Class-based Quality-of-Service MIB

This chapter contains the following sections:

Class-based Quality-of-Service MIB

The Class-based Quality-of-Service MIB (cbQoSMIB) feature provides the Simple Network Management Protocol (SNMP) MIB that enables retrieval of class-map and policy-map configuration and statistics.

Information About Class-based Quality-of-Service MIB

CoPP and QoS policies now support Class-based Quality-of-Service MIB (cbQoSMIB). cbQoSMIB is the SNMP MIB that provides access to Modular QoS CLI (MQC) configuration and statistics.

The following cbQoSMIB tables are supported by QoS policies and CoPP:

- cbQosClassMapCfg
- cbQosMatchStmtCfg
- cbQosPoliceStats
- cbQosPolicyMapCfg
- cbQosPoliceCfg

The following cbQoSMIB tables are supported by QoS policies:

- cbQosInterfacePolicy
- cbQosObjects
- cbQosQueueingCfg
- cbQosServicePolicy
- cbQosSetCfg

Class-based Quality-of-Service MIB Phase 2

Beginning from Cisco NX-OS Release 7.3(0)N1(1), the following cbQoSMIB tables are also supported by QoS policies:

- cbQosClassMapStats
- cbQosMatchStmtStats
- cbQosQueueingStats

More detailed information on cbQoSMIB tables and elements is available at the following url: http://tools.cisco.com/Support/SNMP/do/BrowseOID.do?local=en&translate=Translate&objectInput=1.3.6.1.4.1.9.9.166

Licensing Requirements for Class-based Quality-of-Service MIB

This feature does not require a 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 Cisco NX-OS licensing scheme, see the Cisco NX-OS Licensing Guide.

Prerequisite for Class-based Quality-of-Service MIB

- You must enable QoS Statistics under **show policy-map interface** to view statistics under Class-based Quality-of-Service MIB. For more information, refer Enabling QoS Statistics under show policy-map interface.

Guidelines and Limitations for Class-based Quality-of-Service MIB

The guidelines and limitations for viewing statistics are as follows:

- Statistics can be viewed per Access Control Entry (ACE) in an Access Control List (ACL) if there is no policer attached.
- Statistics can be viewed per ACE in an ACL, if there is only one ACE in the ACL and if a policer is attached.
- Statistics cannot be viewed per ACE in an ACL, if there are more than one ACEs in an ACL and a policer is attached.
- The limitations above apply to QoS-based matches as well, such as **match dscp** *dscp-list* , **match precedence** *precedence-list* and so on.
- Statistics cannot be viewed with **match-all** rules.
- Statistics can be viewed only with **match-any**.
- For instances when the statistics do not get enabled without a policer, follow these steps:
  - Create a class. You can add as many rules as required.
  - Create a policy-map and attach the above class to it.
  - Add a dummy policer to it (if you do not require a real policer).

- Apply the policy to the interface.
- Remove the dummy policer to display the statistics.

- Statistics are shown per policy and not at an interface level.
- Use the **show ip access-list** command to display statistics for matches based on access group. These statistics cannot be viewed with the **show policy-map interface** command.

Configuring a QoS Policy

The following configuration is a generic example to configure a QoS policy.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config) # **snmp-server community** *com-name* **rw**	Creates Simple Network Management Protocol (SNMP) communities for SNMPv1 or SNMPv2c.
Step 3	switch(config) # **snmp-server community** *com-name* **rw**	Creates Simple Network Management Protocol (SNMP) communities for SNMPv1 or SNMPv2c.
Step 4	switch(config) # **class-map type qos match-any** *class-map-name*	Specifies the component type qos for the class map and enters the class-map type qos configuration mode.
Step 5	switch(config-cmap-qos) # **description** *text*	Adds a description for the class-map.
Step 6	switch(config-cmap-qos) # **match cos** *cos-list*	Defines the class of traffic using the class of service (CoS) value in a type qos class map.
Step 7	switch(config-cmap-qos) # **match dscp** *dscp-list*	(Optional) Specifies differentiated services code point (DSCP) values in the DiffServ field of the IP Header (either IPv4 or IPv6) as a match criterion.
Step 8	switch(config-cmap-qos) # **exit**	Exits the class-map type qos configuration mode.
Step 9	switch(config) # **policy-map type qos** *qos-policy-map-name*	Specifies the type qos policy map and enters the policy-map qos configuration mode.
Step 10	switch(config-pmap-qos) # **description** *text*	Configures the policy-map description.
Step 11	switch(config-pmap-qos) # **class** *class-map-name*	Configures the service policy for a class-map.
Step 12	switch(config-pmap-c-qos) # **set qos-group** *qos-group-value*	Assigns the QoS group identifier for a class of traffic in a type qos policy map.

	Command or Action	Purpose
Step 13	switch(config-pmap-c-qos) # **exit**	Exits the policy-map type qos class configuration mode.
Step 14	switch(config-pmap-qos) # **exit**	Exits the policy-map qos configuration mode.
Step 15	switch(config) # **interface** *type number*	Enters the interface configuration mode.
Step 16	switch(config-if) # **service-policy type qos input** *policy-map-name*	Applies the service policy map to packets coming into the mentioned interface.
Step 17	switch(config-if) # **exit**	Exits the interface configuration mode.
Step 18	(Optional) switch(config) # **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

This example shows how to configure a QoS policy on a switch:

Note This is a generic example to configure a QoS policy.

```
switch# configure terminal
switch(config)# snmp-server community public rw
switch(config)# snmp-server community private rw
switch(config)# class-map type qos match-any cmap1
switch(config-cmap-qos) # description class map 1
switch(config-cmap-qos) # match cos 4
switch(config-cmap-qos) # match dscp 48
switch(config-cmap-qos) # exit
switch(config) # policy-map type qos pmap1
switch(config-pmap-qos) # description policy map 1
switch(config-pmap-qos) # class cmap1
switch(config-pmap-c-qos) # set qos-group 4
switch(config-pmap-c-qos) # exit
switch(config-pmap-qos) # exit
switch(config) # interface ethernet 1/3
switch(config-if) # service-policy type qos input pmap1
```

Displaying Class-based Quality-of-Service MIB Configuration and Statistics

Procedure

	Command or Action	Purpose
Step 1	$ **snmpwalk -v2c -c** *community-name ip-address oid*	Displays class-map and policy-map configuration and statistics.

	Command or Action	Purpose
		Note Use the **snmpwalk** command on an SNMP-enabled server.

Example

The following examples show how to display class map and policy map configuration and statistics:

Use the **show interface snmp-ifindex** command to display the mapping of ifindices to interfaces:

```
switch(config)# show interface snmp-ifindex

--------------------------------------------------------------------------------
Port             IFMIB Ifindex (hex)
--------------------------------------------------------------------------------
Eth1/1          436207616  (0x1a000000)
Eth1/2          436211712  (0x1a001000)
Eth1/3          436215808  (0x1a002000)
Eth1/4          436219904  (0x1a003000)
Eth1/5          436224000  (0x1a004000)
```

Use the **show policy-map interface** *type number* command to display statistics and the configured policy maps on a specified interface:

```
switch# show policy-map interface ethernet 1/3

Global statistics status :   enabled

 NOTE: Type qos policy-map configured on VLAN will take precedence
       over system-qos policy-map for traffic on the VLAN


Ethernet1/3

  Service-policy (qos) input:   pmap1
    policy statistics status:   enabled

    Class-map (qos):   cmap1 (match-any)
      14 packets
      Match: cos 4
        10 Match packets
      Match: dscp 48
        4 Match packets
      set qos-group 4

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

Use the **snmpwalk** command on the Service Policy Table:

```
$ snmpwalk -v2c -c public A.B.C.D cbQosServicePolicy


Service Policy Table (QoS only table) – corresponding to the service policy applied on
eth1/3

CISCO-CLASS-BASED-QOS-MIB::cbQosIfType.285212681 = INTEGER: mainInterface(1)
CISCO-CLASS-BASED-QOS-MIB::cbQosPolicyDirection.285212681 = INTEGER: input(1)
```

```
CISCO-CLASS-BASED-QOS-MIB::cbQosIfIndex.285212681 = INTEGER: 436215808 //436215808 is the
IFMIB Interface Index value
CISCO-CLASS-BASED-QOS-MIB::cbQosVlanIndex.285212681 = Gauge32: 1

//The interface is Eth1/3.
```

Use the **snmpwalk** command on the Objects Table:

```
$ snmpwalk -v2c -c public A.B.C.D cbQosObjects


Objects Table (QoS only table)  corresponding to the policy-map, class-map, match & set
Statements

CISCO-CLASS-BASED-QOS-MIB::cbQosConfigIndex.285212681.285212681 = Gauge32: 285212836
//285212836 is the Policy Map Config Index
CISCO-CLASS-BASED-QOS-MIB::cbQosConfigIndex.285212681.285212682 = Gauge32: 285212833
//285212833 is a Class Map Config Index
CISCO-CLASS-BASED-QOS-MIB::cbQosConfigIndex.285212681.285212683 = Gauge32: 285212834
//285212834 is a Match Statement Config Index
CISCO-CLASS-BASED-QOS-MIB::cbQosConfigIndex.285212681.285212684 = Gauge32: 285212835
//285212835 is a Match Statement Config Index


CISCO-CLASS-BASED-QOS-MIB::cbQosObjectsType.285212681.285212681 = INTEGER: policymap(1)
CISCO-CLASS-BASED-QOS-MIB::cbQosObjectsType.285212681.285212682 = INTEGER: classmap(2)
CISCO-CLASS-BASED-QOS-MIB::cbQosObjectsType.285212681.285212683 = INTEGER: matchStatement(3)
CISCO-CLASS-BASED-QOS-MIB::cbQosObjectsType.285212681.285212684 = INTEGER: matchStatement(3)

CISCO-CLASS-BASED-QOS-MIB::cbQosParentObjectsIndex.285212681.285212681 = Gauge32: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosParentObjectsIndex.285212681.285212682 = Gauge32: 285212681
CISCO-CLASS-BASED-QOS-MIB::cbQosParentObjectsIndex.285212681.285212683 = Gauge32: 285212682
CISCO-CLASS-BASED-QOS-MIB::cbQosParentObjectsIndex.285212681.285212684 = Gauge32: 285212682
```

Use the **snmpwalk** command on the Policy Map Table:

```
$ snmpwalk -v2c -c public A.B.C.D cbQosPolicyMapCfg | grep 285212836
//285212836 is the Policy Map Config Index obtained from the Objects Table


Policy Map Table corresponding to the policy-map configured above

CISCO-CLASS-BASED-QOS-MIB::cbQosPolicyMapName.285212836 = STRING: pmap1 //pmap1 is the
policy map name
CISCO-CLASS-BASED-QOS-MIB::cbQosPolicyMapDesc.285212836 = STRING: policy map 1 //Policy map
 description
```

Use the **snmpwalk** command on the Class Map Table:

```
$ snmpwalk -v2c -c public A.B.C.D cbQosClassMapCfg | grep 285212833
//285212833 is the Class Map Config Index obtained from the Objects Table

Class Map Table corresponding to the class-map configured above

CISCO-CLASS-BASED-QOS-MIB::cbQosCMName.285212833 = STRING: cmap1 //class-map on which the
service-policy is configured
CISCO-CLASS-BASED-QOS-MIB::cbQosCMDesc.285212833 = STRING: class map 1  //class-map
description
```

Use the **snmpwalk** command on the Match Statement Table:

```
$ snmpwalk -v2c -c public A.B.C.D cbQosMatchStmtCfg | grep 285212834

Match Stmt Table corresponding to the match statement configured above

CISCO-CLASS-BASED-QOS-MIB::cbQosMatchStmtName.285212834 = STRING: match cos 4
```

Use the **snmpwalk** command on the Queuing Config Table:

```
$ snmpwalk -v2c -c public A.B.C.D cbQosQueueingCfg
Queueing Config Table(QoS only table, taken from default QoS policies)

CISCO-CLASS-BASED-QOS-MIB::cbQosQueueingCfgBandwidth.301990031 = INTEGER: 100
CISCO-CLASS-BASED-QOS-MIB::cbQosQueueingCfgBandwidthUnits.301990031 = INTEGER: percentage(2)
CISCO-CLASS-BASED-QOS-MIB::cbQosQueueingCfgPriorityEnabled.301990031 = INTEGER: false(2)
CISCO-CLASS-BASED-QOS-MIB::cbQosQueueingCfgQLimitUnits.301990031 = INTEGER: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosQueueingCfgAggregateQLimit.301990031 = Gauge32: 0
```

Use the **snmpwalk** command on the Set Action Table:

```
$ snmpwalk -v2c -c public A.B.C.D cbQosSetCfg
Set Action Table (QoS only table) corresponding to the set statement configured above

CISCO-CLASS-BASED-QOS-MIB::cbQosSetCfgIpDSCPValue.285212829 = INTEGER: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosSetCfgIpPrecedenceValue.285212829 = INTEGER: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosSetCfgQosGroupValue.285212838 = INTEGER: 4
CISCO-CLASS-BASED-QOS-MIB::cbQosSetCfgL2CosValue.285212829 = INTEGER: 0
```

Use the **snmpwalk** command on the Policing Config Table:

```
$ snmpwalk -v2c -c public A.B.C.D cbQosPoliceCfg
Policing Config Table(no QoS config, displays only CoPP statistics)

CISCO-CLASS-BASED-QOS-MIB::cbQosPoliceCfgBurstSize.721420367 = Gauge32: 65535 Octets
CISCO-CLASS-BASED-QOS-MIB::cbQosPoliceCfgConformAction.721420367 = INTEGER: transmit(1)
CISCO-CLASS-BASED-QOS-MIB::cbQosPoliceCfgViolateAction.721420367 = INTEGER: drop(5)
CISCO-CLASS-BASED-QOS-MIB::cbQosPoliceCfgRate64.721420367 = Counter64: 1048576 bits/second

CISCO-CLASS-BASED-QOS-MIB::cbQosPoliceCfgRateType.721420367 = INTEGER: bps(1)
CISCO-CLASS-BASED-QOS-MIB::cbQosPoliceCfgConditional.721420367 = INTEGER: false(2)
```

Use the **snmpwalk** command on the Policing Stats Table:

```
$ snmpwalk -v2c -c public A.B.C.D cbQosPoliceStats
Policing Stats Table(no QoS config, displays only CoPP statistics)

CISCO-CLASS-BASED-QOS-MIB::cbQosPoliceConformedByte64.721420366.721420376 = Counter64: 80121
 Octets
CISCO-CLASS-BASED-QOS-MIB::cbQosPoliceViolatedByte64.721420366.721420367 = Counter64: 0
Octets
```

Note All CoPP configurations are available by default.

The sample snmpwalk outputs below display the cbQosMatchStmtStats and cbQosClassMapStats tables that are supported by the QoS policies starting from Cisco NX-OS Release 7.3(0)N1(1):

```
$ snmpwalk -v2c -c public A.B.C.D cbQosMatchStmtStats
CISCO-CLASS-BASED-QOS-MIB::cbQosMatchPrePolicyPkt64.285212681.285212683 = Counter64: 10
//The config indices match the objects displayed in the Objects Table above
CISCO-CLASS-BASED-QOS-MIB::cbQosMatchPrePolicyPkt64.285212681.285212684 = Counter64: 4
CISCO-CLASS-BASED-QOS-MIB::cbQosMatchPrePolicyPkt64.285212681.285212687 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosMatchPrePolicyByte64.285212681.285212683 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosMatchPrePolicyByte64.285212681.285212684 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosMatchPrePolicyByte64.285212681.285212687 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosMatchPrePolicyBitRate.285212681.285212683 = Gauge32: 0 bits
 per second
CISCO-CLASS-BASED-QOS-MIB::cbQosMatchPrePolicyBitRate.285212681.285212684 = Gauge32: 0 bits
 per second
CISCO-CLASS-BASED-QOS-MIB::cbQosMatchPrePolicyBitRate.285212681.285212687 = Gauge32: 0 bits
 per second


$snmpwalk -v2c -c public A.B.C.D cbQosClassMapStats
CISCO-CLASS-BASED-QOS-MIB::cbQosCMPrePolicyPkt64.285212681.285212682 = Counter64: 14 //The
 config indices match the objects displayed in the Objects Table above
CISCO-CLASS-BASED-QOS-MIB::cbQosCMPrePolicyPkt64.285212681.285212686 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosCMPrePolicyByte64.285212681.285212682 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosCMPrePolicyByte64.285212681.285212686 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosCMPrePolicyBitRate.285212681.285212682 = Gauge32: 0 bits
per second
CISCO-CLASS-BASED-QOS-MIB::cbQosCMPrePolicyBitRate.285212681.285212686 = Gauge32: 0 bits
per second
CISCO-CLASS-BASED-QOS-MIB::cbQosCMPostPolicyByte64.285212681.285212682 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosCMPostPolicyByte64.285212681.285212686 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosCMDropPkt64.285212681.285212682 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosCMDropPkt64.285212681.285212686 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosCMDropByte64.285212681.285212682 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosCMDropByte64.285212681.285212686 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosCMDropBitRate.285212681.285212682 = Gauge32: 0 bits per
second
CISCO-CLASS-BASED-QOS-MIB::cbQosCMDropBitRate.285212681.285212686 = Gauge32: 0 bits per
second
```

Use the **show policy-map interface control-plane** command to display control plane statistics:

```
switch# show policy-map interface control-plane

Control Plane

  service-policy  input: copp-system-policy-default

    class-map copp-system-class-igmp (match-any)
      match protocol igmp
      police cir 1024 kbps , bc 65535 bytes
        conformed 0 bytes; action: transmit
        violated 0 bytes;
    class-map copp-system-class-pim-hello (match-any)
      match protocol pim
      police cir 1024 kbps , bc 4800000 bytes
        conformed 0 bytes; action: transmit
        violated 0 bytes;
    class-map copp-system-class-bridging (match-any)
      match protocol bridging
      police cir 20000 kbps , bc 4800000 bytes
        conformed 0 bytes; action: transmit
        violated 0 bytes;
    class-map copp-system-class-arp (match-any)
      match protocol arp
      match protocol nd
```

```
      police cir 1024 kbps , bc 3600000 bytes
        conformed 0 bytes; action: transmit
        violated 0 bytes;
    class-map copp-system-class-dhcp (match-any)
      match protocol dhcp
      police cir 1024 kbps , bc 4800000 bytes
        conformed 0 bytes; action: transmit
        violated 0 bytes;
    class-map copp-system-class-wccp (match-any)
      match protocol wccp
      police cir 1060 kbps , bc 4800000 bytes
        conformed 0 bytes; action: transmit
        violated 0 bytes;
.
.
.
```

Additional References for Class-based Quality-of-Service MIB

This section provides additional information related to Class-based Quality-of-Service MIB.

Related Documents

Related Topic	Document Title
Licensing	Cisco NX-OS Licensing Guide
Command reference	Cisco Nexus 5500 Series NX-OS QoS Command Reference Cisco Nexus 5500 Series NX-OS System Management Command Reference

Feature History for Class-based Quality-of-Service MIB

Table 1: Feature History for Class-based Quality-of-Service MIB

Feature Name	Releases	Feature Information
Class-based Quality-of-Service MIB Phase 2	7.3(0)N1(1)	The following cbQoSMIB tables are supported by QoS policies: cbQosClassMapStats, cbQosMatchStmtStats and cbQosQueueingStats
Class-based Quality-of-Service MIB	7.1(1) N1(1)	This feature was introduced.