



QoS: CBQoS Management Policy-to-Interface Mapping Support Configuration Guide, Cisco IOS XE Everest 16.5

Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Any Internet Protocol (IP) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental.

All printed copies and duplicate soft copies of this document are considered uncontrolled. See the current online version for the latest version.

Cisco has more than 200 offices worldwide. Addresses and phone numbers are listed on the Cisco website at www.cisco.com/go/offices.

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: [www.cisco.com go trademarks](http://www.cisco.com/go/trademarks). Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1721R)

© 2019 Cisco Systems, Inc. All rights reserved.



CONTENTS

CHAPTER 1

[Read Me First](#) 1

CHAPTER 2

[QoS CBQoS Management Policy-to-Interface Mapping Support](#) 3

[Prerequisites for QoS CBQoS Management Policy-to-Interface Mapping Support](#) 3

[Restrictions for QoS CBQoS Management Policy-to-Interface Mapping Support](#) 3

[Information About QoS CBQoS Management Policy-to-Interface Mapping Support](#) 4

[Feature Overview of QoS CBQoS Management Policy-to-Interface Mapping Support](#) 4

[Benefits of QoS CBQoS Management Policy-to-Interface Mapping Support](#) 8

[How to Configure QoS CBQoS Management Policy-to-Interface Mapping Support](#) 8

[Configuration Examples for QoS CBQoS Management Policy-to-Interface Mapping Support](#) 9

[Additional References](#) 9

[Feature Information for QoS CBQoS Management Policy-to-Interface Mapping Support](#) 10



CHAPTER 1

Read Me First

Important Information about Cisco IOS XE 16

Effective Cisco IOS XE Release 3.7.0E for Catalyst Switching and Cisco IOS XE Release 3.17S (for Access and Edge Routing) the two releases evolve (merge) into a single version of converged release—the Cisco IOS XE 16—providing one release covering the extensive range of access and edge products in the Switching and Routing portfolio.

Feature Information

Use [Cisco Feature Navigator](#) to find information about feature support, platform support, and Cisco software image support. An account on Cisco.com is not required.

Related References

- [Cisco IOS Command References, All Releases](#)

Obtaining Documentation and Submitting a Service Request

- To receive timely, relevant information from Cisco, sign up at [Cisco Profile Manager](#).
- To get the business impact you're looking for with the technologies that matter, visit [Cisco Services](#).
- To submit a service request, visit [Cisco Support](#).
- To discover and browse secure, validated enterprise-class apps, products, solutions and services, visit [Cisco Marketplace](#).
- To obtain general networking, training, and certification titles, visit [Cisco Press](#).
- To find warranty information for a specific product or product family, access [Cisco Warranty Finder](#).



CHAPTER 2

QoS CBQoS Management Policy-to-Interface Mapping Support

The QoS CBQoS Management Policy-to-Interface Mapping Support feature lets you use Simple Network Management Protocol (SNMP) to find which service policy is applied to a particular interface, without having to search the entire service policy table in the CISCO-CLASS-BASED-QOS-MIB. This feature introduces the CISCO-CBP-TARGET-MIB, which stores these mappings.

- [Prerequisites for QoS CBQoS Management Policy-to-Interface Mapping Support, on page 3](#)
- [Restrictions for QoS CBQoS Management Policy-to-Interface Mapping Support, on page 3](#)
- [Information About QoS CBQoS Management Policy-to-Interface Mapping Support, on page 4](#)
- [How to Configure QoS CBQoS Management Policy-to-Interface Mapping Support, on page 8](#)
- [Configuration Examples for QoS CBQoS Management Policy-to-Interface Mapping Support, on page 9](#)
- [Additional References, on page 9](#)
- [Feature Information for QoS CBQoS Management Policy-to-Interface Mapping Support, on page 10](#)

Prerequisites for QoS CBQoS Management Policy-to-Interface Mapping Support

- You must enable SNMP on a Cisco router that supports the CISCO-CBP-TARGET-MIB.
- You must configure policy maps and attach them to interfaces in an input or output direction within your network.

Restrictions for QoS CBQoS Management Policy-to-Interface Mapping Support

- The CISCO-CBP-TARGET-MIB is limited to read-only (RO) permission for MIB objects.

Information About QoS CBQoS Management Policy-to-Interface Mapping Support

Feature Overview of QoS CBQoS Management Policy-to-Interface Mapping Support

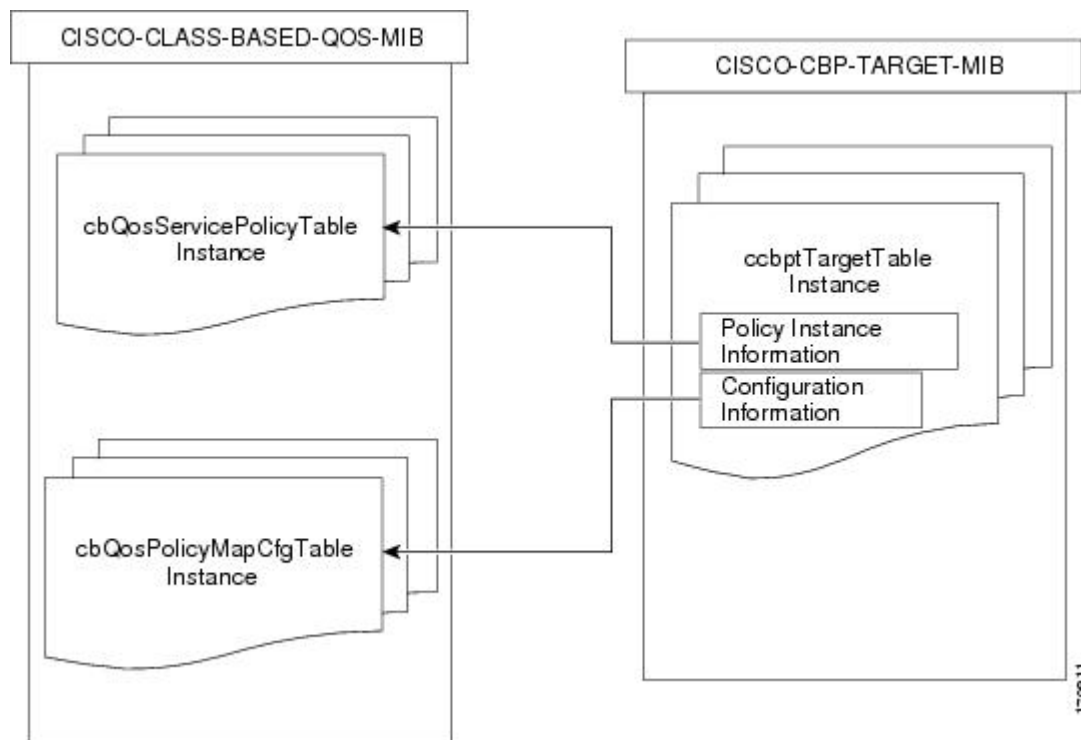
To find the QoS service policies that are applied to a specific interface (more generically referred to as a target), you must search the entire `cbQoSServicePolicyTable` within the `CISCO-CLASS-BASED-QOS-MIB`. This process can be very time consuming in large scale configurations, and therefore, is not feasible.

A solution was to create the `CISCO-CBP-TARGET-MIB`, a more generic MIB that allows any type of target to be mapped to the service policies that are applied to it.

The `CISCO-CBP-TARGET-MIB` maps policy targets to their corresponding attached service policies by providing a link to the policy instance (service policy) and the policy-map configuration data by using row pointers to the tables that manage each one. For policy types in the `CISCO-CLASS-BASED-QOS-MIB`, the `CISCO-CBP-TARGET-MIB` maps targets to their `cbQoSServicePolicyTable` and `cbQoSPolicyMapCfgTable` rows, respectively.

The figure below shows the relationship between the `CISCO-CBP-TARGET-MIB` and the `CISCO-CLASS-BASED-QOS-MIB`.

Figure 1: Relationship Between the `CISCO-CBP-TARGET-MIB` and the `CISCO-CLASS-BASED-QOS-MIB`



CISCO-CBP-TARGET-MIB Objects and Descriptions

The CISCO-CBP-TARGET-MIB consists of the ccbptTargetTable, which describes the class-based policy attachments to specific targets.

The table below lists the CISCO-CBP-TARGET-MIB objects and their descriptions.

Table 1: CISCO-CBP-TARGET-MIB Objects and Descriptions

Object	Description
ccbptPolicyIdNext	Indicates the next available value of ccbptPolicyId that can be used to create a new conceptual row in the ccbptTargetTable. This is a scalar object that is read-only and, therefore, has a value of 0.
ccbptTargetEntry	Describes a class-based policy attachment to a particular target. Note This is not a pollable object that is present in the MIB.
ccbptTargetType	Indicates the type of target, such as an ifIndex, an ATM virtual circuit (VC), a Frame Relay data-link connection identifier (DLCI), or a control plane. Values are as follows: <ul style="list-style-type: none"> • If the target type equals 1, then the target is an ifIndex. • If the target type equals 2, then the target is an ATM VC. • If the target type equals 3, then the target is a Frame Relay DLCI. • If the target type equals 4, then the target is a control plane.
ccbptTargetId	Gives the target identifier in the format indicated by the target type. This object contains variable length octets that are interpreted according to the value of the target type.
ccbptTargetDir	Indicates the direction, input(2) or output(3), relative to the target.
ccbptPolicySourceType	Shows the type of policy applied to the target and shows the cbQoS MIB relationship.
ccbptPolicyId	Contains the cbQoSPolicyIndex value for this instance of the service policy applied to the target. This object is an arbitrary integer that is used to identify a service policy.
ccbptTargetStatus	Indicates the status of the row. This object is always active(1).
ccbptTargetStorageType	Indicates the storage type for the row. This object is always volatile(2).
ccbptPolicyMap	Points to a row in the cbQoSPolicyMapCfgTable indicating the configuration of the policy map for this target.
ccbptPolicyInstance	Points to a row in the cbQoSServicePolicyTable indicating the instance of the policy map attached to this target.
ccbptPolicyAttachTime	Shows the time that this policy map was attached.

Object	Description
ccbptTargetTableLastChange	Shows the time that an entry was added or removed. This is a scalar object that is not part of the ccbptTargetTable entry.

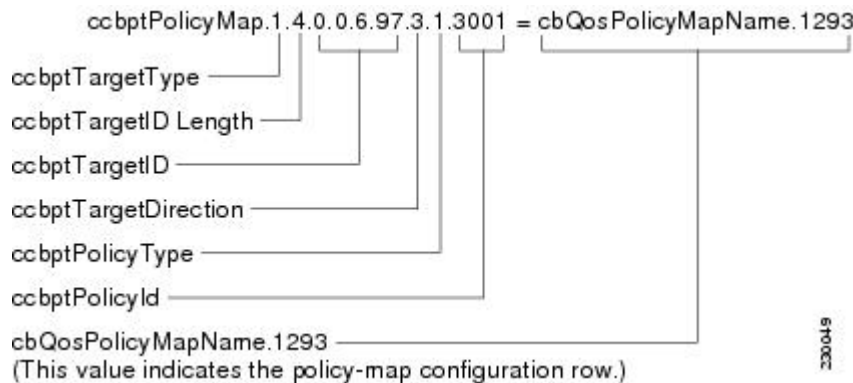
Decoding Index Values

The CISCO-CBP-TARGET-MIB contains objects that define textual conventions for representing targets that have class-based policy mappings. A target can be any logical interface or entity to which a class-based policy can be applied.

The ccbptTarget is a series of octets that should be interpreted according to the value of ccbptTargetType.

The figure below shows a sample index with the type genIf(1) and how to decode index values corresponding to configuration mapping data output.

Figure 2: Sample Index with Mapping Data Output



The figure above shows the mapping of the index portion of the object identifier (OID) for an instance of the ccbptPolicyMap object. Each portion of the index is defined as follows:

Configuration Policy Mapping Data

ccbptPolicyMap.1.4.0.0.6.97.3.1.3001 = cbQosPolicyMapName.1293

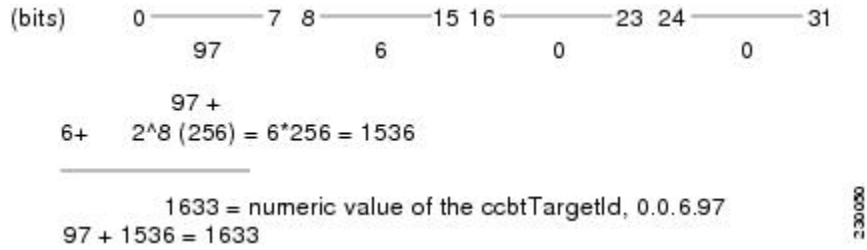
Where from left to right:

- `ccbptTargetType`--Value of 1 indicates the `ccbptTargetType` which is `genIf(1)`. The target type indicates that the value contained in the `ccbptTargetId` is an `ifIndex` value.
- `ccbptTargetId Length`--Value of 4 indicates that the length of the `ccbptTargetId` to follow is 4 bytes. The `ccbptTargetId` is defined in the MIB as a variable length octet string. Representing this object in the index of a table requires that the object be preceded by the length of an octet string.
- `ccbptTargetId`--Value of 0.0.6.97 indicates the target ID. The length of the third index is determined by the value in the second byte of the entire index. (In this example, the length of the target ID is 4 bytes.)

Numerical Value for the ifIndex Example

The figure below shows the numerical value of the `ifIndex` `ccbptTargetId`, 0.0.6.97.

Figure 3: Numerical Value for an ifIndex

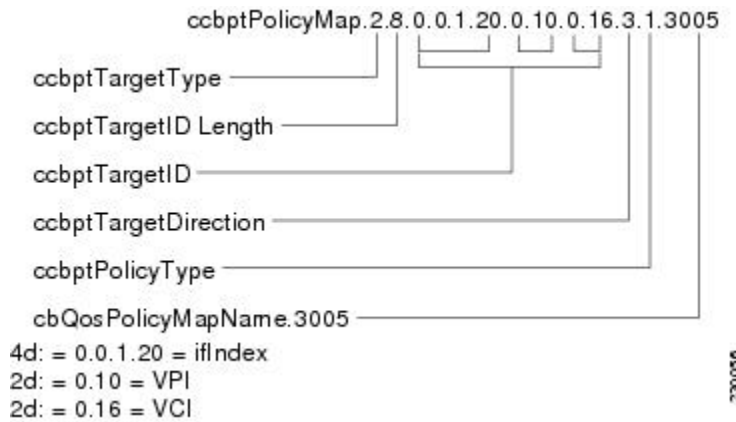


- ccbptTargetDirection--Value of 3 indicates the ccbptTarget output direction.
- ccbptPolicyType--Value of 1 indicates the ccbptPolicyType, which is ciscoCbQos(1).
- ccbptPolicyId--Value of 3001 indicates the ccbptPolicyId, which is the policy index integer for the policy instance applied to the target. The value of 3001 equals the value of the cbQosPolicyIndex for the corresponding entry in the cbQosServicePolicyTable in the CISCO-CLASS-BASED-QOS-MIB.
- cbQosPolicyMapName.1293--Value indicates the row in the cbQosPolicyMapTable describing the configuration of the policy map applied to the output direction of this ccbptTargetId.

Possible Values for ccbptTargetId

The figure below shows the supported ccbptTargetId values.

Figure 4: ccbptTargetId Values



- For genIf(1), OCTET STRING (SIZE(4))--ifIndex (4d). Where the (4d) value is a 4-byte decimal for the length of the ccbptTargetId in the example.
- For atmPvc(2), OCTET STRING (SIZE(8))--ATM PVC (4d:2d:2d). Where the ATM PVC has a ccbptTargetId length of 8 bytes (4d:2d:2d).
- For frDlci(3), OCTET STRING(SIZE(6))--Frame Relay ifIndex is the first 4 bytes, and DLCI is the last 2 bytes (4d:2d).
- For controlPlane(4), OCTET STRING(SIZE(4))--Control Plane Entity (4d).

Objects in the CISCO-CBP-TARGET-MIB

The notation used in the CISCO-CBP-TARGET-MIB follows the conventions defined in Abstract System Notation One (ASN.1). ASN.1 defines an Open System Interconnection (OSI) language used to describe data types independently from particular computer structures and presentation techniques. Each object in the MIB incorporates a DESCRIPTION field that includes an explanation of the object's meaning and usage, which, together with the other characteristics of the object (SYNTAX, MAX-ACCESS, and INDEX), provides sufficient information for management application development, as well as for documentation and testing.

A network administrator can access the entries (objects) in the CISCO-CBP-TARGET-MIB by means of any SNMP-based network management system (NMS). The network administrator can retrieve information in the CISCO-CBP-TARGET-MIB using standard SNMP **get** and **getnext** operations.

Scalar Objects in the CISCO-CBP-TARGET-MIB

The CISCO-CBP-TARGET-MIB contains the following unsupported scalar object:

- **cbpPolicyNext**--Indicates the next available value of **cbpPolicyId** that can be used to create a new conceptual row in the **cbpTargetTable**. If no available identifier exists, this object has a value of 0. This object is read-only and is unsupported.

The CISCO-CBP-TARGET-MIB contains the following supported scalar object:

- **cbpTargetTableLastChange**--Shows the value of **sysUpTime** at the time of the last addition or deletion of an entry in the **cbpTargetTable**. If the number of entries is unchanged since the last reinitialization of the local network management system, the value of this object is 0. This object is read-only and is supported.

Notifications in the CISCO-CBP-TARGET-MIB

There are no notifications in the CISCO-CBP-TARGET-MIB.

Benefits of QoS CBQoS Management Policy-to-Interface Mapping Support

In deployments where service policies are applied to several thousand interfaces, obtaining QoS statistics and configuration information on a per interface or target basis is difficult using the organization of the CISCO-CLASS-BASED-QOS-MIB. You must perform a linear search of the **cbQoSServicePolicyTable** within the MIB to find the corresponding **cbQoSPolicyIndex** and then search for the configuration and statistics for the service policy applied to the interface (target).

The CISCO-CBP-TARGET-MIB offers a direct mapping from the target to the service policy applied to the target and provides the configuration information for that same service policy.

How to Configure QoS CBQoS Management Policy-to-Interface Mapping Support

There is no special way to configure this feature. For information on SNMP and QoS configuration tasks, see the "Configuring SNMP Support" module, the Cisco IOS Network Management Command Reference, and the Cisco IOS Quality of Service Solutions Command Reference, respectively.

Configuration Examples for QoS CBQoS Management Policy-to-Interface Mapping Support

There is no explicit way to configure the CISCO-CBP-TARGET-MIB. For SNMP and QoS examples, see the "Configuring SNMP Support" module, the Cisco IOS Network Management Command Reference , and the Cisco IOS Quality of Service Solutions Command Reference.

Additional References

Related Documents

Related Topic	Document Title
QoS commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	<i>Cisco IOS Quality of Service Solutions Command Reference</i>
QoS features	"Quality of Service Overview" module
SNMP commands: complete command syntax, command modes, command history, defaults, usage guidelines, and examples	<i>Cisco IOS Network Management Command Reference</i>
SNMP configuration tasks	Configuring SNMP Support" module
Other documentation	For information on using SNMP MIB features, see the appropriate documentation for your network management system.

Standards

Standard	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	--

MIBs

MIB	MIBs Link
<ul style="list-style-type: none"> • CISCO-AAA-SESSION-MIB • CISCO-CLASS-BASED-QOS-MIB 	To locate and download MIBs for selected platforms, Cisco IOS XE Software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
RFC 1156	<i>Management Information Base for Network Management of TCP/IP-based Internets</i>
RFC 1157	<i>A Simple Network Management Protocol (SNMP)</i>
RFC 1213	<i>Management Information Base for Network Management of TCP/IP-based Internets: MIB-II</i>

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 CBQoS Management Policy-to-Interface Mapping Support

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 www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 2: Feature Information for QoS CBQoS Management Policy-to-Interface Mapping Support

Feature Name	Releases	Feature Information
QoS CBQoS Management Policy-to-Interface Mapping Support	Cisco IOS XE Release 2.1	The QoS CBQoS Management Policy-to-Interface Mapping Support feature lets you use SNMP to find which service policy is applied to a particular interface, without having to search the entire service policy table in the CISCO-CLASS-BASED-QOS-MIB. This feature introduces the CISCO-CBP-TARGET-MIB, which stores these mappings. This feature was introduced on Cisco ASR 1000 Series Routers.