Preface

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This preface explains the objectives, intended audience, and organization of the *Cisco Cable Modem Termination System Feature Guide* for Cisco IOS Release 12.3(21)BC and earlier releases. This preface also defines this document's conventions for conveying instructions and information.

Purpose

The *Cisco CMTS Feature Guide* describes significant software features that support multiple platforms of the Cisco universal broadband routers. Each chapter describes a feature, to include the following:

- Supported Cisco IOS releases
- Feature benefits, restrictions and requirements
- Supported standards
- MIBs or RFCs; any prerequisites
- The configuration tasks and examples used to set up and implement each feature

This guide represents ongoing leadership of the Cisco CMTS in support of MSOs. Ongoing development for the Cisco CMTS grows as feature support broadens to two or more of the following Cisco CMTS platforms:

- Cisco uBR7100 series universal broadband routers
- Cisco uBR7200 series universal broadband routers
- Cisco uBR10012 universal broadband router

Audience

This guide is intended for CMTS system administrators, network administrators, and support engineers and technicians who configure, maintain, and troubleshoot the Cisco uBR7100 series, the Cisco uBR7200 series, and the Cisco uBR10012 router.

All users should have some experience with configuring Cisco routers and using the Cisco IOS command-line interface (CLI). A basic familiarity with Data-over-Cable Service Interface Specifications (DOCSIS) 1.0, DOCSIS 1.0+ quality of service (QoS) principles, and Simple Network Management Protocol (SNMP) is helpful.

Cable system administrators and support engineers should be acquainted with cable data networks and WAN communications protocols. Cable system technicians should be familiar with their cable plant's base operating parameters and subscriber service offerings. Network administrators should be familiar with the principles of IP routing and subnetting; some of the advanced configurations also require an understanding of access lists and how to use them.

Document Organization

Table 1 summarizes the chapters and features in this guide.

Table 1 Guide Contents and Organization

Title	Description
Admission Control for the Cisco Cable Modem Termination System	Describes the Admission Control feature for the Cisco CMTS, a multifaceted feature that implements a Quality of Service (QoS) policy on the CMTS Headend. Admission Control establishes efficient resource and bandwidth utilization.
Cable Interface Bundling and Virtual Interface Bundling for the Cisco CMTS	Describes and illustrates how to bundle cable interfaces, which simplifies interface configuration and preserves IP address space, as multiple interfaces in a bundle share one IP address. Also describes the use of virtual interfaces in cable interface bundling, in which a virtual (non-physical) interface functions as the bundle master.
Cable Monitor and Intercept Features for the Cisco CMTS	Describes multiple intercept features on the Cisco CMTS, to include the following: • Cable monitor allows an external LAN packet analyzer on the cable interface to monitor inbound and outbound data packets for specific types of traffic between the Cisco CMTS and the cable modems attached to the radio frequency (RF) line card. • Service Independent Intercept (SII) supports the interception of any legal IP protocol. Because SII uses SNMP (specifically SNMPv3), its use can be hidden from other users of the CMTS.
Cable Duplicate MAC Address Reject for the Cisco CMTS	Describes the Cloned Cable Modem Security Detection feature, introduces the **cable privacy bpi-plus-enforce** command, and cites additional commands and supporting documentation on Cisco.com and the Internet.

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COPS Engine Operation on the Cisco CMTS	• COPS TCP support for the Cisco CMTS. The COPS Quality of service (QoS) policy exchange protocol is a standard for communicating network QoS policy information. The Cisco CMTS supports two new configuration commands for enabling and setting COPS processes. The COPS feature in Cisco 12.3(13a)BC enables the following COPS functions: – COPS DSCP Marking for the Cisco CMTS – COPS TCP Window Size for the Cisco CMTS • Access lists support Common Open Policy Service (COPS) on the Cisco CMTS. This feature supports inbound connections to all COPS listener applications on the Cisco CMTS.
DHCP, ToD, and TFTP Services for the Cisco Cable Modem Termination System	Describes how to configure Cisco CMTS platforms so that they support on-board servers to provide Dynamic Host Configuration Protocol (DHCP), Time-of-Day (ToD), and Trivial File Transfer Protocol (TFTP) services for use in Data-over-Cable Service Interface Specifications (DOCSIS) networks. In addition, this chapter provides information about optional configurations that can be used with external DHCP servers.
DOCSIS 1.1 for the Cisco CMTS	Describes how to configure the Cisco CMTS routers for DOCSIS 1.1 operations.
DOCSIS 2.0 A-TDMA Modulation Profiles for the Cisco CMTS	Describes the DOCSIS 2.0 A-TDMA services feature, which provides support for DOCSIS 2.0 Advanced Time Division Multiple Access (A-TDMA) upstream modulation profiles on Cisco cable interface line cards and broadband processing engines (BPEs).
DOCSIS Internal Configuration File Generator for the Cisco CMTS	A built-in tool on the CMTS to generate and internally store DOCSIS configuration files.
EtherChannel for the Cisco Cable Modem Termination System	EtherChannel is a technology by which to configure and aggregate multiple physical Ethernet connections to form a single logical port with higher bandwidth. EtherChannel technology is currently supported on the Cisco uBR7246VXR and the Cisco uBR10012 universal broadband routers.
Flap List Troubleshooting for the Cisco CMTS	The flap list is a patented tool used to troubleshoot cable modem connectivity problems. The flap list tracks “flapping” cable modems—cable modems that have intermittent connectivity problems—that could indicate a problem with the cable modem or with the upstream or downstream portion of the cable plant.
Maximum CPE and Host Parameters for the Cisco CMTS	Explanation of Cisco IOS commands used to set the maximum number of permitted customer premises equipment (CPE) devices that use the cable modem to connect to the cable network, and to synchronize the number of permitted CPE devices recognized by the CMTS and the cable modem.
N+1 Redundancy for the Cisco Cable Modem Termination System	Describes the N+1 Redundancy feature that supports cable interface line card redundancy in Cisco CMTS headends, and the Cisco RF Switch. **Note** This feature is greatly enhanced in multiple releases of the Cisco IOS 12.3 BC software release train.
PacketCable and PacketCable Multimedia on the Cisco CMTS	Describes how to configure the the Cisco CMTS for PacketCable and PacketCable MultiMedia (PCMM) operations.
Point-to-Point Protocol over Ethernet Termination on the Cisco CMTS	Describes the PPPoE Termination feature, which allows service providers to extend their existing PPP dial-up provisioning systems to users on cable networks by encapsulating the PPP packets within Ethernet MAC frames.

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Service Flow Admission Control for the Cisco CMTS	Describes the concepts, advantages, configuration and monitoring capabilities of Service Flow Admission Control on the Cisco CMTS.
Service Flow Mapping to MPLS-VPN on the Cisco CMTS	Describes the mapping of service flows to multiprotocol label switching (MPLS) virtual private networks (VPNs). This feature provides more flexible Managed Access for multiple Internet Service Provider (ISP) support over a hybrid fiber-coaxial (HFC) cable network.
Spectrum Management and Advanced Spectrum Management for the Cisco CMTS	A software and hardware feature provided in the CMTS so that the CMTS may sense both downstream and upstream plant impairments, report them to a management entity, and automatically mitigate them where possible.
Telco Return for the Cisco CMTS	Enables cable companies that do not support two-way radio frequency (RF) transmission or that have not upgraded their cable plants or specific service areas to offer fast downstream data services via the cable plant and upstream transmission via the PSTN over standard phone lines, as opposed to an all-cable network.
Time-of-Day Server for the Cisco CMTS	Enables the CMTS to provide a time-of-day (ToD) server to the cable modems and other customer premises equipment (CPE) devices connected to its cable interfaces. The ToD server gives the current date and time to accurately time stamp the cable modems' Simple Network Management Protocol (SNMP) messages and error log entries.
Unique Device Identifier Retrieval for the Cisco CMTS	Describes the Unique Device Identifier Retrieval (UDI retrieval) feature, which provides the ability to retrieve and display the UDI information from any Cisco product that has electronically stored such identity information.
Upstream Scheduler Mode for the Cisco CMTS	Describes the configuration of upstream scheduler modes, which enables you to select either Unsolicited Grant Services (UGS) or Real Time Polling Service (rtPS) scheduling types, as well as packet-based or TDM-based scheduling. Low latency queueing (LLQ) emulates a packet-mode-like operation over the Time Division Multiplex (TDM) infrastructure of DOCSIS.
Index	Index for the entire manual.

Conventions

This guide uses the following conventions for command syntax descriptions and textual emphasis:

Table 2 Command Syntax and Emphasis Conventions

Convention	Description
boldface font	Commands and keywords are in **boldface**.
italic font	Arguments for which you supply values are in *italics*.
[ ]	Elements in square brackets are optional.
{*x* | *y* | *z*}	Alternative, mutually exclusive keywords are grouped in braces and separated by vertical bars.
[*x* | *y* | *z*]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string, or the string will include the quotation marks.
`screen` font	Terminal sessions and information the system displays are in `screen` font.
`boldface screen` font	Information you must enter is in **`boldface screen`** font.
`italic screen` font	Arguments for which you supply values are in *`italic screen`* font.
^	The symbol ^ represents the key labeled Control—for example, the key combination ^D in a screen display means hold down the Control key while you press the D key.
< >	Nonprinting characters, such as passwords, are in angle brackets in contexts where italics are not available.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Note This symbol means *reader take note*. Notes contain helpful suggestions or references to material not covered in the publication.

Tip This symbol means *the following are useful tips.*

Timesaver This symbol means *the described action saves time*. You can save time by performing the action described in the paragraph.

Caution This symbol means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Terms and Acronyms

To fully understand the content of this guide, you should be familiar with the following terms and acronyms:

Note A complete list of terms and acronyms is available in the *Dictionary of Cisco Internetworking Terms and Acronyms* guide, available on Cisco.com and the Documentation CD-ROM.

- CoS—class of service
- CPE—customer premises equipment
- CRC—cyclic redundancy check
- CSU—channel service unit
- DCE—data communications equipment
- IPSec—IP Security Protocol
- MAC—Media Access Control
- MB—megabyte
- NVRAM—nonvolatile random-access memory
- OIR—online insertion and removal
- PPP—Point-to-Point Protocol
- QoS—quality of service
- RFI—radio frequency interference
- RIP—Routing Information Protocol
- SNMP—Simple Network Management Protocol
- TCP/IP—Transmission Control Protocol/Internet Protocol
- UBR—unspecified bit rate
- UDP—User Datagram Protocol
- UNI—User-Network Interface
- VPN—Virtual Private Network

Related Documentation

Cisco uBR Series Documentation

The procedures in this guide assume that site preparation and hardware setup are complete. Refer to the documents below as required for additional prerequisite information and reference.

Note If the hypertext link to any external document does not operate, you can access the desired document by typing or pasting the full document title in the **Search** field of the Cisco.com home page. Click **Go**.

- *Cisco uBR7100 Series Universal Broadband Routers* documentation web page
- *Cisco uBR7200 Series Universal Broadband Routers* documentation web page
- *Cisco uBR10012 Universal Broadband Router* documentation web page

Additional Documentation Resources

For detailed information on CMTS commands, syntax, and usage, refer to the *Cisco Broadband Cable Command Reference Guide*.

For Cisco IOS software configuration information and support, refer to the configuration and command reference publications that pertain to your version of Cisco IOS software and hardware. Specifically, you should refer to the following publications:

- For procedures on configuring broadband routers using the Cisco command-line interface (CLI), refer to the *Cisco IOS Multiservice Applications Configuration Guide,* Release 12.1
- For information on setting up quality of service (QoS), refer to the *Cisco IOS Quality of Service Solutions Configuration Guide,* Release 12.2 and *Cisco IOS Quality of Service Solutions Command Reference,* Release 12.2 publications.
- For information on encryption, refer to the *Cisco IOS Security Configuration Guide,* Release 12.2 and the *Cisco IOS Security Command Reference,* Release 12.2 publications.
- For information on interfaces, refer to the *Cisco IOS Interface Configuration Guide,* Release 12.2 and the *Cisco IOS Interface Command Reference,* Release 12.2 publications.
- For information on IP, refer to the *Network Protocols Configuration Guide, Part 1* and the *Network Protocols Command Reference, Part 1* publications.
- For information about configuring your Cisco networking device to function as a firewall and traffic filtering capabilities with access control lists, refer to the "Traffic Filtering and Firewalls" chapter of the *Cisco IOS Security Configuration Guide,* Release 12.2 on Cisco.com.

You can also refer to the Cisco IOS software release notes for the version of software you are using on your router. These Web pages on Cisco.com contain release notes for universal broadband routers:

- *Release Notes for the Cisco uBR7100 Series Universal Broadband Routers*
- *Release Notes for the Cisco uBR7200 Series Universal Broadband Routers*
- *Release Notes for the Cisco uBR10012 Universal Broadband Router*

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

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