QoS Monitoring

Revised: December 4, 2015,

QoS Monitoring

The QoS Monitoring feature describes the Quality of Service (QoS) through sample configuration examples. This document is for networking professionals who are responsible for the design, implementation, or administration of a network that includes a standalone Cisco Catalyst 3850 Series or a Cisco Catalyst 3850 Series Switch-stack, referred to as the switch-stack.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and 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 feature information table.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for QoS Monitoring

We recommend that you have basic knowledge about the concepts and terminology of Multi-Layer Switching (MLS) and Modular QoS CLI (MQC).

Note The information in this document was created from devices configured in a lab environment. All devices used in this document had a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of the CLIs used in the configuration.

Supported Platforms

- Cisco Catalyst 3750 Series Switches
- Cisco Catalyst 3850 Series Switches

Restrictions for QoS Monitoring

QoS monitoring is applicable only for Wired components.

Information about QoS

Monitoring QoS Overview

QoS refers to the ability of a network to provide better service to various network traffic over different technologies such as, Asynchronous Transfer Mode (ATM), Ethernet and 802.1 networks, Frame Relay, IP-routed networks, and SONET.

QoS is a collection of technologies that allows applications to request and receive predictable service levels in terms of data throughput capacity (bandwidth), latency variations (jitter), and delay.

QoS Comparison

QoS configuration on Cisco Catalyst 3850 Series Switches uses the MQC (universal QoS configuration model) configuration instead of the MLS QoS (platform-dependent QoS) used in the Cisco Catalyst 3560 Series Switches and Cisco Catalyst 3750 Series Switches.

The following table lists the differences between the Cisco Catalyst 3750 Series Switches MLS QoS and Cisco Catalyst 3850 Series Switches MQC QoS:

Table 1: Differences between Cisco Catalyst 3750 Series Switch MLS QoS and Cisco Catalyst 3850 Series Switch MQC QoS

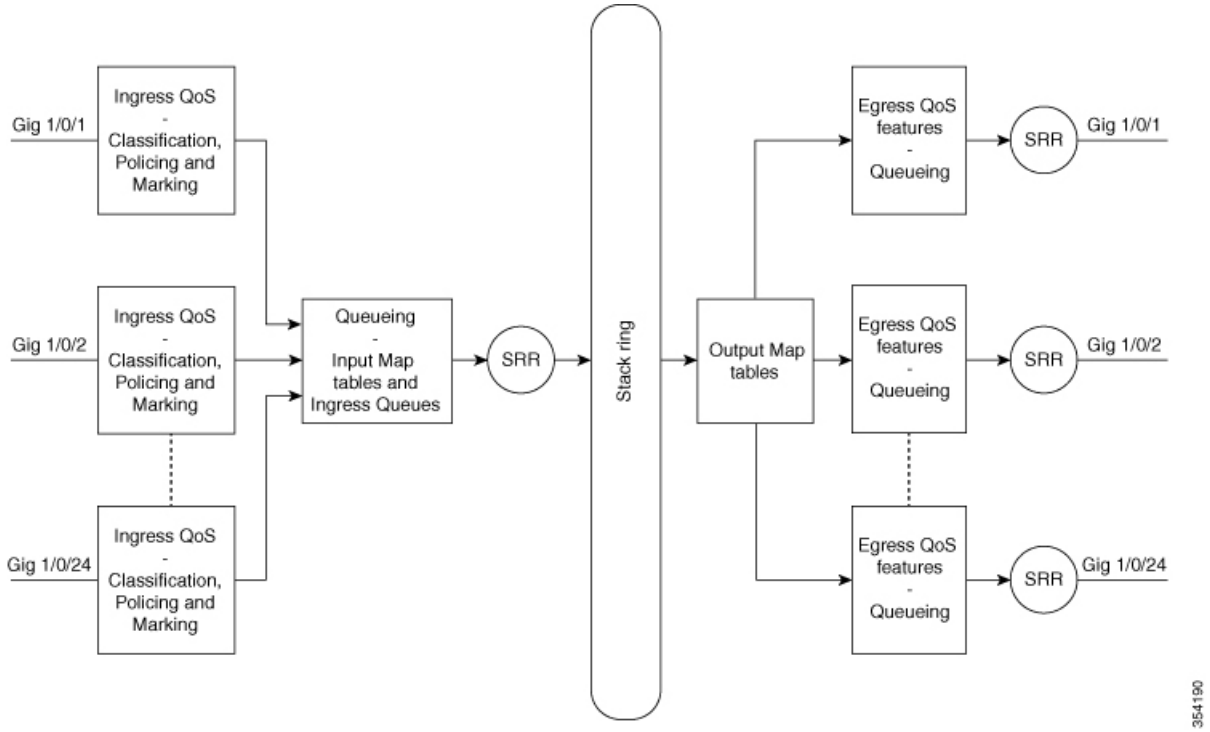
Switch Type	**Cisco Catalyst 3750 Series Switch**	**Cisco Catalyst 3850 Series Switch**
Basic Structure	MLS	MQC
QoS default	Disabled	Enabled
Global Configuration	• Supports MLS QoS • Supports some of MQC at ingress	• Does not support MLS QoS • Supports MQC; class maps and policy maps
Interface Configuration	Supports MLS QoS configuration and some of MQC CLI at the ingress interface	Attaches the policy to the interface.
Port trust default	Disabled	Enabled
Port Ingress	• Classification • Policing • Marking • Queuing	• Classification • Policing • Marking • No Ingress Queuing
Port Egress	Queuing	• Classification • Policing • Marking • Queuing

Switch Virtual Interface (SVI) Ingress	• Classification • Policing • Marking	• Classification • Marking
SVI Egress	None	• Classification • Marking
Trust Configuration	Must be applied to preserve Layer 2 and Layer 3 QoS marking	All packets are trusted (Layer 2 and Layer 3 QoS marking is preserved) by default, unless changed with an application of a specific policy map on the ingress or egress interface

QoS Model on a Cisco Catalyst 3750 Series Switch

The following illustration represents a QoS model on a Cisco Catalyst 3750 Series Switch:

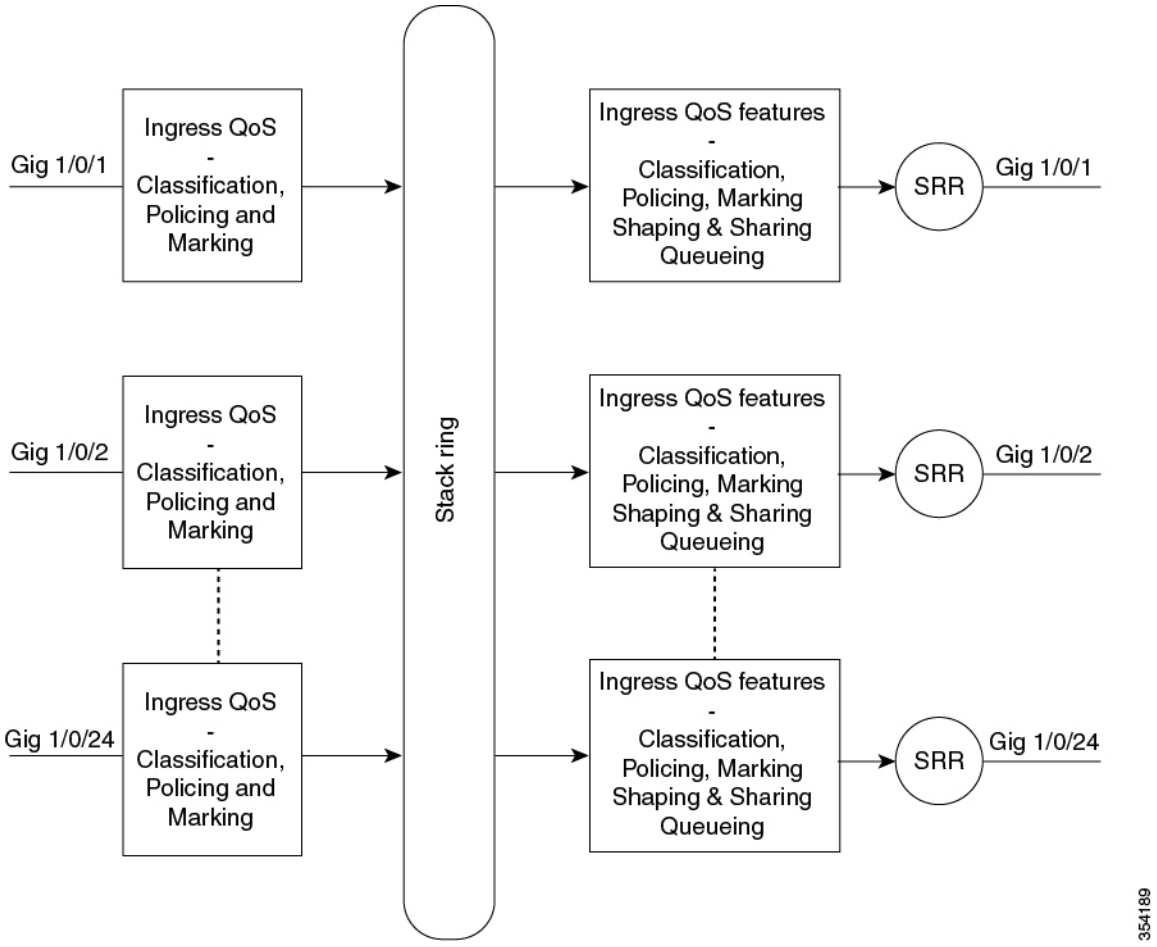
Figure 1: QoS model on a Cisco Catalyst 3750 Series Switch



QoS Model on a Cisco Catalyst 3850 Series Switch

The following illustration represents a QoS model on a Cisco Catalyst 3850 Series Switch:

Figure 2: QoS model on a Cisco Catalyst 3850 Series Switch



Ingress Features

The following table compares the various ingress features available on Cisco Catalyst 3750 Series and Cisco 3850 Series Switches:

Table 2: Ingress Features

Feature	Cisco Catalyst 3750 Series Switch	Cisco Catalyst 3850 Series Switch

Classification	Class-map matches: • Differentiated Services Code Point (DSCP) • Precedence • Access Control List (ACL) • Supports both match-all and match-any	Class-map matches: • Class of Service (CoS) • Precedence • DSCP • ACL • VLAN Supports only match-any.
Marking (unconditional set)	• Set DSCP • Precedence	• Set Cos • Precedence • DSCP • QoS-group
Marking (conditional Marking)	DSCP mutation	• Class-default • table-map
Policing	One-rate, two-color (1r2c)	1r2c and two-rate, three-color (2r3c)
Policing markdown	Policing exceeds markdown. Only supports DSCP.	Policing exceeds and violates markdown. The markdown is supported through a table-map. Supports: • CoS • DSCP • Precedence
Aggregate Policing	Supports aggregate policing	Aggregate policing (one type of Hierarchal QoS [HQoS])
Ingress Queuing	Supports only on 3750 but does not support on 3750x.	Does not support.
Hierarchical QoS (HQoS)	VLAN based HQoS only	Port-based aggregate policing and per-VLAN.

Egress Features

The following table compares the various egress features available on Cisco Catalyst 3750 Series and Cisco Catalyst 3850 Series Switches:

Table 3: Egress Features

Feature	Cisco Catalyst 3750 Series Switch	Cisco Catalyst 3850 Series Switch
Classification support for none queuing action	Does not support	• CoS, • precedence, • DSCP, • QoS-group, • ACL, and • VLAN
Classification support for queuing action	CoS and DSCP	• CoS, • precedence, • DSCP, and • QoS-group
Marking	Does not support	• Set CoS, • precedence, and • DSCP
Policing	Does not support	1r2c, 2r3c with exceed or violate markdown through table-map
Maximum number of queues and queue types	1-priority queue, 3-standard queues, 3-thresholds per standard queue (1P3Q3T) [4 queues] Expedite queue is the priority queue	2-priority queue, 6-standard queue, 3-threshold per standard queue (2P6Q3T) [up to 8 queues]
Egress Queuing	• Share mode, • shape mode, • queue-limit, • priority, and • queue-buffer	• Bandwidth, • bandwidth remaining, • shaping, • queue-limit, • priority, and • queue-buffer

HQoS	Does not support	• Aggregate policing, • per-VLAN, • port-shaper, and • parent user shaper with non-queuing action

DSCP Transparency Mode

The Cisco Catalyst 3850 Series Switch supports DSCP transparency. The Cisco Catalyst 3850 Series Switch uses the DSCP field of a packet at egress. By default, DSCP transparency is disabled. The Cisco Catalyst 3850 Series Switch modifies the DSCP field in an incoming packet, and the DSCP field in the outgoing packet is based on the QoS configuration, including the port trust setting, policing and marking, and the x-to-DSCP AVV table.

If DSCP transparency is enabled by using the **no qos rewrite ip dscp** command, the Cisco Catalyst 3850 Series Switch does not modify the DSCP field in the incoming packet, and the DSCP field in the outgoing packet is the same as that in the incoming packet.

Regardless of the DSCP transparency configuration, the Cisco Catalyst 3850 Series Switch modifies the internal QoS label of the packet, based on the configured QoS policy. The Cisco Catalyst 3850 Series Switch also uses the internal QoS label to select an egress queue and threshold.

How to Enable QoS Monitoring

Verifying QoS Configuration on a Cisco Catalyst 3750 Series Switch

Use the following commands to verify the QoS configuration on a Cisco Catalyst 3750 Series Switch:

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show running-config class-map** **Example:** `Device# show running-config class-map [class-map-name]`	Displays information about the configured class maps.
Step 3	**show running-config policy-map** **Example:** `Device# show running-config policy-map [policy-map-name]`	Displays the information about the configured policy maps.

	Command or Action	Purpose
Step 4	**show policy-map interface** **Example:** `Device# show policy-map interface [interface-type-number]`	Displays statistics and configurations of the input and output policies that are attached to an interface.
Step 5	**show mls qos maps** **Example:** `Device# show mls qos maps`	Displays multilayer switching (MLS) QoS information. The following options can be used with the **show mls qos maps** command: • **cos-dscp** • **cos-mutation** • **dscp-cos** • **dscp-exp** • **dscp-mutation** • **exp-dscp** • **exp-mutation** • **ip-prec-dscp** • **policed-dscp**
Step 6	**show mls qos queue-set** **Example:** `Device# show mls qos queue-set`	Displays QoS settings for the egress queues.
Step 7	**show mls qos interface queuing** **Example:** `Device# show mls qos interface [interface-type-number] queuing`	Displays the queuing statistics of an interface.
Step 8	**show platform port-asic stats drop statistics** **Example:** `Device# show platform port-asic stats drop [interface-type-number] statistics`	Displays platform-dependent port application-specific integrated circuit (ASIC) register information.
Step 9	**show mls qos aggregate-policer** **Example:** `Device# show mls qos aggregate-policer`	Displays information about the aggregate policer for MLS QoS.

Verifying QoS Configuration on a Cisco Catalyst 3850 Series Switch

Use the following commands to verify the QoS configuration on a Cisco Catalyst 3850 Series Switch:

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show running-config class-map** **Example:** `Device# show running-config class-map [class-map-name]`	Displays class map information.
Step 3	**show running-config policy-map** **Example:** `Device# show running-config policy-map [policy-map-name]`	Displays the policy-map configuration.
Step 4	**show table-map** **Example:** `Device# show table-map [table-map-name]`	Displays the configuration of a specified table map or all table maps.
Step 5	**show policy-map interface** **Example:** `Device# show policy-map interface [interface-type-number]`	Displays the statistics and the configurations of the input and output policies that are attached to an interface.
Step 6	**show platform software fed switch 1 qos policy target status** **Example:** `Device# show platform software fed switch 1 qos policy target status`	Displays information about QoS policy status. **Note** fed = Forwarding Engine Driver
Step 7	**show platform hardware fed switch 1 qos queue configuration interface type** **Example:** `Device# show platform hardware fed switch 1 qos queue configuration interface gigabitEthernet 1/0/1`	Displays the port queue configuration information.
Step 8	**show platform hardware fed switch 1 qos queue stats interface type** **Example:** `Device# show platform hardware fed switch 1 qos queue stats interface gigabitEthernet 1/0/1`	Displays the port queue statistics.

Enabling DSCP Transparency Mode

Perform this task to enable DSCP transparency mode on a Cisco Catalyst 3850 Series Switch:

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**qos rewrite ip dscp** **Example:** `Device(config)# qos rewrite ip dscp`	Enables QoS globally.
Step 4	**no qos rewrite ip dscp** **Example:** `Device(config)# no qos rewrite ip dscp`	Enables DSCP transparency. • The switch is configured to not modify the DSCP field of the IP packet.
Step 5	**end** **Example:** `Device(config)# end`	Exits the global configuration and returns to privileged EXEC mode.

Examples for QoS Monitoring

Example: Displaying Port Queue Statistics

Caution The show commands used in this document are for troubleshooting purposes. Use the commands with caution.

The show platform commands are typically reserved for Cisco TAC personnel and are subject to change without notice.

The following sample output from the **show platform hardware fed switch 1 qos queue statistics interface gigabitethernet** command displays the port queue statistics:

```
Device# show platform hardware fed switch 1 qos queue stats interface gigabitEthernet 1/0/1

DATA Port:21 Enqueue Counters
-------------------------------
Queue Buffers Enqueue-TH0 Enqueue-TH1 Enqueue-TH2
----- ------- ----------- ----------- -----------
```

```
    0       0           0           0           0
    1       0           0           0      194328
    2       0           0           0           0
    3       0           0           0           0
    4       0           0           0           0
    5       0           0           0           0
    6       0           0           0           0
    7       0           0           0           0
DATA Port:21 Drop Counters
------------------------------
Queue Drop-TH0    Drop-TH1    Drop-TH2    SBufDrop    QebDrop
----- ----------- ----------- ----------- ----------- -----------
    0           0           0           0           0           0
    1           0           0           0           0           0
    2           0           0           0           0           0
    3           0           0           0           0           0
    4           0           0           0           0           0
    5           0           0           0           0           0
    6           0           0           0           0           0
    7           0           0           0           0           0
AQM Broadcast Early WTD COUNTERS(In terms of Bytes)
-------------------------------------------------
  PORT TYPE          ENQUEUE              DROP
-------------------------------------------------
UPLINK PORT-0        N/A                 0
UPLINK PORT-1        N/A                 0
UPLINK PORT-2        N/A                 0
UPLINK PORT-3        N/A                 0
NETWORK PORTS           0                   0
RCP PORTS               0                   0
CPU PORT                0                   0
```

Note The queuing statistics are in bytes.

Table 4: Field description

Drop-TH0	Refers to packet drop due to crossing Threshold0
Drop-TH1	Refers to packet drop due to crossing Threshold1
Drop-TH2	Refers to packet drop due to crossing Threshold2

Example: Displaying Target Port Type

Caution The show platform commands are typically reserved for Cisco TAC personnel and are subject to change without notice.

The following sample output from the **show platform software fed switch 1 qos policy target status** command displays the target port type:

```
Device# show platform software fed switch 1 qos policy target status

TCG status summary:

Loc Interface IIF-ID Dir State:(cfg,opr) Policy
--- -------------------- ---------------- --- --------------- --------------------
L:0 GigabitEthernet1/0/1 0x00000000000008 OUT VALID,SET_INHW police
```

Example: Displaying Queue Configuration

Caution The show platform commands are typically reserved for Cisco TAC personnel and are subject to change without notice.

Note The **show platform hardware fed switch 1 qos queue configuration interface** command displays the differences in buffers and threshold settings. The values may not be representative of customer scenarios.

The following sample output from the **show platform hardware fed switch 1 qos queue configuration interface** command displays the queue configuration information:

```
Device# show platform hardware fed switch 1 qos queue configuration interface gigabitEthernet1/0/1

DATA Port:21 GPN:1 AFD:Disabled QoSMap:0 HW Queues: 168 - 175
DrainFast:Disabled PortSoftStart:1 - 1080
------------------------------------------------------------
DTS  Hardmax  Softmax PortSMin GlblSMin PortStEnd
--- -------- -------- -------- --------- ---------
0 1  5    120 6   480 6    320 0   0    3   1440
1 1  4    0   7   720 3    480 2   180  3   1440
2 1  4    0   5   0   5    0   0   0    3   1440
3 1  4    0   5   0   5    0   0   0    3   1440
4 1  4    0   5   0   5    0   0   0    3   1440
5 1  4    0   5   0   5    0   0   0    3   1440
6 1  4    0   5   0   5    0   0   0    3   1440
7 1  4    0   5   0   5    0   0   0    3   1440
Priority Shaped/shared weight shaping_step
-------- ------------ ------ ------------
0       0  Shared        50      0
1       0  Shared        75      0
2       0  Shared        10000   24
3       0  Shared        10000   255
4       0  Shared        10000   96
5       0  Shared        10000   255
6       0  Shared        10000   0
7       0  Shared        10000   0

Weight0 Max_Th0 Min_Th0 Weigth1 Max_Th1  Min_Th1 Weight2 Max_Th2 Min_Th2
------- ------- ------ ------    ------  ------  ------ ------   ------
0      0      478       0      0         534        0        0      600      0
1      0      573       0      0         641        0        0      720      0
2      0      0         0      0         0          0        0      0        0
3      0      0         0      0         0          0        0      0        0
4      0      0         0      0         0          0        0      0        0
5      0      0         0      0         0          0        0      0        0
6      0      0         0      0         0          0        0      0        0
7      0      0         0      0         0          0        0      0        0
```

Example: Displaying Port-Shaper Information

Use the following commands to display the port-shaper information:

```
Device# show running-config class-map class_dscp

class-map match-any class_dscp
match dscp af11

Device# show running-config class-map dscp2

class-map match-any dscp2
```

```
match dscp af12

Device# show running-config policy-map child

policy-map child
class class_dscp
  bandwidth percent 25
 class dscp2
  bandwidth percent 25

Device# show running-config policy-map port_shaper

policy-map port_shaper
class class-default
  shape average percent 40
   service-policy child

Device# show running-config interface gigabitEthernet1/0/1

interface GigabitEthernet1/0/1
service-policy output port_shaper

Device# show policy-map interface gigbitEthernet1/0/1

GigabitEthernet1/0/1

  Service-policy output: port_shaper

    Class-map: class-default (match-any)
      10 packets
      Match: any
      Queueing

      (total drops) 0
      (bytes output) 350
      shape (average) cir 400000000, bc 4000000, be 4000000
      target shape rate 400000000

      Service-policy : child
        Class-map: class_dscp (match-any)
          0 packets
          Match:  dscp af11 (10)
            0 packets, 0 bytes
            5 minute rate 0 bps
          Queueing

          (total drops) 0
          (bytes output) 0
          bandwidth 25% (100000 kbps)

        Class-map: dscp2 (match-any)
          0 packets
          Match:  dscp af12 (12)
            0 packets, 0 bytes
            5 minute rate 0 bps
          Queueing

          (total drops) 0
          (bytes output) 0
          bandwidth 25% (100000 kbps)

        Class-map: class-default (match-any)
          10 packets
          Match: any

          (total drops) 0
          (bytes output) 350
```

Example: Disabling QoS

Cisco Catalyst 3750 Series Switch (Global Configuration)	Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch
No MLS QoS	Two queues: • Control packets in queue 2 • Data packets in queue 4	No policy is installed on an egress interface. Control packets in queue 0 and data packets in queue 1

Disabling QoS-Cisco Catalyst 3750 Series Switch

```
Device# show mls qos

QoS is disabled
QoS ip packet dscp rewrite is enabled

Device# show mls qos interface gigabitEthernet 1/0/1 statistics

output queues enqueued:

 queue:    threshold1   threshold2   threshold3
-----------------------------------------------
 queue 0:           4            0            0
 queue 1:           0            0            0 <- control
 queue 2:           0            0            0
 queue 3:           0            0            0 <- data

output queues dropped:
 queue:    threshold1   threshold2   threshold3
-----------------------------------------------
 queue 0:           0            0            0
 queue 1:           0            0            0  <- control
 queue 2:           0            0            0
 queue 3:           0            0            0  <- data

Policer: Inprofile:            0 OutofProfile:
```

Disabling QoS-Cisco Catalyst 3850 Series Switch

Caution The show platform commands are typically reserved for Cisco TAC personnel and are subject to change without notice.

```
Device# show running-config interface gigabitEthernet1/0/1

Device# show platform hardware fed switch 1 qos queue stats interface gigabitEthernet 1/0/1

DATA Port:21 GPN:1 AFD:Disabled QoSMap:0 HW Queues: 168 - 175
  DrainFast:Disabled PortSoftStart:1 - 600
------------------------------------------------------------
  DTS Hardmax   Softmax  PortSMin GlblSMin  PortStEnd
  --- --------  -------- -------- --------- ---------
 0   1  5   120  6   480  0     0   0     0   0   800 <- control
 1   1  4     0  7   720  2   480   2   180   2   800 <- data
 2   1  4     0  5     0  0     0   0     0   0   800
 3   1  4     0  5     0  0     0   0     0   0   800
 4   1  4     0  5     0  0     0   0     0   0   800
 5   1  4     0  5     0  0     0   0     0   0   800
 6   1  4     0  5     0  0     0   0     0   0   800
```

```
 7   1  4     0  5     0  0     0   0     0   0   800

Priority   Shaped/shared   weight  shaping_step
 --------   ------------   ------  ------------
 0       0     Shared            50           0
 1       0     Shared            75           0
 2       0     Shared         10000         179
 3       0     Shared         10000           0
 4       0     Shared         10000           0
 5       0     Shared         10000           0
 6       0     Shared         10000         192
 7       0     Shared         10000           0

   Weight0 Max_Th0 Min_Th0 Weigth1 Max_Th1 Min_Th1 Weight2 Max_Th2 Min_Th2
   ------- -------  ------  ------  ------  ------  ------  ------ ------
 0       0     478       0       0     534       0       0     600       0
 1       0     573       0       0     641       0       0     720       0
 2       0       0       0       0       0       0       0       0       0
 3       0       0       0       0       0       0       0       0       0
 4       0       0       0       0       0       0       0       0       0
 5       0       0       0       0       0       0       0       0       0
 6       0       0       0       0       0       0       0       0       0
 7       0       0       0       0       0       0       0       0       0
```

Example: Enabling Trust CoS

Cisco Catalyst 3750 Series Switch (Global Configuration)	Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch
MLS QoS	MLS QoS trusts CoS interface (based on the default CoS-mapping to the queue-set 1)	Egress queuing policy based on CoS (ingress needs configuration trust CoS)

Enabling Trust CoS-Cisco Catalyst 3750 Series Switch

```
Global config:
Device(config)# mls qos

Interface config:
Device# interface GigabitEthernet1/0/1
Device(config-if)# mls qos trust cos

Device# show mls qos

QoS is enabled
QoS ip packet dscp rewrite is enabled

Device# show mls qos interface gigabitEthernet1/0/1

GigabitEthernet1/0/1
trust state: trust cos
trust mode: trust cos
trust enabled flag: ena
COS override: dis
default COS: 0
DSCP Mutation Map: Default DSCP Mutation Map
Trust device: none
qos mode: port-based

Device# show mls qos maps cos-output-q

Cos-outputq-threshold map:
cos:              0   1   2   3   4   6     7
------------------------------------------------------------
queue-threshold: 2-1 2-1 3-1 3-1 4-1 1-1 4-1 4-1
```

```
Note: cos value 0 maps to 2-1 [queue-set1 : queue2 threshold 1]
```

Enabling Trust CoS-Cisco Catalyst 3850 Series Switches

```
Ingress: apply policy-map trust-cos
Egress: create class based on cos and have queuing action for each class

Interface configuration:
Device(config)# interface GigabiEthernet1/0/1
Device(config-if)# service-policy input <policy-name>

Ingress policy:
Device# show running-config policy-map trust-cos

class class-default
   set cos cos table default

Device# show table-map default

 Table Map default
    default copy

Egress policy:
Device# show running-config policy-map example2

class cos5
    bandwidth percent 15
 class cos0_1
    bandwidth percent 25
 class cos2_3
    bandwidth percent 40
 class cos4_6_7
    bandwidth percent 20

Device# show running-config class-map cos5

class-map match-any cos5
  match cos  5

Device# show running-config class-map cos0_1

class-map match-any cos0_1
  match cos  0
  match cos  1

Device# show running-config class-map cos2_3

class-map match-any cos2_3
  match cos  2
  match cos  3

Device# show running-config class-map cos4_6_7

class-map match-any cos4_6_7
  match cos  4
  match cos  6
  match cos  7
```

Example: Enabling Trust DSCP

Cisco Catalyst 3750 Series Switch (Global Configuration)	Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch

MLS QoS	MLS QoS trust Differentiated Services Code Point (DSCP) interface (based on the default DSCP-mapping to the queue-set 1)	• Input default trusts DSCP • Egress queuing policy based on DSCP

Enabling Trust DSCP-Cisco Catalyst 3750 Series Switch

```
Device# configure terminal
Device(config)# mls qos
Device(config-if)# interface GigabitEthernet1/0/1
Device(config-if)# mls qos trust dscp

Device# show mls qos interface gigabitEthernet 1/0/1

GigabitEthernet1/0/1
trust state: trust dscp
trust mode: trust dscp
trust enabled flag: ena
COS override: dis
default COS: 0
DSCP Mutation Map: Default DSCP Mutation Map
Trust device: none
qos mode: port-based

Device# show mls qos maps dscp-output-q

Dscp-outputq-threshold map:
d1 :d2 0    1     2     3     4     5     6     7     8     9
------------------------------------------------------------
0 : 02-01 02-01 02-01 02-01 02-01 02-01 02-01 02-01 02-01 02-01
1 : 02-01 02-01 02-01 02-01 02-01 02-01 03-01 03-01 03-01 03-01
2 : 03-01 03-01 03-01 03-01 03-01 03-01 03-01 03-01 03-01 03-01
3 : 03-01 03-01 04-01 04-01 04-01 04-01 04-01 04-01 04-01 04-01
4 : 01-01 01-01 01-01 01-01 01-01 01-01 01-01 01-01 04-01 04-01
5 : 04-01 04-01 04-01 04-01 04-01 04-01 04-01 04-01 04-01 04-01
6 : 04-01 04-01 04-01 04-01
```

Enabling Trust DSCP-Cisco Catalyst 3850 Series Switch

Note Ingress: Default trust DSCP, no policy needed.

Egress: Use DSCP as classification and add queuing action based on customer need.

```
One Sample config:
Policy-map:
Device# show running-config policy-map dscp-shape

class dscp56
    shape average percent 10
 class dscp48
    shape average percent 11
 class dscp40
    shape average percent 12
 class dscp32
    shape average percent 13
Class-map:

Device# show running-config class-map dscp56

class-map match-any dscp56
  match  dscp cs7
```

```
Device# show running-config class-map dscp48

class-map match-any dscp48
  match  dscp cs6

Device# show running-config class-map dscp40

class-map match-any dscp40
  match  dscp cs5

Device# show running-config class-map dscp32

class-map match-any dscp32
  match  dscp cs4
```

Example: Enabling QoS on an Interface that has a set Policy

Cisco Catalyst 3750 Series Switch (Global Configuration)	Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch
MLS QoS	Interface input policy with set action to mark the CoS or DSCP value or both. (Marked value will be used for egress mapping)	Need explicit egress policy to do queuing mapping.

Enabling QoS on an Interface that has a set Policy-Cisco Catalyst 3750 Series Switch

```
Device# show running-config class-map dscp-1

class-map match-any dscp-1
match ip dscp 1

Device# show running-config policy-map set-dscp-63

class dscp-1
set dscp 63

Device# show running-config interface fastEthernet7/0/2

interface FastEthernet7/0/2
  mls qos trust dscp
  service-policy input set-dscp-63

Device# show policy-map int fastEthernet7/0/2

FastEthernet7/0/2

Service-policy input: set-dscp-63

Class-map: dscp-1 (match-any)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: ip dscp 1

Class-map: class-default (match-any)
0 packets, 0 bytes
5 minute offered rate 0 bps, drop rate 0 bps
Match: any
0 packets, 0 bytes
5 minute rate 0 bps

Note: Packets come in interface fa7/0/2, dscp1 will be marked to dscp63 which mapping
```

```
based on the existing mapping table, other pkts will retain original dscp value
mapping accordingly
```

Enabling QoS on an Interface that has a set Policy-Cisco Catalyst 3850 Series Switch

Note Input will be the same as Cisco Catalyst 3750 configuration. For the egress interface, queuing action is added under class dscp-63.

```
Device# show running-config class-map dscp-1

class-map match-any dscp-1
match ip dscp 1

Device# show running-config policy-map set-dscp-63

policy-map set-dscp-63
class dscp-1
  set dscp 63

Device# show running-config interface gigabitEthernet1/0/2

interface GigabitEthernet1/0/2
service-policy input set-dscp-63

Device# show policy-map interface gigabitEthernet1/0/2

 GigabitEthernet1/0/2

  Service-policy input: set-dscp-63

    Class-map: dscp-1 (match-any)
      0 packets
      Match: ip dscp 1
        0 packets, 0 bytes
        5 minute rate 0 bps
      QoS Set
        dscp 63

    Class-map: class-default (match-any)
      0 packets
      Match: any
```

Example: Enabling No MLS QoS Trust on an Interface

Cisco Catalyst 3750 Series Switch (Global Configuration)	Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch
MLS QoS	• Interface does not configure MLS QoS trust CoS or DSCP. • CoS or DSCP will be set to 0.	• Interface input policy with class-default. • Set DSCP 0, output policy with class DSCP 0 with queuing action.

Enabling No MLS QoS Trust on an Interface-Cisco Catalyst 3750 Series Switch

```
Global:
Device(config)# mls qos

Interface:
interface GigabitEthernet2/0/45
!
```

Enabling No MLS QoS Trust on an Interface-Cisco Catalyst 3850 Series Switch

```
Input policy:
Device# show running-config policy-map example5-input

class class-default
   set dscp default

Output policy:
Device# show running-config policy-map example5-output

class dscp0
    shape average percent 10 <- queuing action based on customer need

Attach to the ingress port:
Device# show running-config interface gigabitEthernet1/0/1

interface GigabitEthernet1/0/1
 service-policy input example5-input

Attach to the egress port:
Device# show running-config interface gigabitEthernet1/0/2

interface GigabitEthernet1/0/2
 service-policy output example5-output
```

Example: Enabling Change CoS or DSCP Queue Mapping

Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch
MLS QoS trust CoS, MLS QoS trust DSCP, Input policy with set action to mark the DSCP value, and No MLS QoS trust config [both CoS/DSCP will be set zero] will use the new mapping table. (CoS 4 and 5 will be mapped to queue 1 threshold 3) **Note** SRR = Shaped Round Robin	Egress explicit classification with queuing action.

Enabling Change CoS or DSCP Queue Mapping-Cisco Catalyst 3750 Series Switch

```
Device(config)# mls qos srr-queue mapping configuration
Device(config)# mls qos srr-queue output [CoS-map] queue [1] threshold [3] [4 5]

Before Enabling Change CoS or DSCP Queue Mapping:
Device# show mls qos maps cos-output-q

Cos-outputq-threshold map:
cos:              0   1   2   3   4   5   6   7
------------------------------------------------
queue-threshold: 2-1 2-1 3-1 3-1 4-1 1-1 4-1 4-1

User configuration mapping:
```

```
Device(config)# mls qos srr-queue output cos-map queue 3 threshold 3 0

New mapping table after configuration:
Device# show mls qos maps cos-output-q

Cos-outputq-threshold map:
cos:              0   1   2   3   4   5   6   7
------------------------------------------------
queue-threshold: 3-3 2-1 3-1 3-1 4-1 1-1 4-1 4-1
```

Enabling Change CoS or DSCP Queue Mapping-Cisco Catalyst 3850 Series Switch

```
Input : need apply trust-cos policy:
Device# show running-config policy-map trust-cos

class class-default
   set cos cos table default

Device# show table-map default
 Table Map default
    default copy

Egress policy:

Before changing mapping:
Sample config:
Device# show running-config policy-map example2

class cos5
    bandwidth percent 15
 class cos0_1
    bandwidth percent 25
 class cos2_3
    bandwidth percent 40
 class cos4_6_7
    bandwidth percent 20

Device# show running-config class-map cos5

class-map match-any cos5
  match cos  5

Device# show running-config class-map cos0_1

class-map match-any cos0_1
  match cos  0
  match cos  1

Device# show running-config class-map cos2_3

class-map match-any cos2_3
  match cos  2
  match cos  3

Device# show running-config class-map cos4_6_7

!
class-map match-any cos4_6_7
  match cos  4
  match cos  6
  match cos  7

After mapping changing, corresponding sample configuration:

Device# show running-config policy-map example6

class cos5
    bandwidth percent 15
 class cos1
    bandwidth percent 25
 class cos0_2_3
    bandwidth percent 40
```

```
 class cos4_6_7
    bandwidth percent 20

Device# show class-map cos5

 Class Map match-any cos5 (id 25)
   Match cos  5

Device# show running-config class-map cos1

class-map match-any cos1
  match cos  1

Device# show running-config class-map cos0_2_3

class-map match-any cos0_2_3
  match cos  0
  match cos  2
  match cos  3

Device# show running-config class-map cos4_6_7

class-map match-any cos4_6_7
  match cos  4
  match cos  6
  match cos  7

Device# show policy-map interface gigabitEthernet1/0/1
```

Example: Enabling MLS with DSCP Mutation

Cisco Catalyst 3750 Series Switch (Global Configuration)	Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch
MLS QoS DSCP Mutation	• Interface needs MLS QoS trust DSCP configuration. • MLS QoS DSCP-mutation name (name is defined in global).	Interface input policy with table-map mapping different DSCP

Enabling MLS with DSCP Mutation-Cisco Catalyst 3750 Series Switch

```
Device(config)# mls qos map dscp-mutation map-name input-dscp1 [ input-dscp2 [ input-dscp3 [ i nput-dscp4 [
input-dscp5 [input-dscp6 [input-dscp7 [input-dscp8] ] ] ] ] ] to output-dscp
Device(config)# mls qos map dscp-mutation dscp-mutation 0 1 to 63
Device(config)# mls qos map dscp-mutation dscp-mutation 2 3 to 62


Device# show mls qos maps dscp-mutation

Dscp-dscp mutation map:
dscp-mutation:
d1 : d2 0 1 2 3 4 5 6 7 8 9
----------------------------------------
0 : 63 63 62 62 04 05 06 07 08 09
1 : 10 11 12 13 14 15 16 17 18 19
2 : 20 21 22 23 24 25 26 27 28 29
3 : 30 31 32 33 34 35 36 37 38 39
4 : 40 41 42 43 44 45 46 47 48 49
5 : 50 51 52 53 54 55 56 57 58 59
```

```
6 : 60 61 62 63

Dscp-dscp mutation map:
Default DSCP Mutation Map:
d1 : d2 0 1 2 3 4 5 6 7 8 9
---------------------------------------
0 : 00 01 02 03 04 05 06 07 08 09
1 : 10 11 12 13 14 15 16 17 18 19
2 : 20 21 22 23 24 25 26 27 28 29
3 : 30 31 32 33 34 35 36 37 38 39
4 : 40 41 42 43 44 45 46 47 48 49
5 : 50 51 52 53 54 55 56 57 58 59
6 : 60 61 62 63

Interface config:

interface FastEthernet7/0/3
 description trust dscp
 mls qos trust dscp
 mls qos dscp-mutation dscp-mutation

Device# show mls qos interface fastEthernet7/0/3

FastEthernet7/0/3
trust state: trust dscp
trust mode: trust dscp
trust enabled flag: ena
COS override: dis
default COS: 0
DSCP Mutation Map: dscp-mutation
Trust device: none
qos mode: port-based

Interface using default dscp-table:

Device# show mls qos interface gigabitEthernet3/0/1

GigabitEthernet3/0/1
trust state: not trusted
trust mode: not trusted
trust enabled flag: ena
COS override: dis
default COS: 0
DSCP Mutation Map: Default DSCP Mutation Map
Trust device: none
qos mode: port-based
```

Note d1 and d2 are combined to form the 1st and 2nd digit in the original DSCP value and that they intersect at the marked down DSCP value.

Enabling MLS with DSCP Mutation-Cisco Catalyst 3850 Series Switch

Note

- Ingress : Apply policy with DSCP table-map
- Egress: Classify on new DSCP value with queuing action

```
Ingress:
Device# show table-map dscp-2-dscp
 Table Map dscp-2-dscp
 from 0 to 63
 from 1 to 63
 from 2 to 62
```

```
 from 3 to 62
 default copy

Device# show running-config policy-map example7-input
class class-default
 set dscp dscp table dscp-2-dscp

Egress:
Device# show running-config policy-map example7-output

class dscp63
 shape average percent 20 [queuing action based on the user need]
 class dscp62
 shape average percent 30 [queuing action based on user need]
```

Example: Enabling Aggregate Policing

Cisco Catalyst 3750 Series Switch (Global Configuration)	Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch
MLS QoS aggregate policing. (All classes using the aggregate-policing will share the policing rate.)	Needs interface level configuration.	Cisco Catalyst 3850 Series Switch does not support named aggregate policers. However, aggregate policing can be achieved using a hierarchical policy as described in the example described below.
mls QoS aggregate-policeragg_traffic 8000 8000 exceed-action drop	Interface having policy which has agg_traffic as aggregate policer name.	

Enabling Aggregate Policing-Cisco Catalyst 3750 Series Switch

```
Global:
mls qos aggregate-policer agg_traffic 8000 8000 exceed-action drop

Access-list:
access-list 1 permit 192.168.0.0 0.0.0.255
access-list 2 permit 10.0.0.0 0.0.0.255

Class-map:
class-map match-all agg1
 match access-group 1
class-map match-all agg2
 match access-group 2

Policy-map:
policy-map agg_policer
 class agg1
 set dscp 40
 police aggregate agg_traffic
 class agg2
 set dscp 55
 police aggregate agg_traffic

Note: class agg1 and agg2 will share the same policing rate

Device# show mls qos aggregate-policer
aggregate-policer agg_traffic 8000 8000 exceed-action drop

Device# show mls qos interface gigabitEthernet 1/0/2 policers
GigabitEthernet1/0/2
policymap=agg_policer
```

```
type=Shared, id=1 name=agg_traffic

Device# show mls qos interface gigabitEthernet 1/0/2 statistics
GigabitEthernet1/0/2 (All statistics are in packets)

  dscp: incoming
-------------------------------

  0 -  4 :           5            0            0            0            0
  5 -  9 :           0            0            0            0            0
 10 - 14 :           0            0            0            0            0
 15 - 19 :           0            0            0            0            0
 20 - 24 :           0            0            0            0            0
 25 - 29 :           0            0            0            0            0
 30 - 34 :           0            0            0            0            0
 35 - 39 :           0            0            0            0            0
 40 - 44 :           0            0            0            0            0
 45 - 49 :           0            0            0           91            0
 50 - 54 :           0            0            0            0            0
 55 - 59 :           0            0            0            0            0
 60 - 64 :           0            0            0            0
  dscp: outgoing
-------------------------------

  0 -  4 :           5            0            0            0            0
  5 -  9 :           0            0            0            0            0
 10 - 14 :           0            0            0            0            0
 15 - 19 :           0            0            0            0            0
 20 - 24 :           0            0            0            0            0
 25 - 29 :           0            0            0            0            0
 30 - 34 :           0            0            0            0            0
 35 - 39 :           0            0            0            0            0
 40 - 44 :           0            0            0            0            0
 45 - 49 :           0            0            0           91            0
 50 - 54 :           0            0            0            0            0
 55 - 59 :           0            0            0            0            0
 60 - 64 :           0            0            0            0
  cos: incoming
-------------------------------

  0 -  4 :         226            0            0            0            0
  5 -  7 :           0            0            0
  cos: outgoing
-------------------------------

  0 -  4 :           8            0            0            0            0
  5 -  7 :           0           91          127
  output queues enqueued:
 queue:    threshold1   threshold2   threshold3
-----------------------------------------------
 queue 0:           2            0            0
 queue 1:           0            6          218
 queue 2:           0            0            0
 queue 3:           0            0            0

  output queues dropped:
 queue:    threshold1   threshold2   threshold3
-----------------------------------------------
 queue 0:           0            0            0
 queue 1:           0            0            0
 queue 2:           0            0            0
 queue 3:           0            0            0

Policer: Inprofile:           11 OutofProfile:            0
```

Enabling Aggregate Policing-Cisco Catalyst 3850 Series Switch

```
Device# show running-config class-map dscp1

class-map match-any dscp1
```

```
match dscp af11

Device# show running-config class-map dscp2

class-map match-any dscp2
match dscp af12

Device# show running-config policy-map child

policy-map child
class dscp1
  set cos 5
class dscp2
  set cos 7
class class-default
  set precedence 6

Device# show running-config class-map vlan18

class-map match-any vlan18
match vlan 18


Device# show running-config policy-map agg_policing

policy-map agg_policing
class vlan18
  police rate percent 50
   service-policy child
class class-default


Device# show running-config interface gigabiEthernet1/0/1

interface GigabitEthernet1/0/1
service-policy input agg_policing

Device# show policy-map interface gigabitEthernet1/0/1

GigabitEthernet1/0/1

  Service-policy input: agg_policing
    Class-map: vlan18 (match-any)
      0 packets
      Match: vlan  18
        0 packets, 0 bytes
        5 minute rate 0 bps
      police:
          rate 50 %
          rate 500000000 bps, burst 15625000 bytes
        conformed 0 bytes; actions:
          transmit
        exceeded 0 bytes; actions:
          drop
        conformed 0000 bps, exceeded 0000 bps

      Service-policy : child
        Class-map: dscp1 (match-any)
          0 packets
          Match:  dscp af11 (10)
            0 packets, 0 bytes
            5 minute rate 0 bps
          QoS Set
            cos 5

        Class-map: dscp2 (match-any)
          0 packets
          Match:  dscp af12 (12)
            0 packets, 0 bytes
            5 minute rate 0 bps
          QoS Set
            cos 7
```

Example: Enabling Policing Remark

Cisco Catalyst 3750 Series Switch (Global Configuration)	Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch
MLS QoS map policed-DSCP x-to-y	If the interface has a policing policy, exceed is transmit, the global CLI will take effect (input only).	One table-map for exceed and one for violate action of policing, input, and output. **Note** Only one table-map for exceed and one table-map for violate police action is supported in the system regardless of the direction.

Enabling Policing Remark-Cisco Catalyst 3750 Series Switch

```
Default policed-dscp map:
Device# show mls qos map policed-dscp

Policed-dscp map:
d1 : d2 0 1 2 3 4 5 6 7 8 9
----------------------------------------
0 : 00 01 02 03 04 05 06 07 08 09
1 : 10 11 12 13 14 15 16 17 18 19
2 : 20 21 22 23 24 25 26 27 28 29
3 : 30 31 32 33 34 35 36 37 38 39
4 : 40 41 42 43 44 45 46 47 48 49
5 : 50 51 52 53 54 55 56 57 58 59
6 : 60 61 62 63

User define policed-dscp map:
Device(config)# mls qos map policed-dscp dscp1 [ dscp2 [ dscp3 [ dscp4 [ dscp5 [ dscp6 [ dscp7 [dscp8] ] ] ]
] ] ] to policed-dscp

Device(config)# mls qos map policed-dscp 0 10 18 24 46 to 8
Device(config)# exit
Device# show mls qos map policed-dscp

Policed-dscp map:
d1 : d2 0 1 2 3 4 5 6 7 8 9
----------------------------------------
0 : 08 01 02 03 04 05 06 07 08 09
1 : 08 11 12 13 14 15 16 17 08 19
2 : 20 21 22 23 08 25 26 27 28 29
3 : 30 31 32 33 34 35 36 37 38 39
4 : 40 41 42 43 44 45 08 47 48 49
5 : 50 51 52 53 54 55 56 57 58 59
6 : 60 61 62 63

Policy config:
class-map match-all policed-dscp
match access-group 2
class policed-dscp
police 8000 8000 exceed-action policed-dscp-transmit

Attach the above policy at ingress:

Note : Remark table can be used by policing and interface policing
as  long as exceed action is transmit
```

Note d1 and d2 are combined to form the 1st and 2nd digit in the original DSCP value and that they intersect at the marked down DSCP value.

Enabling Policing Remark-Cisco Catalyst 3850 Series Switch

```
Device(config)# table-map policed-dscp
Device(config-tablemap)# map from 0 to 8
Device(config-tablemap)# map from 10 to 8
Device(config-tablemap)# map from 18 to 8
Device(config-tablemap)# map from 24 to 8
Device(config-tablemap)# map from 46 to 8
Device(config-tablemap)# end
Device# show table-map policed-dscp

Table Map policed-dscp
    from 0 to 8
    from 10 to 8
    from 18 to 8
    from 24 to 8
    from 46 to 8
    default copy

Device# show policy-map policed-dscp

  Policy Map policed-dscp
    Class class-default
     police cir percent 10
       conform-action transmit
       exceed-action set-dscp-transmit dscp table policed-dscp
```

Note Cisco Catalyst 3850 Series Switch does not support remark statistics

Example: Enabling Queue-Limit Configuration

Cisco Catalyst 3750 Series Switch (Global Configuration)	Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch
MLS QoS queue-set output 1 threshold 1100 100 50 200 (queue-limit) [1 ->queue-set 1, 1->first queue, 100 ->threshold 1, 100 ->threshold 2, 50 -> reserved buffer, 200 -> max threshold,	Interface configuration queue-set (Default is queue-set 1)	Egress queuing policy with queuing action and queue-limit configuration.

Enabling Queue Limit Configuration-Cisco Catalyst 3750 Series Switch

```
Global config:

mls qos srr-queue output cos-map queue queue-id { cos1...cos8 | threshold threshold-id cos1...cos8 }
mls qos srr-queue output cos-map queue 2 threshold 1 2
mls qos srr-queue output cos-map queue 2 threshold 2 3
mls qos srr-queue output cos-map queue 2 threshold 3 6 7


Device> show mls qos interface [interface-id] [buffers | queueing | statistics] [ | {begin | exclude | include}
 expression]
Device> show mls qos interface gigabitethernet1/0/2 statistics

GigabitEthernet1/0/2
   dscp: incoming
 -------------------------------
   0 -  4 :      4213          0          0          0          0
   5 -  9 :         0          0          0          0          0
  10 - 14 :         0          0          0          0          0
  15 - 19 :         0          0          0          0          0
  20 - 24 :         0          0          0          0          0
  25 - 29 :         0          0          0          0          0
  30 - 34 :         0          0          0          0          0
  35 - 39 :         0          0          0          0          0
  40 - 44 :         0          0          0          0          0
  45 - 49 :         0          0          0          6          0
  50 - 54 :         0          0          0          0          0
  55 - 59 :         0          0          0          0          0
  60 - 64 :         0          0          0          0
   dscp: outgoing
 -------------------------------
   0 -  4 :    363949          0          0          0          0
   5 -  9 :         0          0          0          0          0
  10 - 14 :         0          0          0          0          0
  15 - 19 :         0          0          0          0          0
  20 - 24 :         0          0          0          0          0
  25 - 29 :         0          0          0          0          0
  30 - 34 :         0          0          0          0          0
  35 - 39 :         0          0          0          0          0
  40 - 44 :         0          0          0          0          0
  45 - 49 :         0          0          0          0          0
  50 - 54 :         0          0          0          0          0
  55 - 59 :         0          0          0          0          0
  60 - 64 :         0          0          0          0
   cos: incoming
 -------------------------------
   0 -  4 :    132067          0          0          0          0
   5 -  9 :         0          0          0
   cos: outgoing
 -------------------------------
   0 -  4 :    739155          0          0          0          0
   5 -  9 :        90          0          0
 Policer: Inprofile:        0 OutofProfile:        0

If no interface config, the queue-set 1 will be used:
Device# show mls qos queue-set 1

Queueset: 1
Queue     :       1       2       3       4
----------------------------------------------
buffers   :      15      25      40      20
threshold1:     100     125     100      60
threshold2:     100     125     100     150
reserved  :      50     100     100      50
maximum   :     200     400     400     200

For interface config queue-set 2 explicitly:

Device# show mls qos queue-set 2

Queueset: 2
```

```
Queue     :       1       2       3       4
----------------------------------------------
buffers   :      25      25      25      25
threshold1:     100     200     100     100
threshold2:     100     200     100     100
reserved  :      50      50      50      50
maximum   :     400     400     400     400
```

show mls qos interface

Use the **show mls qos interface** user EXEC command to display quality of service (QoS) information at the port level.

Table 5: Syntax Description

interface-id	(Optional) Display QoS information for the specified port. Valid interfaces include physical ports.
buffers	(Optional) Display the buffer allocation among the queues.
queueing	(Optional) Display the queuing strategy (shared or shaped) and the weights corresponding to the queues.
statistics	(Optional) Display statistics for sent and received Differentiated Services Code Points (DSCPs) and class of service (CoS) values, the number of packets enqueued or dropped per egress queue, and the number of in-profile and out-of-profile packets for each policer.
| begin	(Optional) Display begins with the line that matches the expression.
| exclude	(Optional) Display excludes lines that match the expression.
| include	(Optional) Display includes lines that match the specified expression.
expression	Expression in the output to use as a reference point.

Note Though visible in the command-line help string, the **policer** keyword is not supported.

Enabling Queue Limit Configuration-Cisco Catalyst 3850 Series Switch

```
(multiple class with queue-limit turn on)
Device# show policy-map  q-limit

Policy Map q-limit
    Class users-class
      Queuing action ( shaper, bandwidth and bandwidth remaining)
      queue-limit cos  2 percent 50
      queue-limit cos  3 percent 50
      queue-limit cos  6 percent 70
      queue-limit cos  7 percent 70
```

```
Device# show policy-map interface gigbitEthernet1/0/1
```

Note The policy have to be applied to the interface to view the output of the **show policy-map interface** command.

Using the above configuration, cos 2 and cos 3 will be dropped earlier then cos 6 and 7.

Example: Enabling Queue-Buffer

Cisco Catalyst 3750 Series Switch (Global Configuration)	Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch
MLS QoS queue-set output [1] buffers (15 25 40 20)	Interface config queue-set (default queue-set 1)	Policy-map with queuing action and queue-buffers ratio (0-100)

Enabling Queue-Buffer-Cisco Catalyst 3750 Series Switch

```
Default queue-buffer:
Device# show mls qos queue-set 1

Queueset: 1
Queue     :       1       2       3       4
----------------------------------------------
buffers   :      25      25      25      25
threshold1:     100     200     100     100
threshold2:     100     200     100     100
reserved  :      50      50      50      50
maximum   :     400     400     400     400

User define queue-buffer:
mls qos queue-set output 1 buffers 15 25 40 20

Device# show mls qos queue-set 1

Queueset: 1
Queue     :       1       2       3       4
----------------------------------------------
buffers   :      15      25      40      20
threshold1:     100     125     100      60
threshold2:     100     125     100     150
reserved  :      50     100     100      50
maximum   :     200     400     400     200
```

Enabling Queue-Buffer-Cisco Catalyst 3850 Series Switch

```
Device# show policy-map  queue-buffer

Policy Map queue-buffer
    Class cos7
      bandwidth percent 10
      queue-buffers ratio 15
    Class cos1
      bandwidth percent 30
      queue-buffers ratio 25

class-map:
========
Device# show class-map cos7
 Class Map match-any cos7 (id 22)
```

```
   Match cos  7

Device# show class-map cos1
 Class Map match-any cos1 (id 28)

   Match cos  1

Attach to the interface at egress direction:
Device# show policy-map interface gigbitEthernet1/0/1
```

Example: Enabling Bandwidth

Cisco Catalyst 3750 Series Switch (Global Configuration)	Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch
MLS QoS (share mode)	• Interface level configuration • **srr-queue bandwidth share** *1 30 35 5*	Bandwidth in policy map

Enabling Bandwidth-Cisco Catalyst 3750 Series Switch

Default share and shape mode:

```
Device# show mls qos interface gigabitEthernet 1/0/1 queueing

GigabitEthernet1/0/1
Egress Priority Queue : disabled
Shaped queue weights (absolute) :  25 0 0 0
Shared queue weights  :  25 25 25 25
The port bandwidth limit : 100  (Operational Bandwidth:100.0)
The port is mapped to qset : 1

User config share mode under interface:
interface GigabitEthernet1/0/1
 srr-queue bandwidth share 40 30 20 10
 srr-queue bandwidth shape 0 0 0 0

Device# show mls qos interface gigabitEthernet1/0/1 queueing

GigabitEthernet1/0/1
Egress Priority Queue : disabled
Shaped queue weights (absolute) :  0 0 0 0
Shared queue weights  :  40 30 20 10
The port bandwidth limit : 100  (Operational Bandwidth:100.0)
The port is mapped to qset : 1
```

Enabling Bandwidth-Cisco Catalyst 3850 Series Switch

```
Device# show policy-map  bandwidth

 Policy Map bandwidth
    Class cos1
      bandwidth percent 40
    Class cos2
      bandwidth percent 30
    Class cos3
      bandwidth percent 20
    Class class-default
      bandwidth percent 10
```

```
Device# show class-map cos1

 Class Map match-any cos1

   Match cos  1

Device# show class-map cos2

 Class Map match-any cos2

   Match cos  2

Device# show class-map cos3

 Class Map match-any cos3 (id 26)

   Match cos  3

Device# show class-map cos4

 Class Map match-any cos4 (id 25)

   Match cos  4
```

Example: Enabling Priority

Cisco Catalyst 3750 Series Switch (Global Configuration)	Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch
MLS QoS (expedite queue) **Note** Expedite queue is same as priority queue.	Interface level configuration priority-queue out (make the first queue of the corresponding queue-set as the strict priority queue.)	Priority level 1 in the policy map.

Verifying Priority-Cisco Catalyst 3750 Series Switch

```
interface GigabitEthernet1/0/2
 priority-queue out
 end

Device# show mls qos interface gigabitEthernet1/0/2 queueing

GigabitEthernet1/0/2
Egress Priority Queue : enabled
Shaped queue weights (absolute) :  25 0 0 0
Shared queue weights  :  25 25 25 25
The port bandwidth limit : 100  (Operational Bandwidth:100.0)
The port is mapped to qset : 1
```

MQC Enable with Priority - Cisco Catalyst 3850 Series Switch

```
Device# show run policy-map priority-queue

class cos7
    priority level 1 strict priority
 class cos1
    shape average percent 10
Attach the above policy to interface at egress side:
```

Example: Enabling QoS Shaper

Enabling QoS Shaper-Cisco Catalyst 3750 Series Switch

```
Default shape mode:
GigabitEthernet1/0/3
Egress Priority Queue : disabled
Shaped queue weights (absolute) :  25 0 0 0
Shared queue weights  :  25 25 25 25
The port bandwidth limit : 100  (Operational Bandwidth:100.0)
The port is mapped to qset : 1

User define shape mode:
interface GigabitEthernet1/0/3
 srr-queue bandwidth shape 4 4 4 4

Device# show mls qos interface gigabitEthernet 1/0/3 queueing

GigabitEthernet1/0/3
Egress Priority Queue : disabled
Shaped queue weights (absolute) :  4 4 4 4
Shared queue weights  :  25 25 25 25
The port bandwidth limit : 100  (Operational Bandwidth:100.0)
The port is mapped to qset : 1
```

Enabling QoS Shaper-Cisco Catalyst 3850 Series Switch

```
Device# show policy-map shape

Policy Map shape
    Class cos1
      Average Rate Traffic Shaping
      cir 25%
    Class cos2
      Average Rate Traffic Shaping
      cir 25%
    Class cos3
      Average Rate Traffic Shaping
      cir 25%
    Class cos4
      Average Rate Traffic Shaping
      cir 25%
```

Example: Hierarchical Modular QoS

Cisco Catalyst 3750 Series Switch (Global Configuration)	Cisco Catalyst 3750 Series Switch (Interface)	Cisco Catalyst 3850 Series Switch
Class-map, Policy-map	• Attach policy to SVI. • Interface needs configuration MLS QoS VLAN_based .	Per-VLAN Ingress policy

Hierarchical Modular QoS - Cisco Catalyst 3750 Series Switch

```
Note:
SVI: Parent [class acl based class-map->policing]
```

```
         Child  [class interface range class-map->marking]

Child class-map:
Device(config)# class-map cm-interface-1
Device(config-cmap)# match input gigabitethernet3/0/1 - gigabitethernet3/0/2

Child policy-map:
Device(config)# policy-map port-plcmap-1
Device(config-pmap)# class cm-interface-1
Device(config-pmap-c)# police 900000 9000 drop

Parent class-map matching acl:
Device(config)# access-list 101 permit ip any any

Parent class-map:
Device(config)# class-map cm-1
Device(config-cmap)# match access 101

Device(config)# policy-map vlan-plcmap
Device(config-pmap)# class cm-1
Device(config-pmap-c)# set dscp 7
Device(config-pmap-c)# service-policy port-plcmap-1
Device(config-pmap-c)# exit
Device(config-pmap)# class cm-2
Device(config-pmap-c)# service-policy port-plcmap-1
Device(config-pmap-c)# set dscp 10

Attach the policy to the interface:
Device(config)# interface vlan 10
Device(config-if)# service-policy input vlan-plcmap
```

Hierarchical Modular QoS - Cisco Catalyst 3850 Series Switch

```
Note: Due to target change, this can't be one to one mapping, need config based on
customer requirement.

Target is at port level
Parent classify on vlan
Child: none vlan classification [for example cos/dscp]

Device# show running-config policy-map PV_parent_marking_child_policing
class vlan10
   set dscp 63
   service-policy child_class_dscp_policing
 class vlan11
   set cos 5
   service-policy child_class_dscp_policing
 class vlan12
   set precedence 6
   service-policy child_class_dscp_policing

Device# show running-config policy-map child_class_dscp_policing
class dscp1
    police cir percent 12
 class dscp2
    police cir percent 15
 class dscp3
    police cir percent 20
 class class-default
    police cir percent 22

Device# show running-config class-map vlan10

class-map match-any vlan10
  match vlan  10

Device# show running-config class-map vlan11

class-map match-any vlan11
  match vlan  11
```

```
Device# show running-config class-map vlan12

class-map match-any vlan12
  match vlan  12

Device# show running-config class-map dscp1

class-map match-any dscp1
  match  dscp 1

Device# show running-config class-map dscp2

class-map match-any dscp2
  match  dscp 2

Device# show running-config class-map dscp3

class-map match-any dscp3
  match  dscp 3
```

Additional References for QoS Monitoring

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Command List, All Release
Cisco Catalyst 3750 Series Switches Command Reference	Cisco Catalyst 3750 Series Switch Command Reference Guide

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for QoS Monitoring

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to . An account on Cisco.com is not required.

Table 6: Feature Information for QoS Monitoring

Feature Name	Releases	Feature Information
QoS Monitoring	Cisco IOS XE Release Denali 16.1.1 Cisco IOS XE Release 3E	The QoS Monitoring feature describes the Quality of Service (QoS) through sample configurations examples.

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA 95134-1706
USA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV
Amsterdam, The Netherlands