



# Release Notes for Cisco uBR7200 Series for Cisco IOS Release 12.1 XQ

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Cisco IOS Release 12.1(3) XQ4  
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These release notes for the Cisco uBR7200 Series Universal Broadband Routers describe the enhancements provided in Cisco IOS Release 12.1(3) XQ4. These release notes are updated as needed.

For a list of the software caveats that apply to Release 12.1(3) XQ4, see the [“Caveats” section on page 24](#) and the *Caveats for Cisco IOS Release 12.1 T* document. The caveats documents are updated for every maintenance release and are on Cisco.com and the Documentation CD-ROM.

Use these release notes with *Cross-Platform Release Notes for Cisco IOS Release 12.1*, located on Cisco.com and the Documentation CD-ROM.

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## Introduction

For information on new features and Cisco IOS commands supported by Cisco IOS Release 12.1 XQ, see the [“New and Changed Information” section on page 18](#) and the [“Related Documentation” section on page 28](#).

The Cisco uBR7200 Series Universal Broadband Routers—the Cisco uBR7223, the Cisco uBR7246, and the Cisco uBR7246 VXR—are based on the Data Over Cable Service Interface Specification (DOCSIS) standards. Each is designed to be installed at a service provider’s headend facility.

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. These routers function as the cable modem termination system (CMTS) for subscriber-end devices such as Cisco uBR904 and Cisco uBR924 Cable Access Routers, and other DOCSIS-compliant cable modems (CMs) and set top boxes (STBs).

For cable plants not fully upgraded to support two-way cable transmission, the routers support DOCSIS-compliant telco return, where the cable modem’s return path to the CMTS is via a dial-up telephone line connection instead of an upstream channel over the coaxial cable. The telco-return delivery mechanism enables cable operators to accelerate deployment of high-speed data services before the cable systems are upgraded to two-way plants.

The introduction of the WT2700 Wireless Technology Suite also allows the Cisco uBR7246 VXR, Cisco uBR7246, and Cisco uBR7223 Universal Broadband Routers to become either a two-way high-speed point-to-point wireless system that provides fixed, dedicated wireless links from one headend site to another, or a two-way high-speed multipoint wireless system that provides fixed, dedicated wireless links from one headend site to multiple subscriber units.

The point-to-point link delivers full-duplex data in the unlicensed U-NII band (5.725 to 5.825 GHz). The multipoint link delivers full-duplex data in the licensed Multichannel Multipoint Distribution Service (MMDS) band (2.150 to 2.162 GHz and 2.500 to 2.690 GHz). The WT2700 Wireless Technology Suite includes the wireless modem card, which is installed in the Cisco uBR7200 series chassis, and the Cisco WT2772 wireless transverter, duplexer, and power feed panel, which are external components.

The Cisco uBR7200 series routers support Internet Protocol (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 IOS Release 12.1(3) XQ4 supports cable and fixed wireless system configurations using the Cisco uBR7246 VXR, Cisco uBR7246, and Cisco uBR7223.

### Cisco uBR7246 VXR Universal Broadband Router

The Cisco uBR7246 VXR 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 uBR7246 VXR 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 and/or wireless modem 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**


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The Cisco uBR7246 VXR chassis does not support the MC11-FPGA cable modem card.

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## 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 and/or wireless modem 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 and/or wireless modem cards
- One removable power supply (The Cisco uBR7223 does not feature load-sharing and redundant power supply capability like the Cisco uBR7246 VXR and Cisco uBR7246.)
- Two PCMCIA slots that allow for software upgrades through the use of Flash memory cards

## Universal Broadband Router Overview

[Table 1](#) provides a quick overview of the major hardware features of the three universal broadband routers.

**Table 1 Universal Broadband Router Overview**

Hardware Supported	Cisco uBR7246 VXR	Cisco uBR7246	Cisco uBR7223
Network Processing Engine	One of the following: NPE-225 NPE-300	One of the following: NPE-150 NPE-200 NPE-225	One of the following: NPE-150 NPE-200 NPE-225
I/O Controller	1	1	1
Network Interface Port Adapters	up to 2	up to 2	1
Cable and/or Wireless Modem 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

## Early Deployment Releases

These release notes describe the Cisco uBR7200 Series Universal Broadband Routers for Cisco IOS Release 12.1(3) XQ4, which is an early deployment release based on Release 12.1(3)T; early deployment releases contain fixes to software caveats as well as support for new Cisco hardware and software features. [Table 2](#) shows the new features in Release 12.1(3) XQ4 and the features that Release 12.1(3) XQ4 inherited from Release 12.1(3)T and earlier 12.1 T releases.

**Table 2 Early Deployment Releases for the Cisco uBR7200 Series Universal Broadband Routers**

ED Release	Additional Software Features	Additional Hardware Features
<b>Cisco IOS Release 12.1(3) XQ4</b>	<ul style="list-style-type: none"> <li>Support for Fixed Wireless Multipoint</li> </ul>	<ul style="list-style-type: none"> <li>Multipoint Wireless Modem Card and associated hardware components</li> </ul>
<b>Cisco IOS Release 12.1(3)T and earlier 12.1 T releases</b>	<ul style="list-style-type: none"> <li>Baseline Privacy Interface (BPI) MIB<sup>1</sup></li> <li>Cable Subinterfaces and Interface Bundling support for Virtual Private Networks</li> <li>Circuit Interface Identification MIB</li> <li>DOCSIS Quality of Service Enhancements</li> <li>Enhanced Modem Status Display</li> <li>Enhanced Per Modem Error Counter</li> <li>Expression MIB Support of Delta, Wildcarding, and Aggregation</li> <li>Firewall Enhancements</li> <li>Individual SNMP<sup>2</sup> Trap Support</li> <li>MC16S LED<sup>3</sup> Enhancement</li> <li>MPLS<sup>4</sup> VPN<sup>5</sup> Support for Subinterfaces and Interface Bundles</li> </ul>	<ul style="list-style-type: none"> <li>Point-to-Point Wireless Modem Card and associated hardware components</li> <li>Cisco Cable Clock Card</li> <li>MC16E Cable Modem Card</li> <li>MC16S Cable Modem Card</li> </ul>

**Table 2** Early Deployment Releases for the Cisco uBR7200 Series Universal Broadband Routers (continued)

ED Release	Additional Software Features	Additional Hardware Features
Cisco IOS Release 12.1(3)T and earlier 12.1 T releases (continued)	<ul style="list-style-type: none"> <li>• SNMP Cable Modem Remote Query</li> <li>• Source Specific Multicast</li> <li>• Redirect-Number Support for RADIUS<sup>6</sup> and TACACS+<sup>7</sup> Servers</li> <li>• Upstream Address Verification Enhancement</li> </ul>	(continued)

1. MIB = Management Information Base
2. SNMP = Simple Network Management Protocol
3. LED = light emitting diode
4. MPLS = Multiprotocol Label Switching
5. VPN = Virtual Private Network
6. RADIUS = Remote Access Dial-In User Service
7. TACACS+ = Terminal Access Controller Access Control System Plus

## System Requirements

This section describes the system requirements for Release 12.1(3) XQ4 and includes the following sections:

- [Memory Recommendations, page 5](#)
- [System Interoperability, page 6](#)
- [Supported Hardware, page 8](#)
- [Determining Your Software Release, page 14](#)
- [Upgrading to a New Software Release, page 14](#)
- [Feature Set Tables, page 14](#)

## Memory Recommendations

Table 3 displays the memory recommendations of the Cisco IOS feature sets for the Cisco uBR7200 Series Universal Broadband Routers for Cisco IOS Release 12.1(3) XQ4. Cisco uBR7200 Series Universal Broadband Routers are available with a 16- MB or 20- MB Type II PCMCIA Flash memory card.

**Table 3** Memory Recommendations for the Cisco Series Universal Broadband Routers, Release 12.1(3) XQ4 Feature Sets

Feature Set	Software Image	Recommended Flash Memory	Recommended DRAM Memory	Runs From
<b>Two-Way Data/VoIP and Wireless Images</b>				
DOCSIS Two-Way IP Plus	ubr7200-is-mz	16 MB Flash	64 MB DRAM	RAM
DOCSIS Two-Way IP Plus with BPI	ubr7200-ik1s-mz	16 MB Flash	64 MB DRAM	RAM

The image subset legend for [Table 3](#) is as follows:

- i = IP routing and non-cable interface bridging including Network Address Translation (NAT)
- k1 = DOCSIS Baseline Privacy, which is subject to export controls
- s = “Plus” features: NAT and Inter-Switch Link (ISL)



**Note**

All Cisco IOS Release 12.1(3) XQ4 images require 64 MB of DRAM. All images support all of the hardware listed in the [“Supported Hardware”](#) section on page 8, 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 radio frequency (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 “k1” 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 via 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 VPN support.
- Telco-return CMs—To support telco return, use a Cisco uBR7200 series software image that contains “t” in its file name. The telco return CM must be DOCSIS-based or compliant, and must be configured to support telco return.



**Note**

Some third-party telco-return CMs cannot receive traffic over the same downstream channel as CMs operating on a two-way data system. In these instances, segment your cable plant to allow more than one downstream channel.

- EuroDOCSIS CMs or set top boxes (STBs) with integrated EuroDOCSIS CMs using Cisco MC16E Cable Modem Cards and Cisco IOS Release 12.1(1a)T1 or higher. EuroDOCSIS operation support includes 8 MHz Phase Alternating Line (PAL) or Systeme Electronique Couleur Avec Memoire (SECAM) channel plans.

- DOCSIS 1.0 Extensions

The Cisco uBR7200 series support DOCSIS 1.0 QoS extensions that include:

- Multi-SID support, allowing the definition of multiple Service IDs (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 non-zero 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 (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**

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

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- 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 uBR7246 VXR chassis must be used. The Cisco uBR7246 VXR must contain a clock card and an MC16S or MC16E Cable Modem Card. Only the MC16S and the MC16E Cable Modem Cards support the external clock reference from the clock card to distribute that signal to CMs or set top boxes (STBs) attached to the specific network segments. The chassis must be running Cisco IOS Release 12.1(1a)T1 or higher.

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

## Supported Hardware

Cisco IOS Release 12.1(3) XQ4 supports the following Cisco uBR7200 Series Universal Broadband Routers:

- Cisco uBR7223
- Cisco uBR7246
- Cisco uBR7246 VXR

For detailed descriptions of the new hardware features, see the [“New and Changed Information” section on page 18](#).

## Network Processing Engines

The Cisco uBR7223 and the Cisco uBR7246 support the following Network Processing Engines (NPE) in Cisco IOS Release 12.1(3) XQ4:

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

The Cisco uBR7246 VXR supports the following Network Processing Engines (NPE) in Cisco IOS Release 12.1(3) XQ4:

- NPE-225
- NPE-300

**Note**

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The NPE-300 is not supported on the Cisco uBR7223 and the Cisco uBR7246. The NPE-150 and NPE-200 are not supported on the Cisco uBR7246 VXR.

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## Cable Modem Cards

Cisco IOS Release 12.1(3) XQ4 supports the following cable modem cards, all of which provide connection to the HFC network:

- MC11C cable modem cards (which replace the original MC11-FPGA cable modem cards that are also supported for existing installations) offer the following ports:
  - one upstream port
  - one downstream port
- MC12C cable modem cards (which replace the original MC12 cable modem cards) offer the following ports:
  - two upstream ports
  - one downstream port
- MC14C cable modem cards (which replace the original MC14 cable modem cards) offer the following ports;
  - four upstream ports
  - one downstream port

- MC16C cable modem cards (which replace the MC16B cable modem cards that are also supported for existing installations) offer the following ports:
  - six upstream ports
  - one downstream port
- MC16E cable modem cards provide connection to an HFC network using the proposed EuroDOCSIS (Annex A) standard, and offer the following ports:
  - six upstream ports
  - one downstream port
- MC16S spectrum management cable modem cards offer the following ports:
  - six upstream ports, with dedicated hardware support for enhanced hardware-based spectrum management
  - one downstream port

Table 4 provides a quick overview of the cable modem cards that are supported in Cisco IOS Release 12.1(3) XQ4.

**Table 4 Cisco uBR7200 Series Universal Broadband Routers Cable Modem Cards**

Cable Modem Card	Upstream Ports	Downstream Ports	Additional Features
MC11C	1	1	
MC12C	2	1	
MC14C	4	1	
MC16C	6	1	
MC16E	6	1	EuroDOCSIS (Annex A) Support
MC16S	6	1	Enhanced software- and hardware-based Spectrum Management Support

## Wireless Modem Cards

A wireless modem card installs in a modem card slot of a Cisco uBR7246 VXR, Cisco uBR7246, or Cisco uBR7223 router. It provide the control and data interface to the system's digital motherboard and the RF subsystem in the wireless transverter as well as the up/down conversion from baseband to intermediate frequency (IF). A wireless modem card is configured through the router's system console or via the CiscoView network management system. Cisco IOS Release 12.1(3) XQ4 supports the following wireless modem cards:

- Point-to-Point Wireless Modem Card

A Cisco uBR7200 series router configured with a point-to-point wireless modem card provides a fixed dedicated wireless link from one site to another.

For information on the point-to-point wireless modem card, including detailed installation and configuration information, see the *Cisco uBR7200 Series Universal Broadband Router Wireless Modem Card and Subsystem Installation and Configuration* document.

- Multipoint Wireless Modem Card

A Cisco uBR7200 series router configured with a multipoint wireless modem card provides fixed dedicated wireless links from one site to multiple subscriber units.

For information on the multipoint wireless modem card, including detailed installation and configuration information, see the *Cisco uBR7200 Series Router Multipoint Wireless Modem Card and Subsystem Installation* document.

**Note**

Not all port adapters are supported with wireless modem cards. The HSSI, 10BASE-T Ethernet, 100BASE-T Fast Ethernet, serial Frame Relay, ATM, and POS interfaces are fully supported. The Gigabit Ethernet port adapter was not supported with wireless modem cards at the time the Cisco IOS Release 12.1(3) XQ4 software was released. For more information, see the [“Port Adapter Cards Supported for Wireless Configurations”](#) section on page -13.

## Port Adapter Cards Supported for Cable Configurations

Table 5 lists the port adapters supported by Cisco uBR7200 series routers in cable configurations in Cisco IOS Release 12.1(3) XQ4.

**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 uBR7246 VXR router.

**Table 5** Port Adapters Supported in Cable Configurations of the Cisco uBR7200 Series Universal Broadband Routers

Product Number	Cisco uBR7223	Cisco uBR7246	Cisco uBR7246 VXR
<b>Ethernet</b>			
PA-4E—4-port Ethernet 10BASE-T port adapter	Supported	Supported	Supported <sup>1</sup>
PA-8E—8-port Ethernet 10BASE-T port adapter	Supported	Supported	Supported <sup>2</sup>
PA-FE-TX—1-port 100BASE-TX Fast Ethernet port adapter	Supported	Supported	Supported
PA-FE-FX—1-port 100BASE-FX Fast Ethernet port adapter	Supported	Supported	Supported
PA-2FEISL-TX—2-port 100BASE-TX Fast Ethernet port adapter with Inter-Switch Link (ISL) support	Supported	Supported	Supported
PA-2FEISL-FX—2-port 100BASE-FX Fast Ethernet port adapter with Inter-Switch Link (ISL) support	Supported	Supported	Supported
PA-12E/2FE—12-port 10BASE-T and 2-port 10/100BASE-TX port adapter	Not applicable	Supported	Not applicable
<b>Gigabit Ethernet</b>			
PA-GE—1-port, full-duplex, IEEE 802.3z-compliant Gigabit Ethernet (GE) port adapter <sup>3</sup>	Not applicable	Not applicable	Supported
<b>Serial</b>			
PA-4T+—4-port synchronous serial port adapter	Supported	Supported	Supported

**Table 5 Port Adapters Supported in Cable Configurations of the Cisco uBR7200 Series Universal Broadband Routers (continued)**

Product Number	Cisco uBR7223	Cisco uBR7246	Cisco uBR7246 VXR
PA-8T-232—8-port EIA/TIA-232 synchronous serial port adapter	Supported	Supported	Not applicable
PA-8T-V35—8-port V.35 synchronous serial port adapter	Supported	Supported	Not applicable
PA-8T-X21—8-port X.21 synchronous serial port adapter	Supported	Supported	Not applicable
PA-4E1G-75—4-port unbalanced (75-ohm) E1-G.703/G.704 synchronous serial port adapter	Supported	Supported	Supported
PA-4E1G-120—4-port balanced (120-ohm) E1-G.703/G.704 synchronous serial port adapter	Supported	Supported	Supported
PA-E3—1-port high-speed serial E3 interface port adapter	Supported	Supported	Supported
PA-T3—1-port T3 serial interface port adapter	Supported	Supported	Supported
PA-2E3—2-port high-speed serial E3 interface port adapter	Supported	Supported	Supported
PA-2T3—2-port T3 serial interface port adapter	Supported	Supported	Supported
PA-MC-E3—1-port multi-channel E3, medium-speed serial interface port adapter	Supported	Supported	Not applicable
PA-MC-T3—1-port T3 (channelized into 28 independent T1 data lines) port adapter	Supported	Supported	Not applicable
PA-MC-4T1—4-port multichannel DS1 Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) single-wide port adapter	Supported	Supported	Not applicable
PA-MC-8E1/120—8-port multichannel E1 Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) single-wide port adapter	Supported	Supported	Not applicable
PA-MC-8T1—8-port multichannel DS1 Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) single-wide port adapter	Supported	Supported	Not applicable
<b>HSSI</b>			
PA-H—1-port HSSI port adapter	Supported	Supported	Supported <sup>4</sup>
PA-2H—2-port HSSI port adapter	Supported	Supported	Supported <sup>5</sup>
<b>ATM</b>			

**Table 5** Port Adapters Supported in Cable Configurations of the Cisco uBR7200 Series Universal Broadband Routers (continued)

Product Number	Cisco uBR7223	Cisco uBR7246	Cisco uBR7246 VXR
PA-A1-OC3SMI—1-port ATM OC-3c/STM-1 single-mode intermediate reach port adapter	Supported	Supported	Not applicable
PA-A1-OC3MM—1-port ATM OC-3c/STM-1 multimode port adapter	Supported	Supported	Not applicable
PA-A2-4E1XC-OC3SM—5-port ATM CES <sup>6</sup> (4 E1 120-ohm CBR <sup>7</sup> ports and 1 OC-3 ATM single-mode port) port adapter	Not applicable	Supported	Not applicable
PA-A2-4E1XC-E3ATM—5-port ATM CES <sup>6</sup> (4 E1 120-ohm CBR <sup>7</sup> ports and 1 E3 ATM port) port adapter	Not applicable	Supported	Not applicable
PA-A2-4T1C-OC3SM—5-port ATM CES <sup>6</sup> (4 T1 CBR <sup>7</sup> ports and 1 OC-3 ATM single-mode port) port adapter	Not applicable	Supported	Not applicable
PA-A2-4T1C-T3ATM—5-port ATM CES <sup>6</sup> (4 T1 CBR <sup>7</sup> ports and 1 T3 ATM port) port adapter	Not applicable	Supported	Not applicable
PA-A3-E3—1-port E3 ATM, PCI-based port adapter	Supported	Supported	Not applicable
PA-A3-T3—1-port T3 ATM, PCI-based port adapter	Supported	Supported	Not applicable
PA-A3-OC3MM—1-port OC-3c ATM, PCI-based multimode port adapter	Supported	Supported	Supported
PA-A3-OC3SMI—1-port OC-3c ATM, PCI-based single-mode intermediate reach port adapter	Supported	Supported	Supported
PA-A3-OC3SML—1-port OC-3c ATM, PCI-based single-mode long reach port adapter	Supported	Supported	Supported
<b>Packet-Over-SONET (POS)</b>			
PA-POS-OC3SML—1-port POS OC-3 single-mode, long reach port adapter	Supported	Supported	Supported
PA-POS-OC3SMI—1-port OC3 single-mode, intermediate reach port adapter	Supported	Supported	Supported
PA-POS-OC3MM—1-port POS OC3 multimode port adapter	Supported	Supported	Supported

1. To use a PA-4E 4-port Ethernet 10BASE-T port adapter in a Cisco uBR7246 VXR, be sure you have the minimum required hardware revision (version 1.14, part number 800-02070-04) or a more recent version of the port adapter.
2. To use a PA-8E 8-port Ethernet 10BASE-T port adapter in a Cisco uBR7246 VXR, be sure you have the minimum required hardware revision (version 1.14, part number 800-02069-04) or a more recent version of the port adapter.
3. The Gigabit Ethernet port adapter must be combined with the appropriate optical fiber cable and a Gigabit Interface Converter (GBIC). The Gigabit Ethernet port adapter is supported in Cisco IOS Release 12.0(8)SC1 and later versions of Cisco IOS Release 12.0 SC.
4. To use a PA-H 1-port HSSI port adapter in a Cisco uBR7246 VXR, be sure you have the minimum required hardware revision (version 1.17, part number 800-02747-06) or a more recent version of the port adapter.

5. To use a PA-2H 2-port HSSI port adapter in a Cisco uBR7246 VXR, be sure you have the minimum required hardware revision (version 1.3, part number 800-03306-02) or a more recent version of the port adapter.
6. CES = circuit emulation services.
7. CBR = constant bit rate.

## Port Adapter Cards Supported for Wireless Configurations

Table 6 lists the port adapters supported by Cisco uBR7200 series routers in wireless configurations in Cisco IOS Release 12.1(3) XQ4.

**Table 6** *Port Adapters Supported in Wireless Configurations of the Cisco uBR7200 Series Universal Broadband Routers*

Product Number	Cisco uBR7223	Cisco uBR7246	Cisco uBR7246 VXR
<b>Ethernet</b>			
PA-8E—8-port Ethernet 10BASE-T port adapter	Supported	Supported	Supported <sup>1</sup>
PA-FE-TX—1-port 100BASE-TX Fast Ethernet port adapter	Supported	Supported	Supported
PA-FE-FX—1-port 100BASE-FX Fast Ethernet port adapter	Supported	Supported	Supported
<b>Serial</b>			
PA-2T3+—2-port T3 serial interface port adapter, enhanced	Supported	Supported	Not applicable
<b>HSSI</b>			
PA-2H—2-port HSSI port adapter	Supported	Supported	Supported <sup>2</sup>
<b>ATM</b>			
PA-A3-T3—1-port T3 ATM, PCI-based port adapter	Supported	Supported	Not applicable
PA-A3-OC3MM—1-port OC-3c ATM, PCI-based multimode port adapter	Supported	Supported	Supported
<b>Packet-Over-SONET (POS)</b>			
PA-POS-OC3MM—1-port POS OC3 multimode port adapter	Supported	Supported	Supported

1. To use a PA-8E 8-port Ethernet 10BASE-T port adapter in a Cisco uBR7246 VXR, be sure you have the minimum required hardware revision (version 1.14, part number 800-02069-04) or a more recent version of the port adapter.
2. To use a PA-2H 2-port HSSI port adapter in a Cisco uBR7246 VXR, be sure you have the minimum required hardware revision (version 1.3, part number 800-03306-02) or a more recent version of the port adapter.



**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 uBR7246 VXR router.

## 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) 12.1 XQ Software (ubr7200-is-mz), Version 12.1(3) XQ4, 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/cisco/mkt/ios/prodlit/957\\_pp.htm](http://www.cisco.com/warp/public/cc/cisco/mkt/ios/prodlit/957_pp.htm).

The multipoint wireless modem card (uBR-MCW-MDA) for the Cisco uBR7200 Series Universal Broadband Router requires a microcode bundle (RHE) to allow it to operate.

Microcode software images ship in Flash memory along with the system software image. When the router starts, the system software unpacks the microcode software bundle and loads the proper software on all the interface linecards.

It is possible to use a later version of microcode software than the one shipped with the Cisco IOS software from the factory. The microcode software in Flash memory is mapped to the linecards.

The microcode bundle for the multipoint wireless modem card is downloadable (with a Cisco.com login) at <http://www.cisco.com/cgi-bin/tablebuild.pl/rhe>.



### Note

Unless you fully understand how Cisco IOS software uses microcode software, it is important to keep the factory configuration.

## 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.

Cisco IOS Release 12.1(3) XQ4 supports the same feature sets as Cisco IOS Release 12.1(3)T, but adds new features supported by the Cisco uBR7200 series.

[Table 7](#) lists the features and feature sets supported by the Cisco uBR7200 series in Cisco IOS Release 12.1(3) XQ4 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. For example, (3) means a feature was introduced in Release 12.1(3) XQ4. If a cell in this column is empty, the feature was inherited from Release 12.1(3)T. For information about features inherited from Release 12.1(3)T, refer to the release notes for Release 12.1(3)T.



### 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.

**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 12.1(3) XQ4 (that is, Release 12.1(3)T, on which Release 12.1(3) XQ4 is based) 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	Feature Set		
	In <sup>1</sup>	DOCSIS Two-way, IP Plus	DOCSIS Two-way, IP Plus with BPI
<b>IP Routing</b>			
DRP <sup>2</sup> Server Agent		Yes	Yes
Dynamic Host Configuration Protocol (DHCP) Server		Yes	Yes
Easy IP (Phase 1)		Yes	Yes
Hot Standby Router Protocol (HSRP) over ISL <sup>3</sup> in Virtual LAN Configurations		Yes	Yes
IP Type of Service and Precedence for GRE <sup>4</sup> Tunnels		Yes	Yes
IP Enhanced IGRP <sup>5</sup> Route Authentication		Yes	Yes
Per-Modem Filters		Yes	Yes
<b>Management</b>			
Circuit Interface Identification MIB		Yes	Yes
Cisco Call History MIB Command Line Interface		Yes	Yes
Cisco IOS Internationalization		Yes	Yes
Enhanced Modem Status Display		Yes	Yes
Enhanced Per Modem Error Counter		Yes	Yes
Entity MIB, Phase 1		Yes	Yes
Expression MIB Support of Delta, Wildcarding, and Aggregation		Yes	Yes
Individual SNMP Trap Support		Yes	Yes
Interface Command Enhancements		Yes	Yes
MC16S LED Enhancements		Yes	Yes
MIB Enhancements		Yes	Yes
RF Interface MIB		Yes	Yes
SNMP Cable Modem Remote Query		Yes	Yes
SNMPv2C <sup>6</sup> and SNMPv3 <sup>7</sup>		Yes	Yes

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

Feature	Feature Set		
	In <sup>1</sup>	DOCSIS Two-way, IP Plus	DOCSIS Two-way, IP Plus with BPI
<b>Multimedia</b>			
Bi-Directional PIM <sup>8</sup>		Yes	Yes
IP Multicast Load Splitting across Equal-Cost Paths		Yes	Yes
IP Multicast over ATM Point-to-Multipoint Virtual Circuits		Yes	Yes
IP Multicast over Token Ring LANs		Yes	Yes
Source Specific Multicast		Yes	Yes
Stub IP Multicast Routing		Yes	Yes
<b>Quality of Service (QoS)</b>			
DOCSIS 1.0 <sup>9</sup> + QoS Enhancements		Yes	Yes
Downstream QoS Handling		Yes	Yes
Downstream Traffic Shaping		Yes	Yes
Upstream Traffic Shaping		Yes	Yes
Upstream Address Verification		Yes	Yes
Improved Upstream QoS		Yes	Yes
QoS Configuration		Yes	Yes
QoS Profile Enforcement		Yes	Yes
Read/Create Implementation of QoS		Yes	Yes
RTP <sup>10</sup> Header Compression		Yes	Yes
Multiple SID Support (static only)		Yes	Yes
Dynamic SID support		Yes	Yes
Telco-Return		No	No
Time of Day (ToD) Server		Yes	Yes
<b>Security</b>			
Automated Double Authentication		Yes	Yes
Baseline Privacy Interface (BPI) Encryption		No	Yes
Cable Modem and Multicast Authentication using RADIUS		No	Yes
Dynamic Mobile Hosts		Yes	Yes
Firewall Enhancements		Yes	Yes
HTTP <sup>11</sup> Security		Yes	Yes
Named Method Lists for AAA <sup>12</sup> Authorization & Accounting		Yes	Yes
Per-Modem and Per-Host Access List Support		Yes	Yes
Per-User Configuration		Yes	Yes

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

Feature	Feature Set		
	In <sup>1</sup>	DOCSIS Two-way, IP Plus	DOCSIS Two-way, IP Plus with BPI
Redirect-Number Support for RADIUS and TACACS+ Servers		No	No
Reflexive Access Lists		Yes	Yes
Vendor-Proprietary RADIUS Attributes		Yes	Yes
<b>Switching</b>			
Fast-Switched Policy Routing		Yes	Yes
<b>VPN</b>			
MPLS VPN Support for Subinterfaces and Interface Bundles		Yes	Yes
Cable Subinterfaces and Interface Bundling support for Virtual Private Networks		Yes	Yes
<b>WAN Optimization</b>			
PAD <sup>13</sup> Subaddressing		Yes	Yes
<b>WAN Services</b>			
Bandwidth Allocation Control Protocol (BACP)		Yes	Yes
Enhanced Local Management Interface (ELMI)		Yes	Yes
Frame Relay Enhancements		Yes	Yes
Frame Relay MIB Extensions		Yes	Yes
Frame Relay Router ForeSight		Yes	Yes
ISDN <sup>14</sup> Advice of Charge		Yes	Yes
ISDN Caller ID Callback		Yes	Yes
ISDN Multiple Switch Type		Yes	Yes
ISDN NFAS <sup>15</sup>		Yes	Yes
Microsoft Point-to-Point Compression (MPPC)		Yes	Yes
National ISDN Switch Types for BRI <sup>16</sup> and PRI <sup>17</sup>		Yes	Yes
VPDN <sup>18</sup> MIB and Syslog Facility		Yes	Yes
X.25 Enhancements		Yes	Yes
X.25 Switching between PVCs <sup>19</sup> and SVCs <sup>20</sup>		Yes	Yes
<b>Wireless</b>			
Support for Fixed Wireless Multipoint	12.1(3)XQ	Yes	Yes
Support for Fixed Wireless Point-to-Point		Yes	Yes

1. This column indicates the maintenance release in which the feature was introduced: If a cell in this column is empty, this feature was introduced in a 12.1 T release
2. DRP = Director Response Protocol
3. ISL = Inter-Switch Link

4. GRE = generic routing encapsulation
5. IGRP = Interior Gateway Routing Protocol
6. SNMPv2 = Simple Network Management Protocol version 2
7. SNMPv3 = Simple Network Management Protocol version 3
8. PIM = Protocol Independent Multicast
9. 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 slot scheduling mechanism (UGS) for voice slots, and per IP-precedence rate shaping on the downstream.
10. RTP = Real-Time Transport Protocol
11. HTTP = Hypertext Transfer Protocol
12. AAA = authentication, authorization, and accounting
13. PAD = packet assembler/disassembler
14. ISDN = Integrated Services Digital Network
15. NFAS = non-facility-associated signaling
16. BRI = Basic Rate Interface
17. PRI = Primary Rate Interface
18. VPDN = virtual private dial-up network
19. PVC = permanent virtual circuit
20. SVC = switched virtual circuit

## New and Changed Information

The following sections list the new hardware and software features supported by the Cisco uBR7200 Series Universal Broadband Routers for Cisco IOS Release 12.1 XQ.



**Note**

For information about features that Release 12. XQ inherited from Release 12.1 T, refer to the release notes for Release 12.1 T.

### New Hardware and Software Features in Cisco IOS Release 12.1(3)XQ4

No new hardware and software feature are supported by the Cisco uBR7200 series for Cisco IOS Release 12.1(3) XQ4.

### New Hardware and Software Features in Cisco IOS Release 12.1(3)XQ3

No new hardware and software feature are supported by the Cisco uBR7200 series for Cisco IOS Release 12.1(3) XQ3.

### New Hardware and Software Features in Cisco IOS Release 12.1(3)XQ2

No new hardware and software feature are supported by the Cisco uBR7200 series for Cisco IOS Release 12.1(3) XQ2.

## New Hardware and Software Features in Cisco IOS Release 12.1(3)XQ1

No new hardware and software feature are supported by the Cisco uBR7200 series for Cisco IOS Release 12.1(3) XQ1.

## New Hardware Features in Release 12.1(3)XQ

The following new hardware features are supported by the Cisco uBR7200 series in Cisco IOS Release 12.1(3)XQ.

### Multipoint Wireless Modem Card

The multipoint wireless modem card installs in a modem card slot of a Cisco uBR7246 VXR, Cisco uBR7246, or Cisco uBR7223 router. It is configured through the router's system console or via the CiscoView network management system. The multipoint wireless modem card provides the control and data interface to the system's digital motherboard and the RF subsystem in the wireless transverter. It also provides the up/down conversion from baseband to intermediate frequency (IF).

A Cisco uBR7200 series router configured with a multipoint wireless modem card provides fixed dedicated wireless links from one site to multiple subscriber units.

For more information on the multipoint wireless modem card, including detailed installation information, see the *Cisco uBR7200 Series Router Multipoint Wireless Modem Card and Subsystem Installation* guide.

### Power Feed Panel

The power feed panel serves as an interconnection device between the multipoint wireless modem card, the wireless transverter, and a –48 VDC power supply. The main purpose of this unit is to provide DC power to the system, provide control signals to the wireless transverter, and transmit and receive IF signals to and from the transverters. In addition, the unit contains circuit breakers for the DC power.

At least one power feed panel is required for each installation. Each power feed panel supports a maximum of four wireless transverters.

For more information about the power feed panel, including detailed installation information, see the *Cisco uBR7200 Series Router Multipoint Wireless Modem Card and Subsystem Installation* guide.

### MMDS Wireless Transverter and Duplexer Assembly

The ruggedized wireless transverter is the outdoor data interface to the indoor subsystems. It provides up/down conversion from IF to RF frequencies. One of the transverter's components is the duplexer assembly with antenna connection. The duplexer assembly acts as a filter for transmit and receive isolation. For more information about the wireless transverter and duplexer assembly, including detailed installation information, see the *Cisco uBR7200 Series Router Multipoint Wireless Modem Card and Subsystem Installation* guide.

## New Software Features in Release 12.1(3)XQ

The following new software features are supported by the Cisco uBR7200 Series Universal Broadband Routers in Cisco IOS Release 12.1(3)XQ.

### Support for Fixed Wireless Multipoint

The Cisco high-speed multipoint broadband fixed wireless system provides dedicated, full-duplex, wireless data communication between a single headend site and multiple subscriber sites. It transmits and receives in the licensed Multichannel Multipoint Distribution Service (MMDS) band (2.150 to 2.162 GHz and 2.500 to 2.690 GHz).

Support for fixed wireless multipoint allows the Cisco uBR7246 VXR, Cisco uBR7246, and Cisco uBR7223 to function as the headend of a Cisco broadband fixed wireless point-to-multipoint system, which is designed to use antennas that broadcast the RF signal in a portion of a complete circle, or directionally, in what is called a sector. Each headend site can be designed and configured to broadcast in a single sector, or in multiple sectors, depending on the requirements of the network.

For each sector, the components of a point-to-multipoint headend system consist of the necessary cables and:

- One Cisco uBR7246 or Cisco 7223 Universal Broadband Router
- One wireless modem card installed in the router
- One power-feed panel
- One or two antennas (a second antenna for diversity reception is optional)
- One or two wireless transverters containing the RF amplifier (one for each antenna)
- One or two duplexers (one for each wireless transverter)

On the subscriber side, a Cisco 2600 series modular access router or a Cisco 3600 series modular high-density access router is a required component of the subscriber unit system, which is designed to receive RF signals from the headend and transmit return-RF signals to the headend.

The fixed wireless point-to-multipoint system incorporates Vector Orthogonal Frequency Division Multiplexing (VOFDM), so it does not always depend on line-of-sight (LOS) deployment. With VOFDM, the system allows wireless operation in obstructed, non-line-of-sight (non-LOS) environments by taking advantage of multipath signals. This can be particularly useful in urban and suburban environments.

For additional information about fixed wireless multipoint support, including information about CLI commands, see the *Multipoint Support for the Cisco uBR7200 Series Universal Broadband Router* feature module and the *Cisco uBR7200 Series Router Multipoint Wireless Modem Card and Subsystem Installation* guide.

## 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 website 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 are the MIBs that 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 and Wireless-specific MIBs**—Provide information about the cable and wireless 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.

The and are described in the following sections. For information on the SNMP standard MIBs and Cisco’s platform and network-layer enterprise MIBs, see Cisco’s MIB website at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

## Cable-specific and Wireless-specific MIBs

[Table 8](#) shows the cable and wireless MIBs that are supported on the Cisco uBR7200 Series Universal Broadband Routers. The table also provides a brief description of each MIB’s contents. 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 and Wireless-specific MIBs Supported on Cisco uBR7200 Series Routers*

MIB Filename	Description
SNMPv2-SMI.my SNMPv2-SMI-V1SMI.my	This module specifies the Structure of Management Information (SMI) for SNMPv2, as defined in RFC 1902.
SNMPv2-TC.my SNMPv2-TC-V1SMI.my	This module defines the textual conventions as specified in RFC 1903.
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.

**Table 8 Cable-specific and Wireless-specific MIBs Supported on Cisco uBR7200 Series Routers (continued)**

<b>MIB Filename</b>	<b>Description</b>
CISCO-SMI.my CISCO-SMI-V1SMI.my	This module specifies the Structure of Management Information (SMI) for Cisco's enterprise MIBs.
CISCO-TC.my CISCO-TC-V1SMI.my	This module defines the textual conventions used in Cisco's enterprise MIBs.
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 <i>if</i> table and incorporates the extensions defined in RFC 2233.
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.
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.
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.
CISCO-DOCS-REMOTE-QUERY-MIB (also referred to as SNMP Cable Modem Remote Query)	CMTS CM poller, which is used to poll the remote CMs, can be configured.
CISCO-CIRCUIT-INTERFACE-MIB	This module adds support for a new Cisco enterprise MIB, used to assist in SNMP monitoring of circuit-based interfaces.
EXPRESSION-MIB	This module adds support of the Delta, Wildcarding, Delta Wildcarding, and Aggregation features in the Distributed Management Expression MIB (EXPRESSION-MIB)
CISCO-CABLE-SPECTRUM-MIB.my CISCO-CABLE-SPECTRUM-MIB-V1SMI.my	This module describes the spectrum management flap list attributes.
CISCO-WIRELESS-TC-MIB.my CISCO-WIRELESS-TC-MIB-V1SMI.my	This module contains the textual conventions for the other wireless modem card MIB modules.
CISCO-WIRELESS-EXP-MIB.my CISCO-WIRELESS-EXP-MIB-V1SMI.my	This module is the Cisco Wireless Radio Experimental MIB for the Cisco wireless modem card and related subsystem.

**Table 8** *Cable-specific and Wireless-specific MIBs Supported on Cisco uBR7200 Series Routers (continued)*

MIB Filename	Description
CISCO-WIRELESS-IF-MIB.my CISCO-WIRELESS-IF-MIB-V1SMI.my	This module is the MIB Module for the Cisco Wireless Radio Point to Point interface specification.
CISCO-WIRELESS-P2P-BPI-MIB.my CISCO-WIRELESS-P2P-BPI-MIB-V1SMI.my	This module is the MIB Module for the Baseline Privacy Interface (BPI) as implemented on the wireless modem card. This is a variation of the DOCSIS BPI MIB that has been customized for the point-to-point wireless modem subsystem.

## Deprecated and Replacement 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
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 click to **Software Center: Network Mgmt Products: Cisco Network Management Toolkit: Cisco MIB**.

## Limitations and Restrictions

Cisco IOS Release 12.1(3) XQ4 for the Cisco uBR7200 Series Universal Broadband Routers contains the following limitations and restrictions. Unless otherwise indicated, these limitations and restrictions apply to all previous software releases as well.

### Wireless Modem Card Support for Port Adapters

Not all port adapters are supported with wireless modem cards. The HSSI, 10BASE-T Ethernet, 100BASE-T Fast Ethernet, serial Frame Relay, ATM, and POS interfaces are fully supported. The Gigabit Ethernet port adapter was not supported with wireless modem cards at the time the Cisco IOS Release 12.1(3) XQ4 software was released. For more information, see the [“Port Adapter Cards Supported for Wireless Configurations”](#) section on page -13.

### Wireless System Power Feed Panel

The cable that supplies -48VDC to the wireless system’s power feed panel should not exceed 3 meters in length.

## Important Notes

The following sections contain important notes about Cisco IOS Release 12.1 XQ that apply to Cisco uBR7200 Series Universal Broadband Routers.

### Minimum 64 MB of DRAM is Required

The Cisco uBR7200 Series Universal Broadband Router must have a minimum of 64 MB of DRAM to run all Cisco IOS Release 12.1(3) XQ4 images.

## 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.

All caveats in Cisco IOS Release 12.1(3)T and earlier 12.1 T releases are also in Cisco IOS Release 12.1(3) XQ4. For information on caveats in Cisco IOS Release 12.1 T, see the *Caveats for Cisco IOS Release 12.1 T* document.

All caveats in Cisco IOS Release 12.1 are also in Cisco IOS Release 12.1 T.

For information on caveats in Cisco IOS Release 12.1, see *Caveats for Cisco IOS Release 12.1*, which lists severity 1 and 2 caveats and select severity 3 caveats and is located on Cisco.com and the Documentation CD-ROM.

**Note**

If you have an account with Cisco.com, you can use Bug Navigator II to find caveats of any severity for any release. To reach Bug Navigator II, log in to Cisco.com and click **Software Center: Cisco IOS Software: Cisco Bugtool Navigator II**. Another option is to go to <http://www.cisco.com/support/bugtools>.

## Open Caveats—Cisco IOS Release 12.1(3) XQ4

There are no open caveats specific to Cisco IOS Release 12.1(3) XQ4 that require documentation in the release notes.

## Resolved Caveats—Cisco IOS Release 12.1(3) XQ4

All the caveats listed in this section are resolved in Cisco IOS Release 12.1(3) XQ4. This section describes only severity 1 and 2 caveats and select severity 3 caveats.

- CSCdw65903

An error can occur with management protocol processing. Please use the following URL for further information:

<http://www.cisco.com/cgi-bin/bugtool/onebug.pl?bugid=CSCdw65903>

## Open Caveats for Release 12.1(3)XQ3

This section documents possible unexpected behavior by Cisco IOS Release 12.1(3)XQ3, and describes only severity 1 and 2 caveats and select severity 3 caveats.

- CSCdr60827

Some global configuration commands on the Cisco BR7200 series routers can apply to both cable and radio headend line cards. Although such a command has only one internal setting, it does have both a “cable” form and a “radio” form. Either form can be used to change the global setting and both forms can appear in the running configuration. This might be confusing to the user.

The following commands can apply to both cable and radio headend line cards (this list is not exhaustive):

**cable time-server**

commands that include **cable qos**

commands that include **cable flap-list**

- CSCdr97644

Some of the functions in the radio headend system (that is, the Cisco uBR7200 series router)—most notably the RX gain calibration—do not work properly if the upstream channel has been assigned a subchannel, yet is shutdown.

For example, the following commands in the configuration file cause a problem:

```
radio upstream 1 subchannel 3 modulation-profile 7
radio upstream 1 shutdown
```

This configuration indicates that the subchannel is assigned but shutdown.

Workaround: If the channel is to be shutdown, the following command should also be entered to remove the subchannel assignment:

```
router(config-if)# no radio upstream 1 subchannel
```

The running configuration should be either “unassigned and shutdown” or “assigned and enabled”.

Use the following command to unassign and shutdown a subchannel:

```
radio upstream 1 shutdown
```

Use the following commands to assign and enable a subchannel:

```
radio upstream 1 subchannel 3 modulation-profile 7
no radio upstream 1 shutdown
```

## Resolved Caveats for Release 12.1(3)XQ3

All the caveats listed in this section are resolved in Cisco IOS Release 12.1(3)XQ3. This section describes only severity 1 and 2 caveats and select severity 3 caveats.

- CSCdr49365

The **show radio device access-group** command is not yet available. (This command will be available in the next release).

Workaround: Use the **show cable device access-group** command.

This caveat is resolved in Cisco IOS Release 12.1(3)XQ3.

- CSCdr82563

The **show radio errors** command is not yet available.

Workaround: Use the **show cable modem error** command.

This caveat is resolved in Cisco IOS Release 12.1(3)XQ3 and the **show radio errors** command is now available.

- CSCdr86585

On a Cisco uBR7200 series router configured with both a cable modem card and a wireless modem card, issuing the **no shutdown** command might cause the “Radio link ranging\_1” state to last up to 6 minutes before finally establishing the radio link. Normally the “Radio link ranging\_1” state should last a few seconds.

Issuing the **debug docsis mac log** debugging command will show that “CMAC\_LOG\_RANGING\_BACKOFF\_SET” is set to a large number (that is, a number above 300).

Workaround: Specify a manual ranging backoff value to shorten the long delay:

```
radio upstream <mac channel> range-backoff <start><end>
```

Typically, <start> and <end> are numbers less than 10, as in the following syntax example:

```
radio upstream 0 range-backoff 3 6
```

This caveat is resolved in Cisco IOS Release 12.1(3)XQ3.

- CSCdr91706 and Cisco IOS HTTP Vulnerability

A defect in multiple releases of Cisco IOS software will cause a Cisco router or switch to halt and reload if the Cisco IOS HTTP service is enabled, browsing to <http://router-ip/anytext?/> is attempted, and the enable password is supplied when requested. This defect can be exploited to produce a denial of service (DoS) attack.

The vulnerability, identified as Cisco caveat ID CSCdr91706, affects virtually all mainstream Cisco routers and switches running Cisco IOS software releases 12.0 through 12.1, inclusive. This is not the same defect as CSCdr36952.

The vulnerability has been corrected and Cisco is making fixed releases available for free to replace all affected Cisco IOS releases. Customers are urged to upgrade to releases that are not vulnerable to this defect, as shown in detail below.

This vulnerability can only be exploited if the enable password is known or not set.

You are strongly encouraged to read the complete advisory, which is available at <http://www.cisco.com/warp/public/707/ioshttpserverquery-pub.shtml>

This caveat is resolved in Cisco IOS Release 12.1(3)XQ3.

- CSCds00152

When the radio debugging function is enabled via the **debug radio** command, none of the radio debugging flags appear in the output of the **show debug** command. This makes it difficult to determine if the radio debugging function is turned on. There is no workaround.

This caveat is resolved in Cisco IOS Release 12.1(3)XQ3.

- CSCds04747

Cisco IOS software contains a flaw that permits the successful prediction of TCP Initial Sequence Numbers.

This vulnerability is present in all released versions of Cisco IOS software running on Cisco routers and switches. It only affects the security of TCP connections that originate or terminate on the affected Cisco device itself; it does not apply to TCP traffic forwarded through the affected device in transit between two other hosts.

To remove the vulnerability, Cisco is offering free software upgrades for all affected platforms. The defect is described in DDTS record CSCds04747.

Workarounds are available that limit or deny successful exploitation of the vulnerability by filtering traffic containing forged IP source addresses at the perimeter of a network or directly on individual devices.

This notice will be posted at <http://www.cisco.com/warp/public/707/ios-tcp-isn-random-pub.shtml>.

This caveat is resolved in Cisco IOS Release 12.1(3)XQ3.

- CSCds32217

Multiple Cisco IOS software and CatOS software releases contain several independent but related vulnerabilities involving the unexpected creation and exposure of SNMP community strings. These vulnerabilities can be exploited to permit the unauthorized viewing or modification of affected devices.

To remove the vulnerabilities, Cisco is offering free software upgrades for all affected platforms. The defects are documented in DDTS records CSCds32217, CSCds16384, CSCds19674, CSCdr59314, CSCdr61016, and CSCds49183.

In addition to specific workarounds for each vulnerability, affected systems can be protected by preventing SNMP access.

This notice will be posted at  
<http://www.cisco.com/warp/public/707/ios-snmpp-community-vulns-pub.shtml>.

This caveat is resolved in Cisco IOS Release 12.1(3)XQ3.

## 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 28](#)
- [Platform-Specific Documents, page 29](#)
- [Feature Modules, page 31](#)
- [Cisco IOS Software Documentation Set, page 31](#)

## Release-Specific Documents

The following documents are specific to Release 12.1 and are located on Cisco.com and the Documentation CD-ROM:

- *Cross-Platform Release Notes for Cisco IOS Release 12.1*

On Cisco.com:

**Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.1: Release Notes: Cross-Platform Release Notes**

On the Documentation CD-ROM:

**Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.1: Release Notes: Cross Platform Release Notes**

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

**Technical Documents**

- *Caveats for Cisco IOS Release 12.1* and *Caveats for Cisco IOS Release 12.1 T*

As a supplement to the caveats listed in the “Caveats” section in these release notes, see *Caveats for Cisco IOS Release 12.1* and *Caveats for Cisco IOS Release 12.1 T*, which contain caveats applicable to all platforms for all maintenance releases of Release 12.1.

On Cisco.com:

**Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.1: Release Notes: Caveats**

On the Documentation CD-ROM:

**Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.1: Caveats**

**Note**


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If you have an account with Cisco.com, you can use Bug Navigator II to find caveats of any severity for any release. To reach Bug Navigator II, log in to Cisco.com and click **Software Center: Cisco IOS Software: Cisco Bugtool Navigator II**. Another option is to go to <http://www.cisco.com/support/bugtools>.

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## Platform-Specific Documents

The following platform-specific documents are available:

### Cisco uBR7200 Series Routers

These documents are available for the Cisco uBR7200 Series Universal Broadband Routers on Cisco.com and the Documentation CD-ROM:

- *Cisco uBR7200 Series Universal Broadband Router Hardware Installation Guide*
- *Cisco uBR7200 Series Universal Broadband Router Software Configuration Guide*
- *Cisco uBR7200 Series Universal Broadband Router Configuration Notes*
- *Cisco uBR7200 Series Universal Broadband Router Cable Modem Card Hardware Installation*
- *Multipoint Wireless Support for the Cisco uBR7200 Series Universal Broadband Router*
- *Cisco Network Registrar for the uBR7200 Series Universal Broadband Router*
- *Broadband Command Consolidation*

On Cisco.com:

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

**Note**


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

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On the Documentation CD-ROM:

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

**Note**


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The *Broadband Command Consolidation* is available on the Documentation CD-ROM through the following path:

**Cisco Product Documentation: Broadband/Cable Solutions**

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**Note**


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Information about features of the 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](http://www.cisco.com/univercd/cc/td/doc/product/cable/cab_r_sw/index.htm)

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## Cisco Point-to-Point Wireless Modem Card

These documents are available for the point-to-point wireless modem card (and other components of the Cisco WT2700 Wireless Technology Suite) on Cisco.com and the Documentation CD-ROM:

- *Cisco uBR7200 Series Universal Broadband Router Wireless Modem Card and Subsystem Installation & Configuration*
- *Cisco Broadband Fixed Wireless System Power Feed Panel Replacement Instructions*

On Cisco.com:

**Technical Documents: Documentation Home Page: Cisco Product Documentation: Broadband/Wireless Solutions: Broadband Fixed Wireless Products: Point-to-Point Products**

On the Documentation CD-ROM:

**Cisco Product Documentation: Broadband/Wireless Solutions**

## Cisco Multipoint Wireless Modem Card

These documents are available for the multipoint wireless modem card (and associated components on Cisco.com and the Documentation CD-ROM:

- *Multipoint Wireless Support for the Cisco uBR7200 Series Universal Broadband Router*
- *Cisco uBR7200 Series Multipoint Wireless Modem Card and Subsystem Installation*
- *Cisco Multipoint Headend Power Feed Panel Replacement Instructions*
- *Cisco Multipoint Headend Wireless Transverter Replacement Instructions*
- *Cisco Wireless Transverter Hail Shield Installation Instructions*
- *Cisco Multipoint Headend Wireless Transverter Duplexer Replacement Instructions*

On Cisco.com:

**Technical Documents: Documentation Home Page: Cisco Product Documentation: Broadband/Wireless Solutions: Broadband Fixed Wireless Products: Multipoint Products**

On the Documentation CD-ROM:

**Cisco Product Documentation: Broadband/Wireless Solutions**

## Cisco uBR900 Series Cable Access Routers

The documentation for the Cisco uBR900 series Cable Access Routers are available on Cisco.com and the Documentation CD-ROM at the following locations:

On Cisco.com:

**Technical Documents: Documentation Home Page: Broadband/Cable Solutions: Cisco uBR900 Series Cable Access Routers**

On the Documentation CD-ROM:

**Cisco Product Documentation: Broadband/Cable Solutions: Cisco uBR900 Series Cable Access Routers**

## Feature Modules

Feature modules describe new features and are updates to the Cisco IOS documentation set. A feature module consists of a brief overview of the feature, benefits, 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:

**Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.1: New Feature Documentation**

On the Documentation CD-ROM:

**Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.1: New Feature Documentation: New Features in Release 12.1 T**

## 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:

**Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.1: Configuration Guides and Command References**

On the Documentation CD-ROM:

**Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.1: Configuration Guides and Command References: Cisco IOS Interface Configuration Guide or Cisco IOS Interface Command Reference**

## Release 12.1 Documentation Set Contents

[Table 10](#) lists the contents of the Cisco IOS Release 12.1 software documentation set, which is available in electronic form, and also in printed form upon request.



### Note

You can find the most current Cisco IOS documentation on Cisco.com and the Documentation CD-ROM. These electronic documents may contain updates and modifications made after the paper documents were printed.

On Cisco.com:

**Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.1: Configuration Guides and Command References**

On the Documentation CD-ROM:

**Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.1: Configuration Guides and Command References**

**Table 10 Cisco IOS Release 12.1 Documentation Set**

Books	Major Topics
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Configuration Fundamentals Configuration Guide</i></li> <li>• <i>Cisco IOS Configuration Fundamentals Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>Configuration Fundamentals Overview</li> <li>Cisco IOS User Interfaces</li> <li>Cisco IOS File Management</li> <li>Cisco IOS System Management</li> <li>Cisco IOS User Interfaces Commands</li> <li>Cisco IOS File Management Commands</li> <li>Cisco IOS System Management Commands</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Bridging and IBM Networking Configuration Guide</i></li> <li>• <i>Cisco IOS Bridging and IBM Networking Command Reference, Volume I</i></li> <li>• <i>Cisco IOS Bridging and IBM Networking Command Reference, Volume II</i></li> </ul>	<ul style="list-style-type: none"> <li>Transparent Bridging</li> <li>Source-Route Bridging</li> <li>Token Ring Inter-Switch Link</li> <li>Remote Source-Route Bridging</li> <li>DLSw+</li> <li>Serial Tunnel and Block Serial Tunnel Commands</li> <li>LLC2 and SDLC Commands</li> <li>IBM Network Media Translation Commands</li> <li>SNA Frame Relay Access Support Commands</li> <li>NCIA Client/Server Commands</li> <li>Airline Product Set Commands</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Dial Services Configuration Guide: Terminal Services</i></li> <li>• <i>Cisco IOS Dial Services Configuration Guide: Network Services</i></li> <li>• <i>Cisco IOS Dial Services Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>Preparing for Dial Access</li> <li>Modem Configuration and Management</li> <li>ISDN and Signaling Configuration</li> <li>PPP Configuration</li> <li>Dial-on-Demand Routing Configuration</li> <li>Dial-Backup Configuration</li> <li>Terminal Service Configuration</li> <li>Large-Scale Dial Solutions</li> <li>Cost-Control Solutions</li> <li>Virtual Private Networks</li> <li>X.25 on ISDN Solutions</li> <li>Telco Solutions</li> <li>Dial-Related Addressing Services</li> <li>Dial Access Scenarios</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Interface Configuration Guide</i></li> <li>• <i>Cisco IOS Interface Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>Interface Configuration Overview</li> <li>Configuring LAN Interfaces</li> <li>Configuring Serial Interfaces</li> <li>Configuring Logical Interfaces</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Cisco IOS IP and IP Routing Configuration Guide</i></li> <li>• <i>Cisco IOS IP and IP Routing Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>IP Overview</li> <li>IP Addressing and Services</li> <li>IP Routing Protocols</li> <li>IP Multicast</li> </ul>

**Table 10 Cisco IOS Release 12.1 Documentation Set (continued)**

Books	Major Topics
<ul style="list-style-type: none"> <li>• <i>Cisco IOS AppleTalk and Novell IPX Configuration Guide</i></li> <li>• <i>Cisco IOS AppleTalk and Novell IPX Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>AppleTalk and Novell IPX Overview</li> <li>Configuring AppleTalk</li> <li>Configuring Novell IPX</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Configuration Guide</i></li> <li>• <i>Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>Overview</li> <li>Configuring Apollo Domain</li> <li>Configuring Banyan VINES</li> <li>Configuring DECnet</li> <li>Configuring ISO CLNS</li> <li>Configuring XNS</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Multiservice Applications Configuration Guide</i></li> <li>• <i>Cisco IOS Multiservice Applications Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>Multiservice Applications Overview</li> <li>Voice</li> <li>Video</li> <li>Broadband</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Quality of Service Solutions Configuration Guide</i></li> <li>• <i>Cisco IOS Quality of Service Solutions Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>Quality of Service Overview</li> <li>Classification</li> <li>Congestion Management</li> <li>Congestion Avoidance</li> <li>Policing and Shaping</li> <li>Signaling</li> <li>Link Efficiency Mechanisms</li> <li>Quality of Service Solutions</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Security Configuration Guide</i></li> <li>• <i>Cisco IOS Security Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>Security Overview</li> <li>Authentication, Authorization, and Accounting (AAA)</li> <li>Security Server Protocols</li> <li>Traffic Filtering and Firewalls</li> <li>IP Security and Encryption</li> <li>Configuring Passwords and Privileges</li> <li>Neighbor Router Authentication</li> <li>Configuring IP Security Options</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Switching Services Configuration Guide</i></li> <li>• <i>Cisco IOS Switching Services Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>Cisco IOS Switching Services Overview</li> <li>Cisco IOS Switching Paths</li> <li>Cisco Express Forwarding</li> <li>NetFlow Switching</li> <li>Multiprotocol Label Switching</li> <li>Multilayer Switching</li> <li>Multicast Distributed Switching</li> <li>Virtual LANs</li> <li>LAN Emulation</li> </ul>

**Table 10 Cisco IOS Release 12.1 Documentation Set (continued)**

Books	Major Topics
<ul style="list-style-type: none"> <li><i>Cisco IOS Wide-Area Networking Configuration Guide</i></li> <li><i>Cisco IOS Wide-Area Networking Command Reference</i></li> </ul>	Introduction: Wide-Area Networking Overview Configuring ATM Configuring Frame Relay Configuring Frame Relay-ATM Interworking Configuring SMDS Configuring X.25 and LAPB
<ul style="list-style-type: none"> <li><i>Cisco IOS Configuration Master Index</i></li> <li><i>Cisco IOS Command Reference Master Index</i></li> <li><i>Cisco IOS Debug Command Reference</i></li> <li><i>Cisco IOS Dial Services Quick Configuration Guide</i></li> <li><i>Cisco IOS Software System Error Messages</i></li> <li><i>Cisco IOS Configuration Guide Master Index</i></li> <li><i>New Features in 12.1-Based Limited Lifetime Releases</i></li> <li><i>New Features in Release 12.1 T</i></li> <li>Release Notes (Release-note and caveat documentation for 12.1-based releases and various platforms)</li> </ul>	



**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.**

## Obtaining Documentation

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

### World Wide Web

The most current Cisco documentation is available on the World Wide Web at <http://www.cisco.com>. Translated documentation can be accessed at [http://www.cisco.com/public/countries\\_languages.shtml](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

Cisco documentation is available in the following ways:

- Registered Cisco Direct Customers can order Cisco Product documentation from the Networking Products MarketPlace:  
[http://www.cisco.com/cgi-bin/order/order\\_root.pl](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 corporate headquarters (California, USA) at 408 526-7208 or, in North America, by calling 800 553-NETS(6387).

## Documentation Feedback

If you are reading Cisco product documentation on the World Wide Web, you can submit technical comments electronically. Click **Feedback** in the toolbar and select **Documentation**. After you complete the form, click **Submit** to send it to Cisco.

You can e-mail your comments to [bug-doc@cisco.com](mailto:bug-doc@cisco.com).

To submit your comments by mail, for your convenience many documents contain a response card behind the front cover. Otherwise, you can mail your comments to the following address:

Cisco Systems, Inc.  
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 documentation, troubleshooting tips, and sample configurations from online tools. For Cisco.com registered users, additional troubleshooting tools are available from the TAC website.

### Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information and resources at anytime, from anywhere in the world. This highly integrated Internet application is a powerful, easy-to-use tool for doing business with Cisco.

Cisco.com provides a broad range of features and services to help customers and partners streamline business processes and improve productivity. Through Cisco.com, you can find information about Cisco and our networking solutions, services, and programs. In addition, you can resolve technical issues with online technical support, download and test software packages, and order Cisco learning materials and merchandise. Valuable online skill assessment, training, and certification programs are also available.

Customers and partners can self-register on Cisco.com to obtain additional personalized information and services. Registered users can order products, check on the status of an order, access technical support, and view benefits specific to their relationships with Cisco.

To access Cisco.com, go to the following website:

<http://www.cisco.com>

## Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

### Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

<http://www.cisco.com/tac>

P3 and P4 level problems are defined as follows:

- P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for Cisco.com, go to the following website:

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

If you cannot resolve your technical issue by using the TAC online resources, Cisco.com registered users can open a case online by using the TAC Case Open tool at the following website:

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

### Contacting TAC by Telephone

If you have a priority level 1 (P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

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

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.
- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.



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This document is to be used in conjunction with the documents listed in the [“Related Documentation”](#) section on page 28.

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