QoS: CBQoS MIB Index Enhancements Configuration Guide, Cisco IOS XE Fuji 16.8.x

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 NONINFRINGEMENT 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.

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: https://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)

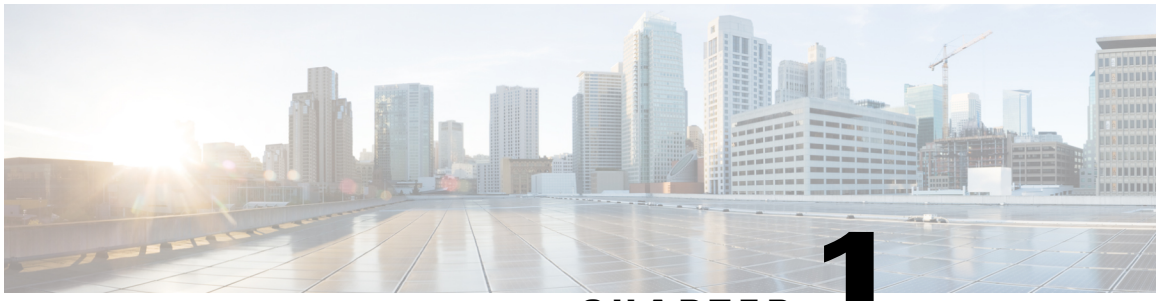
© 2014–2017, 2018 Cisco Systems, Inc. All rights reserved.

CONTENTS

CHAPTER 1 **Read Me First** 1

CHAPTER 2 **CBQoS MIB Index Enhancements** 3

- Finding Feature Information 3
- Prerequisites for the QoS CBQoS MIB Index Enhancements 3
- Restrictions for the CBQoS MIB Index Enhancements 4
- Information About the CBQoS MIB Index Enhancements 4
  - Feature Overview of the QoS CBQoS MIB Index Enhancements 4
  - Benefits of the QoS CBQoS MIB Index Enhancements 4
- How to Configure the CBQoS MIB Index Enhancements 5
  - Enabling Cisco IOS MIB and CBQoS MIB Index Persistence 5
  - Verifying CBQoS MIB Index Persistence 6
- Configuration Examples for the CBQoS MIB Index Enhancements 7
  - Example Enabling Cisco IOS MIB and CBQoS MIB Index Persistence 7
  - Examples Verifying Cisco IOS MIB and CBQoS MIB Index Persistence 7
- Additional References 8
- Feature Information for the QoS CBQoS MIB Index Enhancements 9



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.

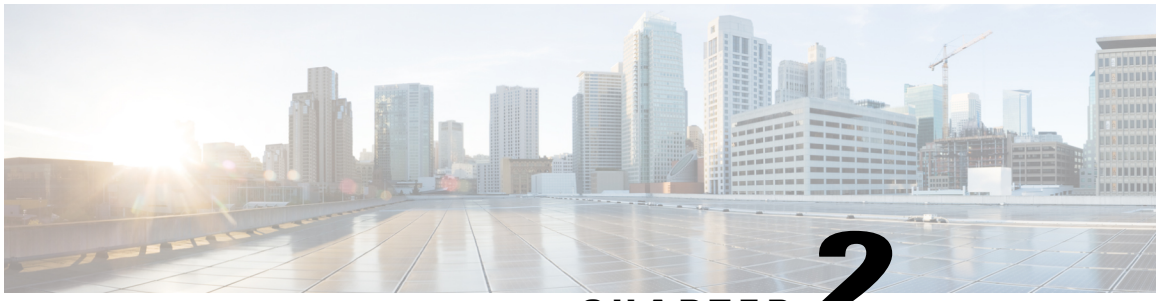
Related References

- Cisco IOS Command References, All Releases

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see What's New in Cisco Product Documentation.

To receive new and revised Cisco technical content directly to your desktop, you can subscribe to the What's New in Cisco Product Documentation RSS feed. RSS feeds are a free service.



CHAPTER 2

CBQoS MIB Index Enhancements

The Class-Based Quality of Service (CBQoS) MIB Index Enhancements feature introduces persistence across all CBQoS MIB indexes including cbQosConfigIndex, cbQosObjectsIndex, and cbQosPolicyIndex.

- Finding Feature Information, page 3
- Prerequisites for the QoS CBQoS MIB Index Enhancements, page 3
- Restrictions for the CBQoS MIB Index Enhancements, page 4
- Information About the CBQoS MIB Index Enhancements, page 4
- How to Configure the CBQoS MIB Index Enhancements, page 5
- Configuration Examples for the CBQoS MIB Index Enhancements, page 7
- Additional References, page 8
- Feature Information for the QoS CBQoS MIB Index Enhancements, page 9

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 the QoS CBQoS MIB Index Enhancements

You must enable ifMIB persistence by issuing the **snmp-server ifindex persist**command. Then issue the **snmp mib persist cbqos**command to enable CBQoS MIB index persistence.

Note If you issue the **snmp mib persist cbqos**commandbeforethe **snmp-server ifindex persist**command, you receive a prompt requesting you to enable ifIndex persistence first.

Restrictions for the CBQoS MIB Index Enhancements

If the internal hashing of configuration strings causes too many collisions, NVRAM storage may become tight. You can issue the **more nvram** command to display a new collision file called cbqos-mib to help you keep track of the size.

Information About the CBQoS MIB Index Enhancements

Feature Overview of the QoS CBQoS MIB Index Enhancements

The cbQosConfigIndex, cbQosObjectsIndex, and cbQosPolicyIndex are volatile because when a networking device reboots, the index numbers may change. This happens because system rebooting can cause the order of the Modular QoS CLI (MQC) configuration to differ from the actual configuration order, which is user-driven and unpredictable. As a result, you must read the MIB frequently to extract statistical and configuration information. Therefore, once a reload has occurred, the MIB has to be repolled to reestablish the indexes to the data stored in the CBQoS MIB.

Traditionally, MIB persistence is handled by Cisco IOS APIs, which save the index and key information to NVRAM. The data is then retrieved and repopulated after reloading. However, this approach does not work well for the current implementation of the cbQosObjectsIndex because of the large amount of information that needs to be saved.

An index encoding scheme based on configuration entries instead of operational sequence is being implemented to provide persistent indexes on router reload so that MIB information retains the same set of object values each time that a networking device reboots.

The index encoding scheme has been changed to handle the performance/scalability issue. Each service policy is uniquely identified by an index called cbQosPolicyIndex, and its cbQosObjectsIndex is uniquely identified under the service policy.

Note As a result of this change in the index encoding scheme, an application must not assume that the cbQosPolicyIndex is usually identical to its cbQosObjectsIndex as a policy-map.

Benefits of the QoS CBQoS MIB Index Enhancements

These enhancements provide a repeatable method for generating MIB indexes so that they do not change between reboots.

The complexity of configuring and correlating statistics objects is reduced, making it easier for network management applications to gather accurate information.

How to Configure the CBQoS MIB Index Enhancements

Enabling Cisco IOS MIB and CBQoS MIB Index Persistence

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **snmp-server ifindex persist**
4. **snmp mib persist** [**cbqos** | **v3mibs**]
5. **end**
6. **write mib-data**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**snmp-server ifindex persist** **Example:** `Router(config)# snmp-server ifindex persist`	Enables Cisco IOS MIB index (ifIndex) persistence.
Step 4	**snmp mib persist** [**cbqos**	**v3mibs**] **Example:** `Router(config)# snmp mib persist cbqos`	Enables MIB persistence. • The optional **cbqos**keyword enables CBQoS MIB persistence. • The optional **v3mibs** keyword enables v3 MIB persistence. **Note** If you have not enabled Cisco IOS MIB index (ifIndex) persistence (Step 3), the following message appears when you issue the **snmp mib persist cbqos** command: Enable 'snmp-server ifindex persist' for persist cbqos index

	Command or Action	Purpose
Step 5	**end** **Example:** `Router(config)# end`	Returns to privileged EXEC mode.

Step 6	**write mib-data**
	
	Example:
	
	write
	
	Example:
	`Router# write mib-data`
	
	Example:
	`Router# write`
		Saves CBQoS MIB data to NVRAM.

Verifying CBQoS MIB Index Persistence

SUMMARY STEPS

1. **enable**
2. **show running-config include cbqos**
3. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.

	Command or Action	Purpose
Step 2	**show running-config include cbqos** **Example:** `Router# show running-config | include cbqos`	Displays the configuration information currently running on the router. **Note** The information should include snmp mib persist cbqos.
Step 3	**exit** **Example:** `Router# exit`	Returns to user EXEC mode.

Configuration Examples for the CBQoS MIB Index Enhancements

Example Enabling Cisco IOS MIB and CBQoS MIB Index Persistence

The following example enables Cisco IOS MIB (ifIndex) and CBQoS MIB index persistence:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# snmp-server ifindex persist
Router(config)# snmp mib persist cbqos
```

Examples Verifying Cisco IOS MIB and CBQoS MIB Index Persistence

The following examples verify that Cisco IOS MIB (ifIndex) and CBQoS MIB index persistence have been configured:

```
Router# show running-config
| include cbqos
snmp mib persist cbqos
Router# show running-config
| include persist
snmp-server ifindex persist
snmp mib persist cbqos
```

Additional References

Related Documents

Related Topic	Document Title
QoS commands	*Cisco IOS Quality of Service Solutions Command Reference*
SNMP commands	*Cisco IOS Network Management Command Reference*
SNMP configuration tasks, MIB persistence	"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
CISCO-CLASS-BASED-QOS-MIB, Revision 13 **Note** The CISCO-CLASS-BASED-QOS-MIB is actually two MIBs: the CISCO-CLASS-BASED-QOS-MIB and the CISCO-CLASS-BASED-QOS-CAPABILITY-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 2233	*The Interfaces Group MIB Using SMIv2*

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 the QoS CBQoS MIB Index Enhancements

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 1: Feature Information for the QoS CBQoS MIB Index Enhancements

Feature Name	Releases	Feature Information
QoS CBQoS MIB Index Enhancements	Cisco IOS XE Release 2.4	The CBQoS MIB Index Enhancements feature introduces persistence across all CBQoS MIB indexes including cbQosConfigIndex, cbQosObjectsIndex, and cbQosPolicyIndex.