



Class-based Quality-of-Service MIB

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Class-based Quality-of-Service MIB

The Class-based Quality-of-Service MIB (cbQoS MIB) 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 (cbQoS MIB). cbQoS MIB is the SNMP MIB that provides access to Modular QoS CLI (MQC) configuration and statistics.

The following cbQoS MIB tables are supported by QoS policies and CoPP:

- cbQoSClassMapCfg
- cbQoSMatchStmtCfg
- cbQoSPoliceStats
- cbQoSPolicyMapCfg
- cbQoSPoliceCfg

The following cbQoS MIB 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 cbQoS MIB tables are also supported by QoS policies:

- cbQoSClassMapStats
- cbQoSMatchStmntStats
- cbQoSQueueingStats

More detailed information on cbQoS MIB 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 <i>com-name</i> rw	Creates Simple Network Management Protocol (SNMP) communities for SNMPv1 or SNMPv2c.
Step 3	switch(config) # snmp-server community <i>com-name</i> rw	Creates Simple Network Management Protocol (SNMP) communities for SNMPv1 or SNMPv2c.
Step 4	switch(config) # class-map type qos match-any <i>class-map-name</i>	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 <i>text</i>	Adds a description for the class-map.
Step 6	switch(config-cmap-qos) # match cos <i>cos-list</i>	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 <i>dscp-list</i>	(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 <i>qos-policy-map-name</i>	Specifies the type qos policy map and enters the policy-map qos configuration mode.
Step 10	switch(config-pmap-qos) # description <i>text</i>	Configures the policy-map description.
Step 11	switch(config-pmap-qos) # class <i>class-map-name</i>	Configures the service policy for a class-map.
Step 12	switch(config-pmap-c-qos) # set qos-group <i>qos-group-value</i>	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 <i>type number</i>	Enters the interface configuration mode.
Step 16	switch(config-if) # service-policy type qos input <i>policy-map-name</i>	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 <i>community-name</i> <i>ip-address oid</i>	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 cbQosMatchStmntCfg | grep 285212834
```

Match Stmt Table corresponding to the match statement configured above

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

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

```
$ snmpwalk -v2c -c public A.B.C.D cbQosQueueingCfg
Queuing 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 cbQosMatchStmntStats 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::cbQosCMPPostPolicyByte64.285212681.285212682 = Counter64: 0
CISCO-CLASS-BASED-QOS-MIB::cbQosCMPPostPolicyByte64.285212681.285212686 = 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 6000 Series NX-OS QoS Command Reference Cisco Nexus 6000 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 cbQoS MIB 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.

