Release Notes for Cisco uBR7200 Series for Cisco IOS Release 12.2 CX

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Cisco IOS Release 12.2(15)CX1
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These release notes for the Cisco uBR7200 series universal broadband routers describe the enhancements and caveats provided in Cisco IOS Release 12.2(15)CX1. This release is based on Cisco IOS Release 12.2(15)BC1, which is a child of Cisco IOS Release 12.2(15)T.

The 12.2 BC train is an interim release train that provides DOCSIS 1.1 two-way support, along with fixes for software caveats and support for selected new features.

Note   Cisco IOS Release 12.2(15)CX1 adds support for the Cisco uBR-MC16U/X and Cisco uBR-MC28U/X cable interface line cards.

For a list of the software caveats that apply to Cisco IOS Release 12.2(15)CX1, see the "Caveats" section on page 40 and *Caveats for Cisco IOS Release 12.2 T*. Use these release notes in conjunction with the cross-platform *Release Notes for Cisco IOS Release 12.2 T* located on Cisco.com and the Documentation CD-ROM.

Note   Cisco IOS Release 12.2(15)CX1 does not include support for telco-return images.

Cisco recommends that you view the field notices for this release to see if your software or hardware platforms are affected. If you have an account on Cisco.com, you can find field notices at http://www.cisco.com/warp/customer/770/index.shtml. If you do not have a Cisco.com login account, you can find field notices at http://www.cisco.com/warp/public/770/index.shtml.

CISCO SYSTEMS

Contents

These release notes describe the following topics:

Introduction

For information on new features and Cisco IOS commands supported by
Cisco IOS Release 12.2(15)CX1, see the "New and Changed Information" section on page 24 and the
"Related Documentation" section on page 45.

Cisco uBR7200 Series Universal Broadband Routers

The Cisco uBR7200 series universal broadband routers—the Cisco uBR7223, the Cisco uBR7246, and the Cisco uBR7246VXR—are based on the Data-over-Cable Service Interface Specification (DOCSIS) standards. Each is designed to be installed at a cable operator's headend facility or distribution hub and to function as the cable modem termination system (CMTS) for subscriber-end devices such as the Cisco uBR905 and Cisco uBR925 cable access routers, and other DOCSIS-compliant cable modems (CMs) and set-top boxes (STBs).

Cisco uBR7200 series universal broadband routers allow two-way transmission of digital data and Voice over IP (VoIP) traffic over a hybrid fiber-coaxial (HFC) network. The Cisco uBR7200 series routers support IP routing with a wide variety of protocols and combinations of Ethernet, Fast Ethernet, Gigabit Ethernet, serial, High-Speed Serial Interface (HSSI), Packet over SONET (POS) OC-3 and OC-12c, and Asynchronous Transfer Mode (ATM) media.

Cisco uBR7246VXR Universal Broadband Router

The Cisco uBR7246VXR offers an industry-proven CMTS and carrier-class router in a scalable platform with a high-performance network processing engine to support data, voice, and video services for medium to large network installations.

The Cisco uBR7246VXR provides the following major hardware features:

- High-performance network processing engine
- I/O controller
- Up to two network interface port adapters

- Up to four cable interface line cards
- Up to two removable power supplies providing load-sharing and redundancy capabilities
- Two Personal Computer Memory Card International Association (PCMCIA) slots that allow for software upgrades through the use of Flash memory cards

Note The Cisco uBR7246VXR chassis does not support the MC11-FPGA cable interface line card.

Cisco uBR7246 Universal Broadband Router

The Cisco uBR7246 offers an industry-proven CMTS and carrier-class router in a scalable platform to support data, voice, and video services for medium to large network installations.

The Cisco uBR7246 provides the following major hardware features:

- Network processing engine
- I/O controller
- Up to two network interface port adapters
- Up to four cable interface line cards
- Up to two removable power supplies providing load-sharing and redundancy capabilities
- Two PCMCIA slots that allow for software upgrades through the use of Flash memory cards

Cisco uBR7223 Universal Broadband Router

The Cisco uBR7223 is a cost-effective, scalable interface between subscriber cable modems and the backbone data network, and is designed specifically for small to medium network installations.

The Cisco uBR7223 provides the following major hardware features:

- Network processing engine
- I/O controller
- One network interface port adapter
- Up to two cable interface line cards
- One removable power supply (The Cisco uBR7223 does not feature load-sharing and redundant power supply capability like the Cisco uBR7246VXR and Cisco uBR7246.)
- Two PCMCIA slots that allow for software upgrades through the use of Flash memory cards

Cisco uBR7200 Series Universal Broadband Router Overview

Table 1 provides a quick overview of the major hardware features of the three Cisco uBR7200 series universal broadband routers.

Table 1   Universal Broadband Router Overview

Supported Hardware	Cisco uBR7246VXR	Cisco uBR7246	Cisco uBR7223
Network Processing Engine	One of the following: • UBR7200-NPE-G1 • NPE-225 • NPE-300 • NPE-400	One of the following: • NPE-150 • NPE-200 • NPE-225	One of the following: • NPE-150 • NPE-200 • NPE-225
I/O Controller	One of the following: • UBR7200-I/O • UBR7200-I/O-FE • UBR7200-I/O-2FE/E	One of the following: • UBR7200-I/O • UBR7200-I/O-FE	One of the following: • UBR7200-I/O • UBR7200-I/O-FE
Network Interface Port Adapters	up to 2	up to 2	1
Cable Interface Line Cards	up to 4	up to 4	up to 2
Removable Power Supplies	up to 2	up to 2	1
PCMCIA Slots	2	2	2

Note The UBR7200-NPE-G1 does not require that an I/O controller be installed. See the "New Hardware Features in Release 12.2(11)CX" section on page 29 for more information.

Early Deployment Releases

These release notes describe the Cisco uBR7200 series universal broadband routers for Cisco IOS Release 12.2(15)CX1, which is based on Cisco IOS Release 12.2(15)BC1.
Cisco IOS Release 12.2 BC is an early deployment (ED) release that contains fixes to software caveats as well as support for new Cisco hardware and software features. Feature support is cumulative from release to release, unless otherwise noted.

Supported Features

Cisco IOS Release 12.2(15)CX1 supports the features provided in Cisco IOS Release 12.2(15)BC1, which is a child of Cisco IOS Release 12.2(15)T, for the Cisco uBR7200 series universal broadband routers.

Table 2 lists the features that were previously supported by the Cisco uBR7200 series in Cisco IOS Release 12.2(15)BC1 and earlier releases, and any new features that are supported in Cisco IOS Release 12.2(15)CX1.

Table 2 Early Deployment (ED) Releases for the Cisco uBR7200 Series

ED Release	Software Features[1] and MIBs[2]	Hardware Features	Hardware Availability
Cisco IOS Release 12.2(15)CX1	None	None	—
Cisco IOS Release 12.2(15)CX	• DOCSIS 2.0 A-TDMA Support	• Cisco uBR-MC16U/X cable interface line card • Cisco uBR-MC28U/X cable interface line card	Now
Cisco IOS Release 12.2(11)CX1	None	None	—
Cisco IOS Release 12.2(11)CX	None	• UBR7200-NPE-G1 on the Cisco uBR7246VXR	Now
Cisco IOS Release 12.2(15)BC1	• Command-Line Interface Enhancements • Dynamic Shared Secret • Fast Fault Detection • Load Balancing for the Cisco CMTS • PacketCable Debug Enhancements • Subscriber Traffic Management • Support for Cisco Broadband Troubleshooter Version 3.0	None	—
Cisco IOS Release 12.2(11)BC1	• N+1 Redundancy for the Cisco uBR7200 Series • Support for the **cable source-verify leasetimer** Command • Support for **packetcable element-id** Command	None	—
Cisco IOS Release 12.2(8)BC2a	None	None	—

Table 2   Early Deployment (ED) Releases for the Cisco uBR7200 Series (continued)

ED Release	Software Features[1] and MIBs[2]	Hardware Features	Hardware Availability

Cisco IOS Release 12.2(8)BC2	• Adding Load Information and a Timestamp to Show Commands
	
	• Display Modem Capabilities with the **show cable modem mac** Command
	
	• Support for the **cable modem vendor** Command
	
	• Support for the **cable tftp-enforce** Command
	
	• Support for a Secondary Shared Secret
	
	• Enhancement to the **show hccp brief** Command
	
	• Enhancement to the **cable filter group** Command
	
	• PacketCable Commands
	
	• Advanced Spectrum Management Features:
	  – CNR-based Intelligent Frequency Hopping
	  – CNR-based Dynamic Modulation Change
	  – Dynamic Channel Width Change
	
	• Support for Acterna DCMTA v1.1 and Cisco Broadband Troubleshooter Version 3.0[3]
		• Cisco uBR-MC16S Spectrum Management Card with Advanced Spectrum Management Features	Now

Cisco IOS Release 12.2(8)BC1	• EXEC Commands in Configuration Mode • Secure Shell (SSH)	None	—
Cisco IOS Release 12.2(4)BC1b	• Cisco IOS Network-Based Application Recognition (NBAR) • Turbo ACL • SNMP Cable Modem Remote Query	• Support for the uBR7200-I/O-2FE/E input/output controller in the Cisco uBR7246VXR chassis	Now
Cisco IOS Release 12.2(4)BC1	• Baseline Privacy Interface Plus (BPI+) • PPPoE[4] Termination	• Support for PA-T3+ and PA-2T3+ port adapters for the Cisco uBR7223 and Cisco uBR7246VXR routers • Support for the Cisco uBR-MC16E cable interface line card for the Cisco uBR7223 and Cisco uBR7246VXR routers	Now

Table 2 *Early Deployment (ED) Releases for the Cisco uBR7200 Series (continued)*

ED Release	Software Features[1] and MIBs[2]	Hardware Features	Hardware Availability

Cisco IOS Release 12.2(4)XF1	• DOCSIS 1.0 Support
	
	• DOCSIS 1.0+ Support
	
	• DOCSIS 1.1 Support, including:
	  – TLV[5] Parser Support
	  – BE[6], UGS[7], UGS-AD[8], rtPS[9] Service Flows
	  – DSC[10] Service Flow, Classifier, and PHS[11]
	  – Fragmentation
	  – Concatenation
	  – PHS
	  – DS[12] Classification and Queuing
	
	• Access Lists
	
	• Spectrum Management and Dynamic Upstream Modulation
	
	• Cable Intercept Command
	
	• Cable Interface Setup Facility
	
	• DHCP/TOD/TFTP[13] Server Support
	
	• Cable Interface Bundling Support
	
	• Cable Subinterface Support
	
	• Cable Source Verification Feature
	
	• MPLS[14] VPN[15] Support for Subinterfaces and Interface Bundles
	
	• Dynamic Mobile Hosts Feature
	
	• IP NAT/PAT[16] Translation
	
	• Internal Modem Configuration File Editor
	
	• Cable Flap List
	
	• Cable ARP[17] and Proxy ARP Support
	
	• Cable Downstream Frequency Override CLI[18]
	
	• MAX-CPE CLI override
		• Cisco uBR-MC11C
		
		• Cisco uBR-MC12C
		
		• Cisco uBR-MC14C
		
		• Cisco uBR-MC16C
		
		• Cisco uBR-MC28C
		
		• Cisco uBR-MC28C-BNC
			Now

1. Only major features are listed.

2. MIB = Management Information Base

3. The Acterna DCMTA tool is no longer available.

4. PPPoE = Point-to-Point Protocol over Ethernet

5. TLV = Type/Length/Value

6. BE = Best Effort

7. UGS = Unsolicited Grant Service

8. UGS-AD = Unsolicited Grant Service with Activity Detection

9. rtPS = Real-Time Polling Service

10. DSC = Dynamic Service Change

11. PHS = Payload Header Suppression

12. DS = Downstream

13. DHCP = Dynamic Host Configuration Protocol, TOD = Time of Day, TFTP = Trivial File Transfer Protocol

14. MPLS = Multiprotocol Label Switching

15. VPN = Virtual Private Network

16. NAT/PAT = Network Address Translation/Port Address Translation

17. ARP = Address Resolution Protocol

18. CLI = command line interface

Unsupported Features

Table 3 lists the features that are not supported in Cisco IOS Release 12.2(15)CX1, along with the most recent, recommended Cisco IOS release that does support that particular feature for the Cisco uBR7200 series routers.

Table 3   Features Not Supported in Cisco IOS Release 12.2(15)CX1

Software or Hardware Feature	Supported in Cisco IOS Release
Bridging over the Cable Interface	Not Supported for the Cisco uBR7200 series
Cable Downstream Frequency Command	Release 12.1(10)EC
Telco Return Support	Release 12.1(10)EC
Web Cache Communication Protocol	Release 12.2(4)T2

System Requirements

This section describes the system requirements for Cisco Release 12.2(15)CX1 and includes the following sections:

Memory Recommendations

Cisco IOS Release 12.2(15)CX1 provides two different boot images for the Cisco uBR7200 series routers:

- ubr7200-kboot-mz.122-15.CX.bin

  The "kboot" version of the boot image is a new version of the boot image software that can run only on the Cisco uBR7200-NPE-G1 processor and the UBR7200-I/O-2FE/E I/O controller, because it is too large to load on the other I/O controllers. This image contains support for almost all supported port adapters, allowing the Cisco uBR7246VXR router to boot over almost any type of WAN interface.

- ubr7200-boot-mz.122-15.CX.bin

  The "boot" version of the boot image is small enough to be loaded on I/O controllers with 4MB of Flash memory, but it supports only Ethernet, FastEthernet, Gigabit Ethernet, OC POS, and a limited number of ATM port adapters. If you are using a serial port adapter or most ATM port adapters, you will not be able to boot over the WAN interface.

This difference in boot images affects only the ability of the Cisco uBR7246VXR router to boot over the WAN interface. When the router has successfully loaded the Cisco IOS software, it will have connectivity over all of the port adapters that this particular version of Cisco IOS software supports.

Table 4 displays the memory recommendations of the Cisco IOS feature sets for the Cisco uBR7200 series universal broadband routers for Cisco IOS Release 12.2(15)CX1. Cisco uBR7200 series routers are only available with a 48 MB or 128 MB of Flash disk memory on the I/O Controller cards. The UBR7200-NPE-G1 uses compact Flash disk only.

Note Flash disks, an alternative to linear Flash memory, are Flash memory-based devices that can be used as file storage media in the PCMCIA card slots of the I/O Controllers. Each I/O Controller has two PCMCIA slots and can be configured with up to 256 MB of Flash disk memory.

Table 4   Memory Recommendations for the Cisco uBR7200 Series Routers,
Cisco Release 12.2(15)CX1 Feature Sets

Feature Set	Software Image	Recommended Flash Disk Memory	Recommended DRAM Memory	Runs From
Two-Way Data/VoIP Images				
DOCSIS Two-Way	ubr7200-p-mz	48-MB Flash disk	128-MB DRAM	RAM
DOCSIS Two-Way IP Plus	ubr7200-is-mz	48-MB Flash disk	128-MB DRAM	RAM
DOCSIS Two-Way with BPI	ubr7200-k8p-mz	48-MB Flash disk	128-MB DRAM	RAM
DOCSIS Two-Way IP Plus with BPI	ubr7200-ik8s-mz	48-MB Flash disk	128-MB DRAM	RAM
DOCSIS Two-Way 3DES	ubr7200-k9p-mz	48-MB Flash disk	128-MB DRAM	RAM
DOCSIS Two-Way 3DES IP Plus	ubr7200-ik9s-mz	48-MB Flash disk	128-MB DRAM	RAM

The image subset legend for Table 4 is as follows:

- i = IP routing, MPLS-VPN support, and noncable interface bridging, including Network Address Translation (NAT)

- k8 = DOCSIS Baseline Privacy

- p = IP routing with Intermediate System-to-Intermediate System (IS-IS) and Border Gateway Protocol (BGP); MPLS-VPN support; no bridging and no NAT

- s = "Plus" features: NAT and Inter-Switch Link (ISL)

- k9 = 3DES level of encryption

Note All images support all of the hardware listed in the "Supported Hardware" section on page 12, unless otherwise indicated.

System Interoperability

This section clarifies the operation of certain features in the Cisco uBR7200 series universal broadband routers.

- DOCSIS 1.0 Baseline Privacy

  DOCSIS baseline privacy interface (BPI) gives subscribers data privacy across the RF network, encrypting traffic flows between the CMTS and CM. BPI ensures that a CM, uniquely identified by its Media Access Control (MAC) address, can obtain keying material for services only it is authorized to access.

  To enable BPI, choose software at both the CMTS and CM that support the mode of operation. For the Cisco uBR7200 series software, choose an image with "k8" in its file name or BPI in the feature set description.

  The CM must also support BPI. CMs must have factory-installed RSA private/public key pairs to support internal algorithms to generate key pairs prior to first BPI establishment. BPI must be enabled using the DOCSIS configuration file.

  Note RSA stands for Rivest, Shamir, and Adelman, inventors of a public-key cryptographic system.

- CM Interoperability

  - The Cisco uBR7200 series interoperates with DOCSIS-based two-way CMs that support basic Internet access, VoIP, or Virtual Private Networks (VPNs).

  - EuroDOCSIS CMs or STBs with integrated EuroDOCSIS CMs using Cisco uBR-MC16E cable interface line cards and Cisco IOS Release 12.2(4)BC1 or higher. EuroDOCSIS operation support includes 8-MHz Phase Alternating Line (PAL) or Systeme Electronique Couleur Avec Memoire (SECAM) channel plans.

    Note Cisco IOS Release 12.2(15)CX1 does not support telco-return CMs/STBs.

- DOCSIS 1.0 Extensions

  The Cisco uBR7200 series supports the following DOCSIS 1.0 quality of service (QoS) extensions:

  - Multi-Service ID (SID) support, allowing the definition of multiple SIDs on the upstream—Voice traffic can be designated on a higher QoS committed information rate (CIR) secondary SID, while data traffic can be forwarded on a best-effort basis on a primary SID. Secondary SIDs are higher QoS CIR-type classes that have a nonzero minimum reserved rate (CIR-type service). These SIDs receive preferential treatment at the CMTS for grants over any tiered best-effort type data SID of that upstream. Reliable operation with voice requires multiple SIDs—at least two per CM to separate voice from data. In DOCSIS 1.0, SIDs are set up statically. When supporting DOCSIS 1.0 extensions, SIDs can be set up statically or dynamically. Both the CMTS and CM must support this capability.

  - CM-initiated dynamic MAC messages—Dynamic Service Addition (DSA) and Dynamic Service Deletion (DSD). These messages allow dynamic SIDs to be created and deleted at run-time on a per-VoIP call basis.

  - Unsolicited grant service (constant bit rate [CBR] scheduling) on the upstream—This helps provide a higher-quality channel for upstream VoIP packets from an Integrated Telephony Cable Modem (ITCM) such as the Cisco uBR924 cable access router.

  - Ability to provide separate downstream rates for any given ITCM, based on the IP-precedence value in the packet—This helps separate voice signaling and data traffic that goes to the same ITCM to address rate-shaping purposes.

  - Concatenation—To increase the per-CM upstream throughput in certain releases of software, Cisco uBR7200 series software supports a concatenated burst of multiple MAC frames from a CM that supports concatenation.

  Note All DOCSIS 1.0 extensions are activated only when a CM or Cisco uBR924 that supports these extensions solicits services using dynamic MAC messages or the feature set. If the CMs in your network are pure DOCSIS 1.0-based, they receive regular DOCSIS 1.0 treatment from the CMTS.

- Clock Synchronization

  The Cisco uBR7200 series support clock hardware and software to enable high-quality delivery of IP telephony services through synchronized data transmissions. To support the clock feature set, a Cisco uBR7246VXR chassis must be used. The Cisco uBR7246VXR must contain a clock card and either a Cisco uBR-MC16E or Cisco uBR-MC28C cable interface line card. Only these cards support the external clock reference from the clock card to distribute that signal to CMs or STBs attached to the specific network segments.

  Each cable modem must also support VoIP applications and the clock reference feature set to enable synchronized timing. The Cisco uBR924 and Cisco uBR925 cable access routers, running Cisco IOS Release 12.0(7)T or later, supports the clock reference feature set automatically.

- National Clock Card

  The Cisco uBR7246VXR supports the National Clock Card. The National Clock Card allows the Cisco uBR7246VXR to accept a primary or secondary external clock reference. If there is no primary clock, the Clock Card goes into Holdover. After a period of 2-10 seconds, the Clock Card switches to the secondary clock. When the primary clock is back online, the Clock Card switches to the primary clock after a period of 2-10 seconds. The National Clock Card requires the Cisco uBR-MC1xS or the Cisco uBR-MC1xE cable interface line card.

Supported Hardware

Cisco IOS Release 12.2(15)CX1 only supports the Cisco uBR7246VXR universal broadband router.

For detailed descriptions of the new hardware features, see the "New and Changed Information" section on page 24.

Network Processing Engines

The Cisco uBR7223 and the Cisco uBR7246 support the following Network Processing Engines (NPE) in Cisco IOS Release 12.2(15)CX1:

- NPE-150
- NPE-200
- NPE-225

The Cisco uBR7246VXR supports the following Network Processing Engines (NPEs) in Cisco IOS Release 12.2(15)CX1:

- UBR7200-NPE-G1
- NPE-225
- NPE-300
- NPE-400

Note   The Cisco UBR7200-NPE-G1, Cisco NPE-300, and Cisco NPE-400 are not supported on the Cisco uBR7223 and the Cisco uBR7246. The Cisco NPE-150 and Cisco NPE-200 are not supported on the Cisco uBR7246VXR.

Note   The Cisco NPE-300 is at end-of-life and has not been orderable since November 15, 2001. See the following product bulletin for more details on the Cisco NPE-300 recommended upgrade path:

http://www.cisco.com/warp/partner/synchronicd/cc/general/bulletin/rt/1438_pp.htm

For more information, see the *Network Processing Engine and Network Services Engine Installation and Configuration* guide and the *Memory Replacement Instructions for the Network Processing Engine or Network Services Engine and Input/Output Controller* guide on Cisco.com.

I/O Controllers

Cisco IOS Release 12.2(15)CX1 supports the following I/O controllers for the Cisco uBR7200 series universal broadband routers:

- UBR7200-I/O-2FE/E input/output controller—Two Fast Ethernet ports and one Ethernet port; equipped with 2 RJ-45 receptacles for 10/100 Mbps operation. Supported for the Cisco uBR7246VXR router. The Cisco IOS Release 12.1(10)EC boot helper image [ubr7200-boot-mz.12.1-10.EC] must be used on this controller

- UBR7200-I/O-FE—One Fast Ethernet port; equipped with an MII receptacle and an RJ-45 receptacle for use at 100 Mbps full-duplex or half-duplex operation. Only 1 receptacle can be configured for use at a time. Supported for Cisco uBR7223, Cisco uBR7246, and Cisco uBR7246VXR routers. The 12.0(15)SC [ubr7200-boot-mz.12.0-15.SC] boot helper image is recommended for this controller.

- UBR7200-I/O—Has no Fast Ethernet port. Supported for Cisco uBR7223, Cisco uBR7246, and Cisco uBR7246VXR routers. The 12.0(15)SC [ubr7200-boot-mz.12.0-15.SC] boot helper image is recommended for this controller.

Note Do not use the 12.1(10)EC boot helper image with the UBR7200-I/O-FE and UBR7200-I/O controllers.

Cable Interface Line Cards

Cisco IOS Release 12.2(15)CX1 supports the following cable interface line cards, all of which provide connection to the HFC network:

- MC11C cable interface line cards offer the following ports:
    - one upstream port
    - one downstream port

- MC12C cable interface line cards offer the following ports:
    - two upstream ports
    - one downstream port

- MC14C cable interface line cards offer the following ports:
    - four upstream ports
    - one downstream port

- MC16C, MC16S, MC16U, and MC16X cable interface line cards offer the following ports:
    - six upstream ports
    - one downstream port

- MC16E cable interface line cards provide connection to an HFC network using the EuroDOCSIS (Annex A) standard, and offer the following ports:
    - six upstream ports
    - one downstream port

- MC28C and MC28C-BNC cable interface line cards offer the following ports:
  - eight upstream ports
  - two downstream ports
- MC28U and MC28X cable interface line cards offer the following ports, organized into two DOCSIS MAC domains:
  - eight upstream ports
  - two downstream ports

Table 5 provides a quick overview of the cable interface line cards that are supported in Cisco IOS Release 12.2(15)CX1 for the Cisco uBR7200 series routers:

Table 5   Cisco uBR7200 Series Cable Interface Line Cards

Cable Interface Line Card	Upstream Ports	Downstream Ports	Additional Features
MC16U and MC16X	6	1	• Supports either DOCSIS or Euro-DOCSIS operation • Supports DOCSIS 2.0 A-TDMA • Are two of the new Broadband Processing Engine (BPE) series of cable interfaces that provide increased performance
MC28U and MC28X	8	2	• Supports either DOCSIS or Euro-DOCSIS operation • Supports DOCSIS 2.0 A-TDMA • Are two of the new Broadband Processing Engine (BPE) series of cable interfaces that provide increased performance
MC11C	1	1	
MC12C	2	1	
MC14C	4	1	
MC16C	6	1	
MC16E	6	1	EuroDOCSIS (Annex A) Support
MC28C	8	2	
MC28C-BNC	8	2	BNC connectors instead of F-connectors
MC16S	6	1	Supports advanced spectrum management features

Port Adapter Cards

Table 6 lists and describes the port adapters supported by Cisco uBR7200 series routers in Cisco IOS Release 12.2(15)CX1.

Note Table 6 identifies some port adapters for the Cisco uBR7200 series routers that are in an end-of-life (EOL) stage. See the following product bulletin for more current details on these EOL port adapters:

http://www.cisco.com/warp/partner/synchronicd/cc/general/bulletin/rt/1438_pp.htm

Note Not all Cisco uBR7200 series routers support all port adapters. Some port adapters must be at certain revision levels to be used in the Cisco uBR7246VXR router.

Table 6   Cisco uBR7200 Series Port Adapter Releases

Product Number	Cisco uBR7223	Cisco uBR7246	Cisco uBR7246VXR	End-of-Life
Ethernet				
PA-4E—4-port Ethernet 10BASE-T port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-8E—8-port Ethernet 10BASE-T port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	Yes
PA-FE-TX—1-port 100BASE-TX Fast Ethernet port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-FE-FX—1-port 100BASE-FX Fast Ethernet port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-2FEISL-TX—2-port 100BASE-TX Fast Ethernet port adapter with Inter-Switch Link (ISL) support	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	Yes
PA-2FEISL-FX—2-port 100BASE-FX Fast Ethernet port adapter with ISL support	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	Yes
PA-12E/2FE—12-port 10BASE-T and 2-port 10/100BASE-TX port adapter	Not applicable	12.2(4)XF1	Not applicable	No
PA-2FE-TX—2-port 100BASE-TX Fast Ethernet port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-2FE-FX—2-port 100BASE-FX Fast Ethernet port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
Gigabit Ethernet				
PA-GE—1-port, full-duplex, IEEE 802.3z-compliant Gigabit Ethernet (GE) port adapter[1]	Not applicable	Not applicable	12.2(4)XF1	No

Table 6   Cisco uBR7200 Series Port Adapter Releases (continued)

Product Number	Cisco uBR7223	Cisco uBR7246	Cisco uBR7246VXR	End-of-Life
Serial				
PA-4T+—4-port synchronous serial port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-8T-232—8-port EIA/TIA-232 synchronous serial port adapter	12.2(4)XF1	12.2(4)XF1	Not applicable	Yes
PA-8T-V35—8-port V.35 synchronous serial port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-8T-X21—8-port X.21 synchronous serial port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	Yes
PA-4E1G-75—4-port unbalanced (75-ohm) E1-G.703/G.704 synchronous serial port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	Yes
PA-4E1G-120—4-port balanced (120-ohm) E1-G.703/G.704 synchronous serial port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	Yes
PA-E3—1-port high-speed serial E3 interface port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-T3—1-port T3 serial interface port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-T3+—1-port T3 serial interface port adapter enhanced	12.2(4)BC1	Not applicable	12.2(4)BC1	No
PA-2E3—2-port high-speed serial E3 interface port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-2T3—2-port T3 serial interface port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-2T3+—2-port T3 serial interface port adapter enhanced	12.2(4)BC1	Not applicable	12.2(4)BC1	No
PA-MC-T3—1-port T3 (channelized into 28 independent T1 data lines) port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-MC-2T1—2-port multichannel DS1 Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) single-wide port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	Yes
PA-MC-4T1—4-port multichannel DS1 ISDN PRI single-wide port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-MC-8E1/120—8-port multichannel E1 ISDN PRI single-wide port adapter	12.2(4)XF1	12.2(4)XF1	Not applicable	Yes

Table 6 Cisco uBR7200 Series Port Adapter Releases (continued)

Product Number	Cisco uBR7223	Cisco uBR7246	Cisco uBR7246VXR	End-of-Life
PA-MC-8T1—8-port multichannel DS1 ISDN PRI single-wide port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	Yes
PA-MC-2E1/120—2-port multichannel E1 ISDN PRI single-wide port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
HSSI				
PA-H—1-port HSSI port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	Yes
PA-2H—2-port HSSI port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
ATM				
PA-A1-OC3SMI—1-port ATM OC-3c/STM-1 single-mode intermediate reach port adapter	12.2(4)XF1	12.2(4)XF1	Not applicable	No
PA-A1-OC3MM—1-port ATM OC-3c/STM-1 multimode port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	Yes
PA-A2-4E1XC-OC3SM—5-port ATM CES[2] (4 E1 120-ohm CBR[3] ports and 1 OC-3 ATM single-mode port) port adapter	Not applicable	12.2(4)XF1	Not applicable	Yes
PA-A2-4E1XC-E3ATM—5-port ATM CES[2] (4 E1 120-ohm CBR[3] ports and 1 E3 ATM port) port adapter	Not applicable	12.2(4)XF1	Not applicable	Yes
PA-A2-4T1C-OC3SM—5-port ATM CES[2] (4 T1 CBR[3] ports and 1 OC-3 ATM single-mode port) port adapter	Not applicable	12.2(4)XF1	Not applicable	Yes
PA-A2-4T1C-T3ATM—5-port ATM CES[2] (4 T1 CBR[3] ports and 1 T3 ATM port) port adapter	Not applicable	12.2(4)XF1	Not applicable	Yes
PA-A3-E3—1-port E3 ATM, PCI-based port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-A3-T3—1-port T3 ATM, PCI-based port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-A3-OC3MM—1-port OC-3c ATM, PCI-based multimode port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-A3-OC3SMI—1-port OC-3c ATM, PCI-based single-mode intermediate reach port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
PA-A3-OC3SML—1-port OC-3c ATM, PCI-based single-mode long reach port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No

Table 6   Cisco uBR7200 Series Port Adapter Releases (continued)

Product Number	Cisco uBR7223	Cisco uBR7246	Cisco uBR7246VXR	End-of-Life
PA-A3-8T1IMA—ATM inverse multiplexer over ATM port adapter with 8 T1 ports	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	No
Packet-Over-SONET (POS)				
PA-POS-OC3SML—1-port POS OC-3 single-mode, long reach port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	Yes
PA-POS-OC3SMI—1-port OC-3 single-mode, intermediate reach port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	
PA-POS-OC3MM—1-port POS OC3 multimode port adapter	12.2(4)XF1	12.2(4)XF1	12.2(4)XF1	Yes
Dynamic Packet Transport (DPT)				
PA-SRP-OC12SML—2-port OC-12c (STM4c) single-mode fiber, long reach DPT port adapter	Not applicable	12.2(4)XF1	12.2(4)XF1	
PA-SRP-OC12SMI—2-port OC-12c (STM4c) single-mode fiber, intermediate reach DPT port adapter	Not applicable	12.2(4)XF1	12.2(4)XF1	
PA-SRP-OC12SMX—2-port OC-12c (STM4c) single-mode fiber, extended reach DPT port adapter	Not applicable	12.2(4)XF1	12.2(4)XF1	
PA-SRP-OC12MM—2-port OC-12c (STM4c) multimode fiber DPT port adapter	Not applicable	12.2(4)XF1	12.2(4)XF1	Yes

1. The Gigabit Ethernet port adapter must be combined with the appropriate optical fiber cable and a Gigabit Interface Converter (GBIC).

2. CES = circuit emulation services.

3. CBR = constant bit rate.

Determining Your Software Release

To determine the version of Cisco IOS software running on the Cisco uBR7200 series universal broadband router, log in to the router and enter the **show version** EXEC command:

```
Router> show version
Cisco Internetwork Operating System Software
IOS (tm) 12.2 BC Software (ubr7200-is-mz), Version 12.2(15)CX1, RELEASE SOFTWARE
```

Upgrading to a New Software Release

For general information about upgrading to a new software release, see *Cisco IOS Upgrade Ordering Instructions* located at: http://www.cisco.com/warp/public/cc/pd/iosw/prodlit/957_pp.htm.

Feature Set Tables

The Cisco IOS software is packaged in feature sets consisting of software images—depending on the platform. Each feature set contains a specific set of Cisco IOS features.

Table 7 lists the features and feature sets supported by the Cisco uBR7200 series in Cisco IOS Release 12.2(15)CX1 and uses the following conventions:

- Yes—The feature is supported in the software image.
- No—The feature is not supported in the software image.
- In—The number in the "In" column indicates the Cisco IOS release in which the feature was introduced (excluding deferred images). Cisco IOS Release 12.2(4)XF1 is the base release; all features, unless otherwise noted, were introduced in this release.

✎

Note This table might not be cumulative or list all the features in each image. You can find the most current Cisco IOS documentation on Cisco.com. These electronic documents may contain updates and modifications made after the hard-copy documents were printed. If you have a Cisco.com login account, you can find image and release information regarding features prior to Cisco IOS Release 12.2(15)CX1 by using the Feature Navigator tool at http://www.cisco.com/go/fn.

Table 7   Feature List by Feature Sets for Cisco uBR7200 Series Universal Broadband Routers

Feature	In[1]	DOCSIS Two-way	DOCSIS Two-way with BPI	DOCSIS Two-way, IP Plus	DOCSIS Two-way, IP Plus with BPI	DOCSIS Two-Way 3DES with BPI	DOCSIS Two-Way 3DES IP Plus with BPI
IP Routing							
DHCP[2] Server		Yes	Yes	Yes	Yes	Yes	Yes
DRP[3] Server Agent		Yes	Yes	Yes	Yes	Yes	Yes
Easy IP (Phase 1)		Yes	Yes	Yes	Yes	Yes	Yes
Hot-Standby 1+1 Redundancy		No	No	No	No	No	No
HSRP[4] over ISL[5] in Virtual LAN Configurations		No	No	Yes	Yes	Yes	Yes
IP Type of Service and Precedence for GRE[6] Tunnels		Yes	Yes	Yes	Yes	Yes	Yes
IP Enhanced IGRP[7] Route Authentication		Yes	Yes	Yes	Yes	Yes	Yes
N+1 Redundancy for the Cisco uBR7200 Series	12.2(11)BC1	Yes	Yes	Yes	Yes	Yes	Yes
Per-Modem Filters		Yes	Yes	Yes	Yes	Yes	Yes
PPPoE Termination		Yes	Yes	Yes	Yes	Yes	Yes
Management							
Cable Interface Setup Facility		Yes	Yes	Yes	Yes	Yes	Yes

Table 7   Feature List by Feature Sets for Cisco uBR7200 Series Universal Broadband Routers (continued)

Feature	In[1]	DOCSIS Two-way	DOCSIS Two-way with BPI	DOCSIS Two-way, IP Plus	DOCSIS Two-way, IP Plus with BPI	DOCSIS Two-Way 3DES with BPI	DOCSIS Two-Way 3DES IP Plus with BPI
Cisco Call History MIB Command Line Interface		Yes	Yes	Yes	Yes	Yes	Yes
DOCSIS 2.0 A-TDMA Support	12.2(15)CX	Yes	Yes	Yes	Yes	Yes	Yes
DOCSIS Ethernet MIB Objects Support (RFC 2665)		Yes	Yes	Yes	Yes	Yes	Yes
DOCSIS OSSI[8] Objects Support (RFC 2233)		Yes	Yes	Yes	Yes	Yes	Yes
Dynamic Ranging Support		Yes	Yes	Yes	Yes	Yes	Yes
Enhanced Modem Status Display		Yes	Yes	Yes	Yes	Yes	Yes
Enhanced Per-Modem Error Counter		Yes	Yes	Yes	Yes	Yes	Yes
Entity MIB, Phase 1		Yes	Yes	Yes	Yes	Yes	Yes
Internal Modem Configuration File Editor		Yes	Yes	Yes	Yes	Yes	Yes
LinkUp/Down Traps Support (RFC 2233)		Yes	Yes	Yes	Yes	Yes	Yes
RF Interface MIB		Yes	Yes	Yes	Yes	Yes	Yes
SNMPv2C[9] and SNMPv3[10]		Yes	Yes	Yes	Yes	Yes	Yes
Multimedia							
Bidirectional PIM[11]		No	No	No	No	No	No
IP Multicast Load Splitting across Equal-Cost Paths		No	No	No	No	No	No
IP Multicast over ATM[12] Point-to-Multipoint Virtual Circuits		No	No	No	No	No	No
IP Multicast over Token Ring LANs		No	No	No	No	No	No
Stub IP Multicast Routing		No	No	No	No	No	No
Quality of Service							
252 Operator Configurable QoS Service Profiles for DOCSIS 1.0		Yes	Yes	Yes	Yes	Yes	Yes
Admission Control for Load Balancing		Yes	Yes	Yes	Yes	Yes	Yes
Admission Control (Including Weighting Functions per QoS Profile)		Yes	Yes	Yes	Yes	Yes	Yes

Table 7 Feature List by Feature Sets for Cisco uBR7200 Series Universal Broadband Routers (continued)

Feature	In[1]	DOCSIS Two-way	DOCSIS Two-way with BPI	DOCSIS Two-way, IP Plus	DOCSIS Two-way, IP Plus with BPI	DOCSIS Two-Way 3DES with BPI	DOCSIS Two-Way 3DES IP Plus with BPI
DOCSIS 1.0 Configuration File Editor (IOS CLI-based)		Yes	Yes	Yes	Yes	Yes	Yes
Dynamic Upstream Modulation		Yes	Yes	Yes	Yes	Yes	Yes
DOCSIS 1.0+[13] QoS Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
Downstream QoS Handling		Yes	Yes	Yes	Yes	Yes	Yes
Downstream Traffic Shaping		Yes	Yes	Yes	Yes	Yes	Yes
Dynamic SID Support		Yes	Yes	Yes	Yes	Yes	Yes
Dynamic Map-Advance		Yes	Yes	Yes	Yes	Yes	Yes
Dynamic Time-of-Day-Based QoS Service Profiles for DOCSIS 1.0		Yes	Yes	Yes	Yes	Yes	Yes
Guaranteed Upstream Minimum Throughput per Modem for DOCSIS 1.0		Yes	Yes	Yes	Yes	Yes	Yes
Improved Upstream QoS		Yes	Yes	Yes	Yes	Yes	Yes
Multiple SID Support for DOCSIS 1.0+		Yes	Yes	Yes	Yes	Yes	Yes
Multiple SID Support for DOCSIS 1.1		Yes	Yes	Yes	Yes	Yes	Yes
Multiple SID Support (static only)		Yes	Yes	Yes	Yes	Yes	Yes
QoS Configuration		Yes	Yes	Yes	Yes	Yes	Yes
QoS Profile Enforcement		Yes	Yes	Yes	Yes	Yes	Yes
QoS Profile Management via SNMP, CLI, or Dynamic		No	Yes	Yes	Yes	Yes	Yes
RTP[14] Header Compression		Yes	Yes	Yes	Yes	Yes	Yes
Telco Return		No	No	No	No	No	No
Time of Day (ToD) Server		Yes	Yes	Yes	Yes	Yes	Yes
TOS Bit Restamping and TOS-based QoS for DOCSIS 1.0		Yes	Yes	Yes	Yes	Yes	Yes
Upstream Address Verification		Yes	Yes	Yes	Yes	Yes	Yes
Upstream Traffic Shaping		Yes	Yes	Yes	Yes	Yes	Yes
Security							
Automated Double Authentication		Yes	Yes	Yes	Yes	Yes	Yes
BPI Encryption		No	Yes	No	Yes	Yes	Yes
BPI+ Encryption		No	Yes	No	Yes	Yes	Yes

Table 7   Feature List by Feature Sets for Cisco uBR7200 Series Universal Broadband Routers (continued)

Feature	Feature Set						
	In[1]	DOCSIS Two-way	DOCSIS Two-way with BPI	DOCSIS Two-way, IP Plus	DOCSIS Two-way, IP Plus with BPI	DOCSIS Two-Way 3DES with BPI	DOCSIS Two-Way 3DES IP Plus with BPI
Cable Modem and Multicast Authentication using RADIUS[15]		No	No	No	No	No	No
Cable source-verify		Yes	Yes	Yes	Yes	Yes	Yes
Cable source-verify DHCP (Including lease-query)		Yes	Yes	Yes	Yes	Yes	Yes
Cisco IOS Firewall Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
Dynamic Mobile Hosts		Yes	Yes	Yes	Yes	Yes	Yes
HTTP[16] Security		Yes	Yes	Yes	Yes	Yes	Yes
Named Method Lists for AAA[17] Authorization & Accounting		Yes	Yes	Yes	Yes	Yes	Yes
Per-Modem and Per-Host Access List Support		Yes	Yes	Yes	Yes	Yes	Yes
Per-User Configuration		Yes	Yes	Yes	Yes	Yes	Yes
Redirect-Number Support for RADIUS and TACACS[18]+ Servers		No	No	No	No	No	No
Reflexive Access Lists		Yes	Yes	Yes	Yes	Yes	Yes
Secure Shell (SSH)		Yes	Yes	Yes	Yes	Yes	Yes
SNMP Access Lists (Including Logging Feature)		Yes	Yes	Yes	Yes	Yes	Yes
TFTP-enforce		Yes	Yes	Yes	Yes	Yes	Yes
TACACS+		Yes	Yes	Yes	Yes	Yes	Yes
Vendor-Proprietary RADIUS Attributes		No	No	No	No	No	No
Switching							
Fast-Switched Policy Routing		Yes	Yes	Yes	Yes	Yes	Yes
VPN							
MPLS VPN Support for Subinterfaces and Interface Bundles		Yes	Yes	Yes	Yes	Yes	Yes
WAN Optimization							
PAD[19] Subaddressing		Yes	Yes	Yes	Yes	Yes	Yes
WAN Services							
Bandwidth Allocation Control Protocol (BACP)		Yes	Yes	Yes	Yes	Yes	Yes

Table 7   Feature List by Feature Sets for Cisco uBR7200 Series Universal Broadband Routers (continued)

Feature	In[1]	DOCSIS Two-way	DOCSIS Two-way with BPI	DOCSIS Two-way, IP Plus	DOCSIS Two-way, IP Plus with BPI	DOCSIS Two-Way 3DES with BPI	DOCSIS Two-Way 3DES IP Plus with BPI
Enhanced Local Management Interface (ELMI)		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay MIB Extensions		Yes	Yes	Yes	Yes	Yes	Yes
Frame Relay Router ForeSight		Yes	Yes	Yes	Yes	Yes	Yes
ISDN[20] Advice of Charge		Yes	Yes	Yes	Yes	Yes	Yes
ISDN Caller ID Callback		Yes	Yes	Yes	Yes	Yes	Yes
ISDN Multiple Switch Type		Yes	Yes	Yes	Yes	Yes	Yes
ISDN NFAS[21]		Yes	Yes	Yes	Yes	Yes	Yes
Microsoft Point-to-Point Compression (MPPC)		Yes	Yes	Yes	Yes	Yes	Yes
National ISDN Switch Types for BRI[22] and PRI[23]		Yes	Yes	Yes	Yes	Yes	Yes
VPDN[24] MIB and Syslog Facility		Yes	Yes	Yes	Yes	Yes	Yes
X.25 Enhancements		Yes	Yes	Yes	Yes	Yes	Yes
X.25 Switching Between PVCs[25] and SVCs[26]		Yes	Yes	Yes	Yes	Yes	Yes

1. The number in the "In" column indicates the Cisco IOS release in which the feature was introduced. For example, 12.1(3a)EC1 means that a feature was introduced in Cisco IOS Release 12.1(3a)EC1. If a cell in this column is empty, the feature was included in the initial base release.

2. DHCP = Dynamic Host Configuration Protocol

3. DRP = Director Response Protocol

4. HSRP = Hot-Standby Routing Protocol

5. ISL = Inter-Switch Link

6. GRE = generic routing encapsulation

7. IGRP = Interior Gateway Routing Protocol

8. OSSI = Operations Support System Interface

9. SNMPv2 = Simple Network Management Protocol version 2

10. SNMPv3 = Simple Network Management Protocol version 3

11. PIM = Protocol Independent Multicast

12. ATM = Asynchronous Transfer Mode

13. The DOCSIS 1.0+ QoS Enhancements is a set of Cisco's Quality of Service extensions to DOCSIS 1.0 to enable basic VoIP service over the DOCSIS link before DOCSIS 1.1 becomes available. The main enhancements include support for dynamic creation and teardown of flows during voice calls, support for one new unsolicited grant service (UGS) slot scheduling mechanism for voice slots, and per IP-precedence rate shaping on the downstream.

14. RTP = Real-Time Transport Protocol

15. RADIUS = Remote Access Dial-In User Service

16. HTTP = Hypertext Transfer Protocol

17. AAA =authentication, authorization, and accounting

18. TACACS = Terminal Access Controller Access Control System

19. PAD = packet assembler/disassembler

20. ISDN = Integrated Services Digital Network

21. NFAS = non-facility-associated signaling

22. BRI = Basic Rate Interface

23. PRI = Primary Rate Interface

24. VPDN = virtual private dial-up network

25. PVC = permanent virtual circuit

26. SVC = switched virtual circuit

New and Changed Information

The following sections list the new hardware and software features supported by the Cisco uBR7200 series routers for Cisco IOS Release 12.2(15)CX1.

Note Cisco IOS Release 12.2(15)CX1 is based on Cisco IOS Release 12.2(15)BC1. All features in Cisco IOS Release 12.2(15)BC1 are in Cisco IOS Release 12.2(15)CX1. To view the features in Cisco IOS Release 12.2(15)BC1, see the *Release Notes for Cisco uBR7200 Series for Cisco IOS Release 12.2 BC* at the following URL and click on New and Changed Information:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122relnt/ubr7200/u7208bc1.htm

New Hardware Features in Release 12.2(15)CX1

Cisco uBR-MC16U/X

The Cisco uBR-MC16U and Cisco uBR-MC16X (Cisco uBR-MC16U/X) cable interface line cards are two of the new Broadband Processing Engine (BPE) series of cable interfaces that are available for the Cisco uBR7246VXR universal broadband router. The BPE cards provide increased performance and advanced Radio Frequency (RF) management, as well as innovative, integrated tools for sophisticated content, traffic and network management.

The Cisco uBR-MC16U/X card has one downstream port and six upstream ports, organized into a single DOCSIS MAC domain. There are two versions, the Cisco uBR-MC16U and the Cisco uBR-MC16X, which are identical except for the type of upconverter that the downstream ports use:

- Cisco UBR-MC16U card—Each downstream port includes an onboard integrated upconverter that generates an RF signal suitable for connection to a combiner and transmission on the coaxial cable network, without the need for any external upconverters.

- Cisco uBR-MC16X card—The downstreams on this card do not include integrated upconverters. Instead, the downstream ports generate an IF signal that must be converted through an external upconverter before transmission on the cable network. This allows the Cisco uBR-MC16X card to easily replace existing line card installations that currently use external upconverters.

Note The downstream on the Cisco uBR-MC16U card is labelled xc RF" to indicate that it outputs an RF-wave from the internal upconverter. The downstream on the Cisco uBR-MC16X card is labelled "DS" to indicate that it outputs an IF-wave that requires an external upconverter.

In Cisco IOS Release 12.2(15)CX and later releases, the downstream ports support 64-QAM and 256-QAM, and the upstream ports support QPSK, 8-QAM, 16-QAM, 32-QAM, and 64-QAM modulation, depending on the upstream's mode of operation.

Depending on the configuration, the Cisco uBR-MC16U/X line card supports either DOCSIS or Euro-DOCSIS operation:

- DOCSIS cable networks are based on the ITU J.83 Annex B physical layer standard and Data-over-Cable Service Interface Specifications (DOCSIS, Annex B) specification, which use 6 MHz National Television Systems Committee (NTSC) channel plans. In this mode, the downstream uses a 6 MHz channel width in the 85 to 860 MHz frequency range, and the upstream supports multiple channel widths in the 5 to 42 MHz frequency range.

- EuroDOCSIS cable networks are based on the ITU J.112 Annex A physical layer standard and European DOCSIS (EuroDOCSIS, Annex A) specification, which use 8 MHz Phase Alternating Line (PAL) and Systeme Electronique Couleur Avec Memoire (SECAM) channel plans. In this mode, the downstream uses an 8 MHz channel width in the 85 to 860 MHz frequency range, and the upstream supports multiple channel widths in the 5 to 65 MHz frequency range.

When operating in either the DOCSIS or EuroDOCSIS mode of operation, the Cisco uBR-MC16U/X card supports the following types of networks:

- TDMA-only mode, which supports only DOCSIS 1.0 and DOCSIS 1.1 cable modems.

- A-TDMA-only mode, which supports DOCSIS 2.0 cable modems.

- Mixed TDMA/A-TDMA mode, which supports both DOCSIS 1.0/DOCSIS 1.1 and DOCSIS 2.0 cable modems on the same upstream.

For more information, see *Configuring the Cisco uBR-MC16U/X Cable Interface Line Card* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122cy/122cx_15/mc16uxfm.htm

Note The Cisco uBR-MC16U/X card also supports the extended frequency ranges that are used in Japanese Annex B networks: 70 to 860 MHz (downstream) and 5 to 55 Mhz (upstream).

Cisco uBR-MC28U/X

The Cisco uBR-MC28U and Cisco uBR-MC28X (Cisco uBR-MC28U/X) cable interface line cards are two of the new Broadband Processing Engine (BPE) series of cable interfaces that are available for the Cisco uBR7246VXR universal broadband router. The BPE cards provide increased performance and advanced Radio Frequency (RF) management, as well as innovative, integrated tools for sophisticated content, traffic and network management.

Note The downstream on the Cisco uBR-MC28U card is labelled "DS0 RF" to indicate that it outputs an RF-wave from the internal upconverter. The downstream on the Cisco uBR-MC28X card is labelled "DS" to indicate that it outputs an IF-wave that requires an external upconverter.

In Cisco IOS Release 12.2(15)CX and later releases, the downstream ports support 64-QAM and 256-QAM, and the upstream ports support QPSK, 8-QAM, 16-QAM, 32-QAM, and 64-QAM modulation, depending on the upstream's mode of operation.

Depending on the configuration, the Cisco uBR-MC28U/X line card supports either DOCSIS or Euro-DOCSIS operation:

- DOCSIS cable networks are based on the ITU J.83 Annex B physical layer standard and Data-over-Cable Service Interface Specifications (DOCSIS, Annex B) specification, which use 6 MHz National Television Systems Committee (NTSC) channel plans. In this mode, the downstream uses a 6 MHz channel width in the 85 to 860 MHz frequency range, and the upstream supports multiple channel widths in the 5 to 42 MHz frequency range.

- EuroDOCSIS cable networks are based on the ITU J.112 Annex A physical layer standard and European DOCSIS (EuroDOCSIS, Annex A) specification, which use 8 MHz Phase Alternating Line (PAL) and Systeme Electronique Couleur Avec Memoire (SECAM) channel plans. In this mode, the downstream uses an 8 MHz channel width in the 85 to 860 MHz frequency range, and the upstream supports multiple channel widths in the 5 to 65 MHz frequency range.

When operating in either the DOCSIS or EuroDOCSIS mode of operation, the Cisco uBR-MC28U/X card supports the following types of networks:

- TDMA-only mode, which supports only DOCSIS 1.0 and DOCSIS 1.1 cable modems.

- A-TDMA-only mode, which supports DOCSIS 2.0 cable modems.

- Mixed TDMA/A-TDMA mode, which supports both DOCSIS 1.0/DOCSIS 1.1 and DOCSIS 2.0 cable modems on the same upstream.

Note The Cisco uBR-MC28U/X card also supports the extended frequency ranges that are used in Japanese Annex B networks: 70 to 860 MHz (downstream) and 5 to 55 Mhz (upstream).

For more information, see *Configuring the Cisco uBR-MC28U/X Cable Interface Line Card* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122cy/122cx_15/mc28uxfm.pdf

No New Software Features in Release 12.2(15)CX1

There are no new software features in Cisco IOS Release 12.2(15)CX1.

New Hardware Features in Release 12.2(15)CX

Cisco uBR-MC16U/X and Cisco uBR-MC28U/X Cable Interface Line Cards

Cisco IOS Release 12.2(15)CX introduces support for the following new cable interface line cards,

- The Cisco uBR-MC16U/X card provides one downstream port and six upstream ports. In Cisco IOS Release 12.2(15)CX, the downstream ports support 64-QAM and 256-QAM, and the upstream ports support QPSK, 8-QAM, 16-QAM, 32-QAM, and 64-QAM modulation, depending on the upstream's mode of operation.

- The Cisco uBR-MC28U/X card provides two downstream ports and eight upstream ports, organized into two DOCSIS MAC domains. In Cisco IOS Release 12.2(15)CX, the downstream ports support 64-QAM and 256-QAM, and the upstream ports support QPSK, 8-QAM, 16-QAM, 32-QAM, and 64-QAM modulation, depending on the upstream's mode of operation.

These new cable interface line cards are part of the new Broadband Processing Engine (BPE) series of cable interfaces that are available for the Cisco uBR7246VXR universal broadband router. The BPE cards provide increased performance and advanced Radio Frequency (RF) management, as well as innovative, integrated tools for sophisticated content, traffic and network management.

Note See the "Upstream Modulation Type Mismatch Can Cause Modems to Go Offline When Using Cisco uBR-MC16U/X and Cisco uBR-MC28U/X Cards" section on page 32 for important configuration information on these new cards.

Line Card Models

The new cards come in two versions, the "U" and the "X" versions, which are identical except for the type of upconverter that the downstream ports use:

- Cisco uBR-MC16U (part number UBR-MC16U) and Cisco UBR-MC28U card (part number UBR-MC28U)—Each downstream port includes an onboard integrated upconverter that generates an RF signal suitable for connection to a combiner and transmission on the coaxial cable network, without the need for any external upconverters. This can save both the money and rack space required by an external upconverter, as well as reduce the complexity of the equipment at the headend site.

- Cisco uBR-MC16X (part number UBR-MC16X) and Cisco uBR-MC28X card (part number UBR-MC28X)—The downstreams on these cards do not include integrated upconverters. Instead, the downstream ports generate an IF signal that must be converted through an external upconverter before transmission on the cable network. This allows these cards to easily replace existing line card installations that currently use external upconverters.

Modes of Operation

Depending on the configuration, the Cisco uBR-MC16U/X and Cisco uBR-MC28U/X line cards support either DOCSIS or Euro-DOCSIS operation in one of the following operational modes:

- TDMA-only mode, which supports only DOCSIS 1.0 and DOCSIS 1.1 cable modems.
- A-TDMA-only mode, which supports DOCSIS 2.0 cable modems.
- Mixed TDMA/A-TDMA mode, which supports both DOCSIS 1.0/DOCSIS 1.1 and DOCSIS 2.0 cable modems on the same upstream.

Reference Information

For information on installing the Cisco uBR-MC16U/X and Cisco uBR-MC28U/X line cards, refer to the following documents:

- *Cisco uBR7200 Series Cable Interface Line Card Hardware Installation* at the following URL:

  http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_rout/cfig_nts/10494hmc.htm

- *Quick Start - Installing a Cisco uBR-MC16U/X Cable Interface Line Card*

  http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_rout/ubr72qsg/16u_xqsg.htm

- *Quick Start - Installing a Cisco uBR-MC28U/X Cable Interface Line Card*

  http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_rout/ubr72qsg/28uqsg.htm

For information on configuring the Cisco uBR-MC16U/X line card, refer to *Configuring the Cisco uBR-MC16U/MC16X Cable Interface Line Card* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122cy/122cx_15/mc16uxfm.htm

For information on configuring the Cisco uBR-MC28U/X line card, refer to *Configuring the Cisco uBR-MC28U/MC28X Cable Interface Line Card* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122cy/122cx_15/mc28uxfm.htm

New Software Features in Release 12.2(15)CX

DOCSIS 2.0 A-TDMA Support

The Cisco uBR-MC16U/X and Cisco uBR-MC28U/X cards improve the maximum upstream bandwidth on existing DOCSIS 1.0 and DOCSIS 1.1 cable networks by providing a number of advanced PHY capabilities that have been specified by the new DOCSIS 2.0 specifications.

The DOCSIS 2.0 A-TDMA Support feature incorporates the following advantages and improvements of DOCSIS 2.0 networks:

- Builds on existing DOCSIS cable networks by providing full compatibility with existing DOCSIS 1.0 and DOCSIS 1.1 cable modems. (The registration response (REG-RSP) message contains the DOCSIS version number to identify each cable modem's capabilities.)

- Upstreams can be configured for three different modes to support different mixes of cable modems:

  - An upstream can be configured for TDMA mode to support only DOCSIS 1.0 and DOCSIS 1.1 cable modems.

  - An upstream can be configured for A-TDMA mode to support only DOCSIS 2.0 cable modems.

  - An upstream can be configured for a mixed, TDMA/A-TDMA mode, to support both DOCSIS 1.0/DOCSIS 1.1 and DOCSIS 2.0 cable modems on the same upstream.

✎

Note DOCSIS 2.0 A-TDMA cable modems will not register on a TDMA upstream if an A-TDMA or mixed upstream exists in the same MAC domain, unless the CMTS explicitly switches the cable modem to another upstream using an Upstream Channel Change (UCC) message. DOCSIS 1.0 and DOCSIS 1.1 cable modems cannot register on an A-TDMA only upstream.

- A-TDMA mode defines new interval usage codes (IUC) of A-TDMA short data grants, long data grants, and Unsolicited Grant Service (UGS) grants (IUC 9, 10, and 11) to supplement the existing DOCSIS 1.1 IUC types

- Increases the maximum channel capacity for A-TDMA upstreams to 30 Mbps per 6 MHz channel.

- A-TDMA and mixed modes of operation provide higher bandwidth on the upstream using new 32-QAM and 64-QAM modulation profiles. In addition, an 8-QAM modulation profile is supported.

- Supports a minislot size of 1 tick for A-TDMA operations.

- Increases channel widths to 6.4 MHz (5.12 Msymbol rate).

For additional information on DOCSIS 2.0 A-TDMA Support on the Cisco uBR-MC16U/X card, refer to the section, "DOCSIS 2.0 A-TDMA Support" in *Configuring the Cisco uBR-MC16U/MC16X Cable Interface Line Card* at the following URL:

> http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122cy/122cx_15/mc16uxfm.htm

For additional information on DOCSIS 2.0 A-TDMA Support on the Cisco uBR-MC28U/X card, refer to the section, "DOCSIS 2.0 A-TDMA Support" in *Configuring the Cisco uBR-MC28U/MC28X Cable Interface Line Card* at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122cy/122cx_15/mc28uxfm.htm

No New Hardware Features in Release 12.2(11)CX1

There are no new hardware features in Cisco IOS Release 12.2(11)CX1.

No New Software Features in Release 12.2(11)CX1

There are no new software features in Cisco IOS Release 12.2(11)CX1.

New Hardware Features in Release 12.2(11)CX

Support for the NPE-G1 in the Cisco uBR7246VXR

Cisco IOS Release 12.2(11)CX introduces support for the Network Processing Engine NPE-G1 (NPE-G1) in the Cisco uBR7246VXR universal broadband router. NPE-G1 addresses the demand for performance and flexibility by doubling its processing capacity and enabling unprecedented LAN performance.

The NPE-G1 offers the following benefits:

- Provides performance of up to 1 million packets per second (PPS) in Cisco Express Forwarding (CEF) switching.
- Offers three Gigabit Ethernet/Fast Ethernet ports that do not take up bandwidth points
- Doubles the amount of available DRAM (to 1 GB)
- Eliminates the requirement for an input/output (I/O) controller
- Eliminates I/O controller LAN interface bandwidth points
- Provides modular processors and the ability to upgrade
- Offers improved price performance

Note The Cisco 7200 VXR and Cisco uBR7246VXR routers use different models of the NPE-G1 processor. For the Cisco 7200 VXR, order the NPE-G1 or NPE-G1= product. For the Cisco uBR7246VXR router, order the UBR7200-NPE-G1 or UBR7200-NPE-G1= product. Unless otherwise indicated, all references to the NPE-G1 in this document also refer to UBR7200-NPE-G1.

The NPE-G1 is the first network processing engine for the Cisco uBR7246VXR router to provide the functionality of both a network processing engine and I/O controller. If used without an I/O controller, an I/O blank panel must be in place.

While its design provides I/O controller functionality, it can also work with any I/O controller supported in the Cisco uBR7246VXR router. The NPE-G1, when installed with an I/O controller, provides the bootflash and NVRAM that the Cisco IOS software uses to boot.

> **Note** An I/O controller can be used with the NPE-G1, but an I/O controller is not necessary for system functionality. Installing an I/O controller in a chassis with the NPE-G1 activates the console and auxiliary ports on the I/O controller and automatically disables the console and auxiliary ports onboard the NPE-G1. However, you can still use the Flash disk slots and Ethernet ports on both the NPE-G1 and I/O controller when both cards are installed.

The NPE-G1 maintains and executes the system management functions for the Cisco uBR7246VXR routers and also holds the system memory and environmental monitoring functions.

The NPE-G1 consists of one board with multiple interfaces. The NPE-G1 consists of the following components:

- BCM1250 system
    - Microprocessor operates at an internal clock speed of 700 MHz.
    - Hardware logic to interconnect the processor, DDR-SDRAM (double data rate synchronous dynamic random-access memory), LDT (lightning data transport) bus, the generic PCI bus, and three direct-interface Gigabit Ethernet interfaces.
- Cache memory

    The NPE-G1 has two levels of cache: primary and secondary cache that are internal to the microprocessor with secondary unified cache for data and instruction.
- The NPE-G1 uses DDR-SDRAM for providing code, data, and packet storage.
- Two environmental sensors for monitoring the cooling air as it enters and leaves the chassis.
- Full-feature I/O controller functionality
    - Three Gigabit Ethernet interfaces (six ports: three GBIC [optical] and three RJ-45s [copper]). Any three ports are available at the same time and are linked directly to the BCM1250 system; therefore the interfaces are not charged bandwidth points.
    - Compact Flash Disk for storing the default Cisco IOS software image. The compact Flash Disk slot can be used whether or not an I/O controller is in the router.
    - Auxiliary port with full data terminal equipment (DTE) functionality. (Functional when an I/O controller is not present. If an I/O controller is present, its auxiliary port is the default port.)
    - Console port with full data communications equipment (DCE) functionality. (Functional when an I/O controller is not present. If an I/O controller is present, its console port is the default port.)
    - Boot ROM for storing sufficient code for booting the Cisco IOS software.
    - Flash memory for storing the boot helper (boot loader) image. (The boot helper image comes installed on the NPE-G1.) If an I/O controller is present, its Flash memory is no longer available.

- NVRAM for storing the system configuration and environmental monitoring logs. NVRAM uses lithium batteries to maintain its contents when disconnected from power. If an I/O controller is present, its NVRAM memory is no longer available.

- Upgradable memory modules.

For more information on the NPE-G1, refer to the NPE-G1 Overview chapter in the *Network Processing Engine and Network Services Engine Installation and Configuration* guide at the following URL:

http://www.cisco.com/en/US/products/hw/routers/ps341/products_installation_guide_chapter09186a00800d8a83.html

Note Before beginning any upgrade or installation of the Cisco uBR7200-NPE-G1, See the *Cisco uBR7200-NPE-G1 Read Me First* document, which is at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_rout/cfig_nts/15066r.htm

No New Software Features in Release 12.2(11)CX

There are no new software features in Cisco IOS Release 12.2(11)CX.

Important Notes

The following sections contain important notes about Cisco IOS Release 12.2(15)CX1 that apply to Cisco uBR7200 series universal broadband routers.

Removing Previous Default Modulation Profiles When Upgrading to Cisco IOS Release 12.2(15)CX1

When upgrading to Cisco IOS Release 12.2(15)CX1, remove the previous default modulation profiles in order for to get the optimized default modulation profiles from the rebuild image. The older 41/141/241 modulation profiles would not give optimized channel utilization, although they won't create an upstream hang problem, as the driver code safety check the guard time internally and overwrite the value if necessary.

When upgrading to Cisco IOS Release 12.2(15)CX1 from 12.2(15)CX, you need to force the Cisco uBR7246VXR router to regenerate the default modulation profiles for the Cisco uBR-MC16U/X and Cisco uBR-MC28U/X cable interface line cards. To do this, give the following commands at the global configuration mode prompt:

no cable modulation profile 41

no cable modulation profile 141

no cable modulation profile 241

Upstream Modulation Type Mismatch Can Cause Modems to Go Offline When Using Cisco uBR-MC16U/X and Cisco uBR-MC28U/X Cards

Caveat CSCec40125, All modems on upstream go offline and do not return, describes a situation in which all cable modems on an upstream on a Cisco uBR-MC16U/X or Cisco uBR-MC28U/X card can go offline and do not come back online until the upstream is shut down and reenabled, using the **shutdown** and **no shutdown** commands. To avoid this problem, use the following workaround until this caveat is resolved:

Step 1 Configure the guard time on each modulation profile being used on the Cisco uBR-MC16U/X or Cisco uBR-MC28U/X card so that the guard time on short burst profiles is set to 26 symbols and the guard time for long burst profiles is set to 168 symbols. For example:

```
Router# configure terminal
Route(config)# cable modulation-profile profile-id short 4 76 30 26 qpsk scrambler 152
no-diff 68 shortened
Router(config)# cable modulation-profile profile-id long 8 232 0 168 qpsk scrambler 152
no-diff 100 shortened
Router(config)#
```

✎

Note   The above values are for the default recommended symbols/minislot size of 32 for all channel widths.

Step 2   If using the ingress noise cancellation feature, change the noise cancellation value to 198 for odd port numbers and to 200 for even upstream port numbers. For example, on a Cisco uBR-MC16U card in slot 4/0, you would give the following commands:

```
Router# configure terminal
Router(config)# interface cable 4/0
Router(config-if)# cable upstream 0 ingress-noise-cancellation 200
Router(config-if)# cable upstream 2 ingress-noise-cancellation 200
Router(config-if)# cable upstream 4 ingress-noise-cancellation 200
Router(config-if)# cable upstream 1 ingress-noise-cancellation 198
Router(config-if)# cable upstream 3 ingress-noise-cancellation 198
Router(config-if)# cable upstream 5 ingress-noise-cancellation 198
Router(config-if)#
```

Upgrading When Using Shared Secret Passwords

Cisco IOS Release 12.2 BC changed the encryption algorithm used for the **shared-secret** command. If you are upgrading from Cisco IOS Release 12.1 EC or Cisco IOS Release 12.0 SC, you cannot cut and paste the "shared-secret" configuration lines that include an encrypted password. Instead, you must re-enter the original shared secret passwords at the CLI prompt.

For example, if the actual shared secret password is "cm-sharedsecret-password," you would enter the **cable shared-secret cm-sharedsecret-password** command at the CLI prompt. If you have enabled password encryption, the configuration file will then show only the newly encrypted password.

The following example shows a typical configuration session:

```
Router# config t
Router(config)# service password-encryption
Router(config)# int c6/0
Router(config-if)# cable shared-secret cm-sharedsecret-password
Router(config-if)# exit
Router(config)# exit
Router# show running-config | include shared
cable shared-secret 7 0458064B1C294D5C0C1D161211190910673B253B20222D0103
Router#
```

> **Note**   This change only affects the encryption of the passwords that are stored in the configuration file. It does not affect the actual encryption that is used between the CMTS and CMs, so you do not need to change the shared secret in the DOCSIS configuration files for the CMs.

Using the show cable modem Command After an HCCP Switchover

If you are using HCCP 1+1 or N+1 redundancy, the new primary processor after a switchover automatically creates a new database of the online cable modems. This means that the **show cable modem** *ip-address* and **show cable modem** *ip-address* **cnr** commands might not show a particular cable modem until the CMTS receives IP traffic from that cable modem.

You can force IP traffic by using the **ping** *ip-address* command, and then the **show cable modem** *ip-address* and **show cable modem** *ip-address* **cnr** commands will show the cable modem. You can also display any particular cable modem by using the **show cable modem | include** *ip-address* command.

Maximum Baud Rate on Aux Port for I/O-2FE/E Controller

The Auxiliary Port (AUX) on the Cisco UBR7200-I/O-2FE/E input/output controller for the Cisco uBR7246VXR router supports a maximum baud rate of 19,200 bps. The CLI commands will allow you to set the baud rate for the AUX port to 38,4000 bps, but you will be unable to communicate at this speed. Therefore, set the baud rate for the AUX port to 19,200 bps or less.

SNR Algorithm Updated

Since Cisco IOS Release 12.2(4)BC1, the algorithm for calculating the SNR estimate in the show controllers cable upstream command was refined for a more accurate value. The new SNR estimate uses the algorithm as recommended by the chip manufacturer, and depending on plant characteristics, the new SNR value could be up to 6 dB lower than the values shown in earlier software releases.

> **Note** This value is only an estimate—for the most accurate value, use specialized test equipment like a spectrum analyzer.

Avoiding the Dropping of SNMP Traps

When the **snmp-server enable traps** command is given without any options, it enables all traps, which can generate a significant number of traps at key events, such as system power-up. If the SNMP queue is not large enough to handle all of the traps, new traps will be dropped without notification until the existing traps are sent and slots become available in the queue.

You can do two things to avoid dropping traps in this situation:

- Increase the SNMP trap queue size. The default queue size is 10, which is insufficient to handle all traps. Use the **snmp-server queue-length** *length* global configuration command to increase the queue size. The *length* parameter can range from 10 to 1000. Increase the queue size until traps are no longer dropped.

- Disable unneeded SNMP traps. For example, if you do not need SYSLOG traps (which are sent for every message displayed on the console), disable those traps as follows:

```
router(config)# snmp-server enable traps
router(config)# no snmp-server enable traps syslog
```

DOCSIS 1.0 BPI Support

To conform with a recent change in the DOCSIS 1.0 Baseline Privacy Interface (BPI) Specification, Cisco IOS Release 12.2(8)BC1 and later releases require that the Baseline Privacy Configuration Settings Option (Type 17) must be included in the DOCSIS configuration file for all DOCSIS 1.0 cable modems attempting to register for BPI encryption. If the type 17 option is not included, an "Unauthorized SAID" warning will appear in the CMTS console, and the cable modem will not be allowed to come online.

Previous Cisco IOS Releases allowed DOCSIS 1.0 cable modems to register for BPI encryption and to come online, even if the DOCSIS configuration file did not include the type 17 option. The change to the DOCSIS BPI specification, however, made the type 17 option mandatory for BPI operation.

For more information about this requirement, see the TAC technical note on Cisco.com at http://www.cisco.com/warp/public/109/bpi_changes_23895.html.

Limitation on Vendor-Specific Information in the DOCSIS Configuration File

DOCSIS requires that when the cable modem sends its Registration Request (REG-REQ) message to the CMTS, it must include the configuration information found in the DOCSIS configuration file. This configuration information must include all vendor-specific information fields (VSIF). Because MAC-layer management messages, such as REG-REQ, have a maximum data size of 1522 bytes, this limits the amount of VSIF information that can be included in the DOCSIS configuration file.

In particular, the maximum packet size imposes a limit on the number of Cisco IOS CLI commands you can include as VSIF fields in the DOCSIS configuration file. The exact number of commands that will fit depends on the other information included in the file, as well as the length of each command.

If the REG-REQ message is larger than 1522 bytes, the cable modem will likely report errors similar to the following errors that appears on Cisco uBR900 series cable access routers:

```
%LINK-4-TOOBIG: Interface cable-modem0, Output packet size of 1545 bytes too big
%LINEPROTO-5-UPDOWN: Line protocol on Interface cable-modem0, changed state to down
```

In addition, the CMTS will also report that the cable modem timed out during the registration process. If this occurs, you can try the following steps:

- Reduce the length of the commands by using the abbreviated form of the command. For example, you can specify the **int c0** instead of the full command **interface cable-modem0**.

- SNMP MIB objects are not included in the Registration Request message, so wherever possible, replace the CLI commands with the corresponding SNMP MIB object statements in the DOCSIS configuration file.

- If a large number of CLI commands must be given, use VSIF option 128 to download a Cisco IOS configuration file to the cable modem.

For complete details on what is included in the REG-REQ message, see Chapter 6 of the current DOCSIS 1.1 specification (SP-RFIv1.1-I07-010829 or later).

Note This limitation is being tracked by caveat CSCdv83892 but is not expected to be resolved unless the DOCSIS specification is changed to remove the maximum size limit for MAC-layer management messages.

Configuring the Routing Protocol Causes a Reset of the Cable Modems

Be aware that when configuring a routing protocol on a Cisco uBR7200 series router, the Cisco IOS software must reset the interfaces to enable the change. This normally does not significantly affect operations on the interface, except that when this is done on a cable interface, it causes all cable modems on that particular downstream to reinitialize, potentially interfering with data transmission on that downstream. Therefore, you should use the routing protocol global configuration commands, such as **router rip**, only when a minimum of subscribers would be affected.

Cable Bundling

To reduce the number of subnets consumed per Cisco CMTS, cable interface bundling is used. Multiple cable interfaces can share a single IP subnet. An IP subnet is required for each bundle. You can bundle all cable interfaces on a Cisco CMTS into a single bundle.

Note Cable interface bundling is applicable only in two-way cable configurations. It is not supported in telco-return configurations.

Using the CLI, first configure a master interface for a cable interface bundle. The master interface has an IP address assigned and is visible for IP routing functionality. After you configure the master interface, add additional cable interfaces to the same interface bundle. Those interfaces must not have an IP address assigned. You can also configure multiple bundle interfaces.

Use the following commands to configure and view cable interface bundles:

> **[no] cable bundle n master**
>
> **show cable bundle**

Up to four interface bundles can be configured. In each bundle, specify exactly one interface as the master interface, using the "master" keyword. In the case of a subinterface over a cable bundle, 'x' is the interface number of the bundle master [1]. The subinterface number starts from 1.

Caution Configure an IP address on the master interface only. An attempt to add an interface to a bundle will be rejected if an IP address is configured and the interface is not specified as a master interface.

When bundling cable interfaces, only the interface configured to be the bundle master is allowed to have subinterfaces. An interface that has subinterface(s) defined over it will not be allowed to be part of a bundle. MIB objects on cable interface bundles are not supported as of the date of this publication.

For more information on cable bundling, see the chapter "Understanding System Operations" of the *Cisco uBR7200 Series Software Configuration Guide* and the *Cable Interface Bundling for the Cisco uBR7200 Series Cable Router* feature module. For information on feature modules, see the "Feature Modules" section on page 47.

EIGRP, IS-IS, and OSPF Not Supported on Cable Interfaces

The Cisco uBR7200 supports advanced routing protocols such as Enhanced Interior Gateway Routing Protocol (EIGRP), Intermediate System-to-Intermediate System (IS-IS), and Open Shortest Path First (OSPF) only on the WAN interfaces, not on the cable interfaces. On cable interfaces, use a routing protocol that is supported by the cable modems, such as RIPv2.

Field Notices and Bulletins

- Field Notices—Cisco recommends that you view the field notices for this release to see if your software or hardware platforms are affected. If you have an account on Cisco.com, you can find field notices at http://www.cisco.com/warp/customer/770/index.shtml. If you do not have a Cisco.com login account, you can find field notices at http://www.cisco.com/warp/public/770/index.shtml.

- Product Bulletins—If you have an account on Cisco.com, you can find product bulletins at http://www.cisco.com/warp/customer/cc/general/bulletin/index.shtml. If you do not have a Cisco.com login account, you can find product bulletins at http://www.cisco.com/warp/public/cc/general/bulletin/iosw/index.shtml.

- *What's New for IOS — What's New for IOS* lists recently posted Cisco IOS software releases and software releases that have been removed from Cisco.com. If you have an account on Cisco.com, you can access *What's New for IOS* at http://www.cisco.com/kobayashi/sw-center/sw-ios.shtml or by logging in and selecting **Software Center: Cisco IOS Software: What's New for IOS**.

MIBs

Current MIBs

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB web site on Cisco.com at http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

Supported MIBs

The Cisco uBR7200 series universal broadband routers support the following categories of MIBs:

- SNMP standard MIBs—These MIBs are required by any agent supporting SNMPv1 or SNMPv2 network management.

- Cisco's platform and network-layer enterprise MIBs—Common across most of Cisco's router platforms. If your network management applications are already configured to support other Cisco routers, such as the 2600 series or 7200 series, no further configuration is needed unless the version of Cisco IOS software being used has updated these MIBs.

- Cable-specific MIBs—Provide information about the cable interfaces and related information on the uBR7200 series routers. They include both DOCSIS-specific MIBs and Cisco-specific enterprise MIBs. If your network management applications have not already been configured for the uBR7200 series routers, these MIBs must be loaded.

- Deprecated MIBs—Supported in earlier releases of Cisco IOS software but have been replaced by more standardized, scalable MIBs. Network Management applications and scripts should convert to the replacement MIBs as soon as possible.

For information on the SNMP standard MIBs and Cisco's platform and network-layer enterprise MIBs, see Cisco's MIB web site at http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

The cable-specific MIBs are described in the following section.

Cable-Specific MIBs

Table 8 shows the cable-specific MIBs that are supported on the Cisco uBR7200 series universal broadband routers. The table also provides a brief description of each MIB's contents and the Cisco IOS Software Release in which the MIB was initially functional—earlier releases might have had unsupported prototype versions of the MIB; later releases might have added new attributes and functionality. Because of interdependencies, the MIBs must be loaded in the order given in the table.

Note The names given in Table 8 are the filenames for the MIBs as they exist on Cisco's FTP site (ftp://ftp.cisco.com/pub/mibs/ or http://www.cisco.com/public/mibs). Most MIBs are available in both SNMPv1 and SNMPv2 versions; the SNMPv1 versions have *V1SMI* as part of their filenames.

Table 8   Cable-Specific MIBs Supported on Cisco uBR7200 Series Routers

MIB Filename	Description	Introduced in Release
SNMPv2-SMI.my SNMPv2-SMI-V1SMI.my	This module specifies the Structure of Management Information (SMI) for SNMPv2, as defined in RFC 1902.	12.2(4)XF1
SNMPv2-TC.my SNMPv2-TC-V1SMI.my	This module defines the textual conventions as specified in RFC 1903.	12.2(4)XF1
SNMPv2-MIB.my SNMPv2-MIB-V1SMI.my	The management protocol, SNMPv2, provides for the exchange of messages that convey management information between the agents and the management stations, as defined in RFC 1907.	12.2(4)XF1
CISCO-SMI.my CISCO-SMI-V1SMI.my	This module specifies the SMI for Cisco's enterprise MIBs.	12.2(4)XF1
CISCO-TC.my CISCO-TC-V1SMI.my	This module defines the textual conventions used in Cisco's enterprise MIBs.	12.2(4)XF1

Table 8   Cable-Specific MIBs Supported on Cisco uBR7200 Series Routers (continued)

MIB Filename	Description	Introduced in Release
IF-MIB.my IF-MIB-V1SMI.my	This module describes generic objects for the Layer 3 network interface sublayers. This MIB is an updated version of MIB-II's *if* table and incorporates the extensions defined in RFC 2233.	12.2(4)XF1
DOCS-IF-MIB.my DOCS-IF-MIB-V1SMI.my	This module describes the DOCSIS-compliant Radio Frequency (RF) interfaces in cable modems and cable modem termination systems, as defined in RFC 2670.	12.2(4)XF1
DOCS-BPI-MIB.my	This module—available in an SNMPv2 version only—describes the attributes for the DOCSIS-specified Baseline Privacy Interface (BPI) on cable modems and the CMTS.	12.2(4)XF1
CISCO-DOCS-EXT-MIB.my CISCO-DOCS-EXT-MIB-V1SMI.my	This module extends the DOCSIS standard RFI MIB (DOCS-IF-MIB) with Cisco-specific extensions, such as QoS attributes and connection status and other information regarding the cable modems and CPE devices supported by the CMTS.	12.2(4)XF1
CISCO-DOCS-REMOTE-QUERY-MIB.my	This module facilitates SNMP polling of remote CMs on a CMTS.	12.2(4)XF1
CISCO-CABLE-SPECTRUM-MIB.my CISCO-CABLE-SPECTRUM-MIB-V1SMI.my	This module describes the spectrum management flap list attributes.	12.2(4)XF1

Deprecated MIBs

Old Cisco MIBs will be replaced in a future release. Currently, OLD-CISCO-* MIBs are being converted into more scalable MIBs without affecting existing Cisco IOS products or network management system (NMS) applications. You can update from deprecated MIBs to the replacement MIBs as shown in Table 9.

Table 9   Replacements for Deprecated MIBs

Deprecated MIB	Replacement
OLD-CISCO-APPLETALK-MIB	RFC1243-MIB
OLD-CISCO-CHASSIS-MIB	ENTITY-MIB
OLD-CISCO-CPUK-MIB	To be determined
OLD-CISCO-DECNET-MIB	To be determined
OLD-CISCO-ENV-MIB	CISCO-ENVMON-MIB

Table 9   Replacements for Deprecated MIBs (continued)

Deprecated MIB	Replacement
OLD-CISCO-APPLETALK-MIB	RFC1243-MIB
OLD-CISCO-FLASH-MIB	CISCO-FLASH-MIB
OLD-CISCO-INTERFACES-MIB	IF-MIB CISCO-QUEUE-MIB
OLD-CISCO-IP-MIB	To be determined
OLD-CISCO-MEMORY-MIB	CISCO-MEMORY-POOL-MIB
OLD-CISCO-NOVELL-MIB	NOVELL-IPX-MIB
OLD-CISCO-SYS-MIB	(Compilation of other OLD* MIBs)
OLD-CISCO-SYSTEM-MIB	CISCO-CONFIG-COPY-MIB
OLD-CISCO-TCP-MIB	CISCO-TCP-MIB
OLD-CISCO-TS-MIB	To be determined
OLD-CISCO-VINES-MIB	CISCO-VINES-MIB
OLD-CISCO-XNS-MIB	To be determined

Note   Some of the MIBs listed in Table 9 represent feature sets that are not supported on Cisco uBR7200 series universal broadband routers.

Note   *Cisco Management Information Base (MIB) User Quick Reference* is no longer published. If you have an account with Cisco.com, you can find the current list of MIBs supported by Cisco. To reach the *Cisco Network Management Toolkit,* go to Cisco.com, press **Login**, and then go to **Software Center: Network Mgmt Products: Cisco Network Management Toolkit: Cisco MIB**.

Caveats

Caveats describe unexpected behavior in Cisco IOS software releases. Severity 1 caveats are the most serious caveats; severity 2 caveats are less serious. Severity 3 caveats are moderate caveats, and only select severity 3 caveats are included in the caveats document.

This section only contains open and resolved caveats for the current Cisco IOS maintenance release.

All caveats in Cisco IOS Release 12.2(15)BC1 that apply to the Cisco uBR7200 Series are also in Cisco IOS Release 12.2(15)CX1.

For information on caveats in Cisco IOS Release 12.2 T, see *Caveats for Cisco IOS Release 12.2*, which lists severity 1 and 2 caveats and select severity 3 caveats for Cisco IOS Release 12.2 T and is located on Cisco.com and the Documentation CD-ROM.

Caveat numbers and brief descriptions for Cisco IOS Release 12.2(15)CX1 are listed in this section. For details about a particular caveat, you can use Bug Toolkit.

If you have an account on Cisco.com, you can use the Bug Toolkit to find select caveats of any severity. To reach the Bug Toolkit, log in to Cisco.com and click **Service & Support**: **Software Center**: **Cisco IOS Software**: **BUG TOOLKIT**. Another option is to go to http://www.cisco.com/cgi-bin/Support/Bugtool/launch_bugtool.pl.

Open Caveats for Release 12.2(15)CX1

There are no open caveats specific to Cisco IOS Release 12.2(15)CX1 that require documentation in the release notes.

Closed and Resolved Caveats for Release 12.2(15)CX1

The caveat listed in Table 13 is resolved in Cisco IOS Release 12.2(15)CX1. This table describes only severity 1 and 2 caveats and select severity 3 caveats.

Table 10   Closed and Resolved Caveats for Release 12.2(15)CX1

Caveat ID Number	Description
CSCec30030	The CBT trace window display fft frequency is always less than the real frequency. This is repeatable. It is easy to see the problem if RBW is big.
	The second problem is when CBT trace window frequency span equals multiple of RBW. For example: frequency span = 6000 KHz, RBW = 60 KHz hence span = 100*RBW. In this corner case, the last FFT point displayed in Trace window is very big. This is repeatable.
	There are no known workarounds.
CSCec31823	When a spectrum group is configured with frequencies above the north american freq-range and within the japanese freq-range, and when this spectrum group is assigned to an upstream, the cm's on that upstream will not make it past init(rc) state on cmts bootup.
	Changing the upstream configuration from a spectrum group to a fixed frequency and rebooting will work fine, as will changing the upstream config to a spectrum group that is contained within the north american range.
	Workaround: Once the cmts is in this broken state, changing the spectrum group or the upstream frequency in the running config, as specified above, will cause the modems to come on-line.
CSCec40125	Under heavy load, all of the modems on an upstream of the MC28u linecard may go offline. Modems are never seen in any kind of registration state by the CMTS, again. All incoming packets from that upstream are lost or corrupted.
	Workaround: This problem can be corrected with a shut/no shut on the upstream.
	Please see Field Notice Number 27315 for a Workaround/Solution.

Table 10   Closed and Resolved Caveats for Release 12.2(15)CX1 (continued)

Caveat ID Number	Description
CSCec40145	Downstream MC28U line card hang can occur under extreme CPU load and high traffic conditions. There are no known workarounds.
CSCec46272	Tracebacks are from linecard SNMP after equalization has been turned on and while polling SNMP docsIfSignalQualityEntry variables. There are no known workarounds.
CSCec52178	Unexpected giant MAPs with MAP size equal to tens of bucket size are encountered under heavy traffic load. There are no known workarounds.
CSCec57848	A router automatic reload is seen under heavy traffic on MC28U. There are no known workarounds.

Open Caveats for Release 12.2(15)CX

All the caveats listed in Table 14 are open in Cisco IOS Release 12.2(15)CX. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 11   Open Caveats for Release 12.2(15)CX

Caveat ID Number	Description
CSCeb26602	MC28U: cdxIfCmtsServiceOutOctets returns 0 for first sf on LC
CSCeb59073	LC-HA: TEK keys re not syncd over for secondary SFs with switchover
CSCeb69466	UCCing from atdma only to tdma upstream failed
CSCeb76503	no error when non-existant spectrum group is assigned
CSCeb84392	MC28U: While changing docsis-modes, modems should not go offline
CSCec09017	NPE log overwritten during line card crash
CSCec14372	scm x.x.x.x cnr report inconsistent value
CSCec16933	MC28U:Crash, due to CLI do sho arp after OIR removal of MC28U
CSCec40125	All modems on upstream go offline and do not return.
CSCin52571	MC28U:COMMIT_FAILED_ERROR on setting ccsFlapRowStatus to destroy
CSCin52601	MC28U:Not all entries in show cable flap is present in ccsFlapTable
CSCin52604	MC28U:Setany on ccsFlapResetNow does not work
CSCin52713	MC28U:CPU HOG while creating sub-interface
CSCin54505	MC28U:BPI_WARNING message when traffic is on and modem in BPI+ mode
CSCin54561	MC28U: After OIR, Spurious memory access made at cmts_sid_deleted

Closed and Resolved Caveats for Release 12.2(15)CX

All the caveats listed in Table 14 are resolved in Cisco IOS Release 12.2(15)CX. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 12   Open Caveats for Release 12.2(15)CX

Caveat ID Number	Description
CSCdu53656	A Cisco device running IOS and enabled for the Border Gateway Protocol (BGP) is vulnerable to a Denial of Service (DOS) attack from a malformed BGP packet. The BGP protocol is not enabled by default, and must be configured in order to accept traffic from an explicitly defined peer. Unless the malicious traffic appears to be sourced from a configured, trusted peer, it would be difficult to inject a malformed packet. BGP MD5 is a valid workaround for this problem. Cisco has made free software available to address this problem. For more details, please refer to this advisory, available at http://www.cisco.com/warp/public/707/cisco-sa-20040616-bgp.shtml.
CSCea28131	A Cisco device running IOS and enabled for the Border Gateway Protocol (BGP) is vulnerable to a Denial of Service (DOS) attack from a malformed BGP packet. The BGP protocol is not enabled by default, and must be configured in order to accept traffic from an explicitly defined peer. Unless the malicious traffic appears to be sourced from a configured, trusted peer, it would be difficult to inject a malformed packet. BGP MD5 is a valid workaround for this problem. Cisco has made free software available to address this problem. For more details, please refer to this advisory, available at http://www.cisco.com/warp/public/707/cisco-sa-20040616-bgp.shtml.

Open Caveats for Release 12.2(11)CX1

There are no open caveats specific to Cisco IOS Release 12.2(11)CX1 that require documentation in the release notes.

Closed and Resolved Caveats for Release 12.2(11)CX1

The caveat listed in Table 13 is resolved in Cisco IOS Release 12.2(11)CX1. This table describes only severity 1 and 2 caveats and select severity 3 caveats.

Table 13   Closed and Resolved Caveats for Release 12.2(11)CX1

Caveat ID Number	Description
CSCdz16916	Static hosts behind CM w/ multiple IP on one MAC loose connectivity

Open Caveats for Release 12.2(11)CX

All the caveats listed in Table 14 are open in Cisco IOS Release 12.2(11)CX. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 14   Open Caveats for Release 12.2(11)CX

Caveat ID Number	Description
CSCdy17114	Memory allocation failure in public buffer pools
CSCdz11970	QOS profile max-burst range restore to 65535 for CLI
CSCdz15213	PXF crashes when tag-switching enabled
CSCdz16916	Static hosts behind CM w/ multiple IP on one MAC loose connectivity

Note All the caveats that are open in Cisco IOS Release 12.2(11)BC1 are also open in Cisco IOS Release 12.2(11)CX. To view caveats in Cisco IOS Release 12.2(11)BC1, see the *Release Notes for Cisco uBR7200 Series for Cisco IOS Release 12.2 BC* at the following URL and click on Caveats:
http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122relnt/ubr7200/u7208bc1.htm

Closed and Resolved Caveats for Release 12.2(11)CX

All the caveats listed in Table 15 are resolved in Cisco IOS Release 12.2(11)CX. This table describes only severity 1 and 2 caveats and select severity 3 caveats.

Table 15   Closed and Resolved Caveats for Release 12.2(11)CX

Caveat ID Number	Description
CSCdz06164	CMTS : IP connectivity failure to Cable Modem and CPE
CSCdz08304	NPE-G1 - Static hosts behind CM can loose IP connectivity

Note All caveats that are closed or resolved in Cisco IOS Release 12.2(11)BC1 are also resolved in Cisco IOS Release 12.2(11)CX. To view caveats in Cisco IOS Release 12.2(11)BC1, see the *Release Notes for Cisco uBR7200 Series for Cisco IOS Release 12.2 BC* at the following URL and click on Caveats:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122relnt/ubr7200/u7208bc1.htm

Related Documentation

The following sections describe the documentation available for the Cisco uBR7200 series. These documents consist of hardware and software installation guides, Cisco IOS configuration guides and command references, system error messages, feature modules, and other documents.

Documentation is available as printed manuals or electronic documents, except for feature modules, which are available online on Cisco.com and the Documentation CD-ROM.

Use these release notes with these documents:

- Release-Specific Documents, page 45
- Platform-Specific Documents, page 46
- Feature Modules, page 47
- Cisco Feature Navigator, page 47
- Cisco IOS Software Documentation Set, page 47

Release-Specific Documents

The following documents are specific to Cisco IOS Release 12.2 T and are located on Cisco.com and the Documentation CD-ROM:

- *Cross-Platform Release Notes for Cisco IOS Release 12.2 T*

  On Cisco.com at:

  Technical Documents: **Cisco IOS Software**: **Cisco IOS Release 12.2 T**: **Release Notes**: **Cross-Platform Release Notes**

  On the Documentation CD-ROM at:

  Cisco Product Documentation: **Cisco IOS Software Configuration**: **Cisco IOS Release 12.2 T**: **Release Notes**: **Cross-Platform Release Notes**

- Product bulletins, field notices, and other release-specific documents on Cisco.com at:

  Technical Documents

- *Caveats for Cisco IOS Release 12.2 T*

  As a supplement to the caveats listed in "Caveats" in these release notes, see *Caveats for Cisco IOS Release 12.2 T*, which contains caveats applicable to all platforms for all maintenance releases of Cisco IOS Release 12.2 T.

  On Cisco.com at:

  Technical Documents: **Cisco IOS Software**: **Cisco IOS Release 12.2 T**: **Release Notes**: **Caveats**

On the Documentation CD-ROM at:

Cisco Product Documentation: **Cisco IOS Software Configuration**: **Cisco IOS Release 12.2 T**: **Caveats**

Note If you have an account on Cisco.com, you can also use the Bug Toolkit to find select caveats of any severity. To reach the Bug Toolkit, log in to Cisco.com and click **Service & Support**: **Software Center**: **Cisco IOS Software**: **BUG TOOLKIT**. Another option is to go to http://www.cisco.com/cgi-bin/Support/Bugtool/launch_bugtool.pl.

Platform-Specific Documents

The following documents are available for the Cisco uBR7200 series universal broadband routers on Cisco.com and the Documentation CD-ROM:

- *Cisco uBR7200 Series Hardware Installation Guide*
- *Cisco uBR7200 Series Software Configuration Guide*
- *Cisco uBR7200 Series Cable Modem Card Hardware Installation Guide*
- *Broadband Cable Command Reference Guide*
- *Cisco CMTS Feature Guide*
- *Cisco uBR7200 Series Configuration Notes*
- *Cisco uBR7200 Series Software Features*
- *Cisco uBR7200 Series Software Release Notes*
- *Cisco Quick Start Guide—Rack-Mounting the Cisco RF Switch with the Cisco uBR7246VXR*
- *Cisco Quick Start Guide—Cabling the Cisco RF Switch to the Cisco uBR7246VXR*

On Cisco.com, beginning under the **Service & Support** heading:

Technical Documents: Documentation Home Page: Broadband Access: Cable: **Cisco uBR7200 Series Universal Broadband Routers**

Note The *Broadband Command Consolidation* is available on Cisco.com through the following path: **Technical Documents: Documentation Home Page: Broadband/Cable Solutions**

On the Documentation CD-ROM:

Cisco Product Documentation: Broadband/Cable Solutions: **Cisco uBR7200 Series Universal Broadband Routers**

Note The *Broadband Command Consolidation* is available on the Documentation CD-ROM through the following path:
Cisco Product Documentation: Broadband/Cable Solutions

Tips Information about features of the Cisco uBR7200 series universal broadband router, as well as software release notes, are available on Cisco.com at:
http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_r_sw/index.htm

Feature Modules

Feature modules describe new software enhancements, committed as features, supported by Cisco IOS Release 12.2(15)CX1, and are updates to the Cisco IOS documentation set. A feature module consists of a brief overview of the feature, benefits, and configuration tasks, and a command reference. As updates, the feature modules are available online only. Feature module information is incorporated in the next printing of the Cisco IOS documentation set.

On Cisco.com at:

Technical Documents: **Cisco IOS Software**: **Cisco IOS Release 12.2 T**: **New Feature Documentation**

On the Documentation CD-ROM at:

Cisco Product Documentation: **Cisco IOS Software Configuration**: **Cisco IOS Release 12.2 T**: **New Feature Documentation**

Cisco Feature Navigator

Cisco IOS software is packaged in feature sets that are supported on specific platforms. To get updated information regarding platform support for this feature, access Cisco Feature Navigator. Cisco Feature Navigator dynamically updates the list of supported platforms as new platform support is added for the feature.

Cisco Feature Navigator is a web-based tool that enables you to quickly determine which Cisco IOS software images support a specific set of features and which features are supported in a specific Cisco IOS image. You can search by feature or release. Under the release section, you can compare releases side by side to display both the features unique to each software release and the features in common.

To access Cisco Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

http://www.cisco.com/register

Cisco Feature Navigator is updated regularly when major Cisco IOS software releases and technology releases occur. For the most current information, go to the Cisco Feature Navigator home page at the following URL:

http://www.cisco.com/cgi-bin/Support/FeatureNav/FN.pl

Cisco IOS Software Documentation Set

The Cisco IOS software documentation set consists of the Cisco IOS configuration guides, Cisco IOS command references, and several other supporting documents. The Cisco IOS software documentation set is shipped with your order in electronic form on the Documentation CD-ROM, unless you specifically ordered the printed versions.

Documentation Modules

Each module in the Cisco IOS documentation set consists of one or more configuration guides and one or more corresponding command references. Chapters in a configuration guide describe protocols, configuration tasks, and Cisco IOS software functionality, and contain comprehensive configuration examples. Chapters in a command reference provide complete command syntax information. Use each configuration guide with its corresponding command reference.

On Cisco.com and the Documentation CD-ROM, two master hot-linked documents provide information for the Cisco IOS software documentation set.

On Cisco.com, beginning under the **Service & Support** heading:

Technical Documents: Cisco IOS Software Configuration: Cisco IOS Release 12.2: Configuration Guides and Command References

On the Documentation CD-ROM:

Cisco IOS Software Configuration: Cisco IOS Release 12.2: Configuration Guides and Command References

Release 12.2 Documentation Set

Note   You can find the most current Cisco IOS documentation on Cisco.com and the Documentation CD-ROM.

On Cisco.com, beginning under the **Service & Support** heading:

Technical Documents: Cisco IOS Software Configuration: Cisco IOS Release 12.2: Configuration Guides and Command References

On the Documentation CD-ROM:

Cisco Product Documentation: Cisco IOS Software Configuration: **Cisco IOS Release 12.2**: **Configuration Guides and Command References**

Note   The *Cisco Management Information Base (MIB) User Quick Reference* publication is no longer published. For the latest list of MIBs supported by Cisco, see *Cisco Network Management Toolkit* on Cisco.com. From Cisco.com, click on the following path: **Service & Support: Software Center: Network Mgmt Products: Cisco Network Management Toolkit: Cisco MIB**.

Table 16 lists the contents of the Cisco IOS Release 12.2 T software documentation set, which is available in electronic form and in printed form if ordered.

Table 16   Cisco IOS Release 12.2 Documentation Set

Books	Major Topics
• *Cisco IOS Configuration Fundamentals Configuration Guide* • *Cisco IOS Configuration Fundamentals Command Reference*	Cisco IOS User Interfaces File Management System Management
• *Cisco IOS Bridging and IBM Networking Configuration Guide* • *Cisco IOS Bridging and IBM Networking Command Reference, Volume 1 of 2* • *Cisco IOS Bridging and IBM Networking Command Reference, Volume 2 of 2*	Transparent Bridging SRB Token Ring Inter-Switch Link Token Ring Route Switch Module RSRB DLSW+ Serial Tunnel and Block Serial Tunnel LLC2 and SDLC IBM Network Media Translation SNA Frame Relay Access NCIA Client/Server Airline Product Set DSPU and SNA Service Point SNA Switching Services Cisco Transaction Connection Cisco Mainframe Channel Connection CLAW and TCP/IP Offload CSNA, CMPC, and CMPC+ TN3270 Server
• *Cisco IOS Dial Technologies Configuration Guide* • *Cisco IOS Dial Technologies Command Reference*	Dial Access Modem and Dial Shelf Configuration and Management ISDN Configuration Signaling Configuration Point-to-Point Protocols Dial-on-Demand Routing Dial Backup Dial Related Addressing Service Network Access Solutions Large-Scale Dial Solutions Cost-Control Solutions Internetworking Dial Access Scenarios
• *Cisco IOS Interface Configuration Guide* • *Cisco IOS Interface Command Reference*	LAN Interfaces Serial Interfaces Logical Interfaces
• *Cisco IOS IP Configuration Guide* • *Cisco IOS IP Command Reference, Volume 1 of 3: Addressing and Services* • *Cisco IOS IP Command Reference, Volume 2 of 3: Routing Protocols* • *Cisco IOS IP Command Reference, Volume 3 of 3: Multicast*	IP Addressing IP Services IP Routing Protocols IP Multicast
• *Cisco IOS AppleTalk and Novell IPX Configuration Guide* • *Cisco IOS AppleTalk and Novell IPX Command Reference*	AppleTalk Novell IPX

Table 16 Cisco IOS Release 12.2 Documentation Set (continued)

Books	Major Topics
• *Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Configuration Guide* • *Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Command Reference*	Apollo Domain Banyan VINES DECnet ISO CLNS XNS
• *Cisco IOS Voice, Video, and Fax Configuration Guide* • *Cisco IOS Voice, Video, and Fax Command Reference*	Voice over IP Call Control Signaling Voice over Frame Relay Voice over ATM Telephony Applications Trunk Management Fax, Video, and Modem Support
• *Cisco IOS Quality of Service Solutions Configuration Guide* • *Cisco IOS Quality of Service Solutions Command Reference*	Packet Classification Congestion Management Congestion Avoidance Policing and Shaping Signaling Link Efficiency Mechanisms
• *Cisco IOS Security Configuration Guide* • *Cisco IOS Security Command Reference*	AAA Security Services Security Server Protocols Traffic Filtering and Firewalls IP Security and Encryption Passwords and Privileges Neighbor Router Authentication IP Security Options Supported AV Pairs
• *Cisco IOS Switching Services Configuration Guide* • *Cisco IOS Switching Services Command Reference*	Cisco IOS Switching Paths NetFlow Switching Multiprotocol Label Switching Multilayer Switching Multicast Distributed Switching Virtual LANs LAN Emulation
• *Cisco IOS Wide-Area Networking Configuration Guide* • *Cisco IOS Wide-Area Networking Command Reference*	ATM Frame Relay SMDS X.25 and LAPB
• *Cisco IOS Mobile Wireless Configuration Guide* • *Cisco IOS Mobile Wireless Command Reference*	General Packet Radio Service

Table 16   Cisco IOS Release 12.2 Documentation Set (continued)

Books	Major Topics
• *Cisco IOS Terminal Services Configuration Guide* • *Cisco IOS Terminal Services Command Reference*	ARA LAT NASI Telnet TN3270 XRemote X.28 PAD Protocol Translation
• *Cisco IOS Configuration Guide Master Index*	
• *Cisco IOS Command Reference Master Index*	
• *Cisco IOS Debug Command Reference*	
• *Cisco IOS Software System Error Messages*	
• *New Features in 12.2-Based Limited Lifetime Releases*	
• *New Features in Release 12.2 T*	
• *Release Notes* (Release note and caveat documentation for 12.2-based releases and various platforms)	

Obtaining Documentation

The following sections provide sources for obtaining documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at this URL:

http://www.cisco.com

Translated documentation is available at this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Cisco documentation and additional literature are available in a CD-ROM package, which ships with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or as an annual subscription.

Ordering Documentation

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/cgi-bin/order/order_root.pl

- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

  http://www.cisco.com/go/subscription

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, U.S.A.) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

You can submit comments electronically on Cisco.com. In the Cisco Documentation home page, click the **Fax** or **Email** option in the "Leave Feedback" section at the bottom of the page.

You can email your comments to bug-doc@cisco.com.

You can submit your comments by mail by using the response card behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Document Resource Connection
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain online documentation, troubleshooting tips, and sample configurations from online tools by using the Cisco Technical Assistance Center (TAC) Web Site. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC Web Site.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com is a highly integrated Internet application and a powerful, easy-to-use tool that provides a broad range of features and services to help you with these tasks:

- Streamline business processes and improve productivity
- Resolve technical issues with online support
- Download and test software packages

- Order Cisco learning materials and merchandise
- Register for online skill assessment, training, and certification programs

If you want to obtain customized information and service, you can self-register on Cisco.com. To access Cisco.com, go to this URL:

http://www.cisco.com

Technical Assistance Center

The Cisco Technical Assistance Center (TAC) is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two levels of support are available: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Cisco TAC inquiries are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

The Cisco TAC resource that you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

You can use the Cisco TAC Web Site to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to this URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to this URL to register:

http://www.cisco.com/register/

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC Web Site, you can open a case online by using the TAC Case Open tool at this URL:

http://www.cisco.com/tac/caseopen

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. These classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this URL:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled: for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). When you call the center, please have available your service agreement number and your product serial number.

This document is to be used in conjunction with the documents listed in the .