History for Mutation

Feature Name	Releases	Feature Information
You can only use similar variables for mutation mapping.	4.1(2)	-
No change	4.2(1)	-