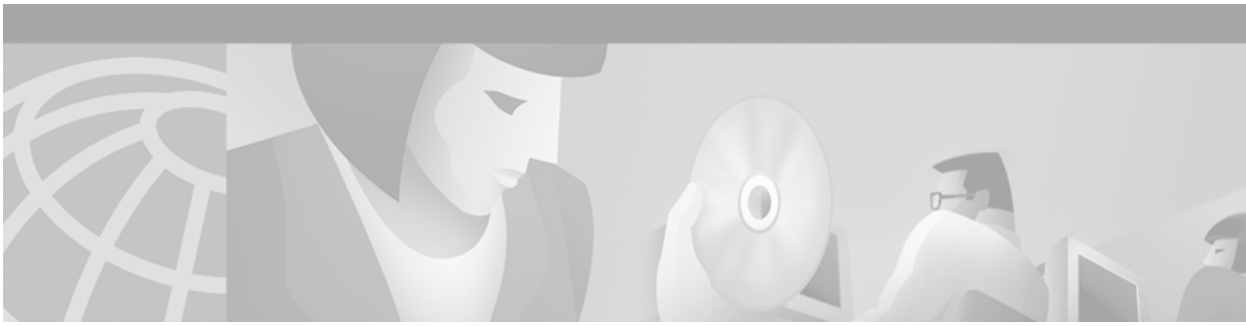

Release Notes for the Cisco uBR10012 Universal Broadband Router for Cisco IOS Release 12.2 XF

June 4, 2001

These release notes for the Cisco uBR10012 series universal broadband router describe the enhancements and caveats provided in Cisco IOS Release 12.2(1)XF1—the first release that supports this router. For a list of the software caveats that apply to Cisco IOS Release 12.2(1)XF1, see the "Caveats" section on page 11.

Cisco IOS Release 12.2(1)XF1 supports the Cisco uBR10012 universal broadband router.

Note You can find the most current Cisco IOS documentation on Cisco.com. This set of electronic documents may contain updates and modifications made after the hard-copy documents were printed.

Contents

These release notes describe the following topics:

Corporate Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

78-12442-01 Rev.C0

Introduction

For information on new features and Cisco IOS commands supported by Cisco IOS Release 12.2(1)XF1, see the "New and Changed Information" section on page 7 and the "Related Documentation" section on page 12.

Cisco IOS Release 12.2(1)XF1 introduces the Cisco uBR10012 Universal Broadband Router, which provides a high-capacity, high-throughput cable modem termination system (CMTS), optimized for aggregating traffic at the edge of the cable network. Designed for cable operators and service providers, the platform connects residential subscribers via cable modems, digital set-top boxes, or IP telephony cable modems for high-speed data, broadband entertainment, and IP telephony solutions.

The Cisco uBR10012 router has been designed as a high-capacity platform that places a new level of intelligence at the edge of the network, enabling cable service providers to maximize their revenues by delivering more feature-rich services to their customers. The Cisco uBR10012 uses the industry-proven Parallel eXpress Forwarding (PXF) technology, derived from the Cisco ESR10000 Edge Services Router, to provide consistent, high-performance throughput, even as software features are added and additional services are deployed.

In addition, it supports a variety of broadband access technologies, including Data-over-Cable Service Interface Specification (DOCSIS), gigabit ethernet, and optical. With support for multiple standards, operators can choose the appropriate services and devices to optimize their capital investment with a single CMTS platform. With access to current and future software enhancements, the Cisco uBR10012 also ensures investment protection as standards and customer needs continue to evolve.

Cable companies and Internet service providers (ISPs) can allocate radio frequency (RF) channel capacity for Internet access or high priority services using a hybrid fiber/coax (HFC) or an all-coax cable plant. Cisco currently provides two router-based DOCSIS CMTS solutions that offer a wider feature set and better manageability than bridge-based systems.

The Cisco uBR10012 Universal Broadband Router

The Cisco uBR10012 universal broadband router brings the powerful performance and proven reliability of the industry-leading, DOCSIS-qualified Cisco uBR7200 series universal broadband router product line to the next level of performance, capacity, and throughput. The Cisco uBR10012 platform provides a complete, easy-to-use, integrated router and cable modem termination system (CMTS) package, with feature-rich software and unparalleled customer service and support. With access to current and future software enhancements, the Cisco uBR10012 routers also ensure investment protection as standards evolve.

The Cisco uBR10012 router supports up to eight cable interface line cards. Cisco IOS Release 12.2(1)XF1 supports the Cisco uBR-LCP-MC28C line card, based on the existing Cisco uBR-MC28C line card, with two downstreams and eight upstreams divided into two domains. This provides the ability to support a large volume of cable modem subscribers using only one chassis.

For connection to the Internet and other networks, the Cisco uBR10012 router supports up to four network uplink line cards, each of which can support connections as fast as 1Gb/s (Gigabit Ethernet). Cisco IOS Release 12.2(1)XF1 supports OC-12 POS and Gigabit Ethernet connectivity.

Note This guide focuses on Cisco uBR10012 software. For detailed descriptions of the Cisco uBR10012 router chassis and components, see the *Cisco uBR10000 Series Hardware Installation Guide* and the appropriate field replaceable unit (FRU) documents.

Cisco uBR10012 Router Cable Interface

The cable interface in the Cisco uBR10012 router serves as the RF cable TV interface, supporting downstream and upstream signals. The downstream is output as an IF signal suitable for use with an external upconverter. Your cable plant, combined with your planned and installed subscriber base, service offering, and external network connections, determines what combination of Cisco uBR10012 cable interfaces, network uplink line cards, and other components that you should use.

System Requirements

This section describes the system requirements for Cisco Release 12.2(1)XF1 and includes the following sections:

Memory Recommendations

Table 1 displays the memory recommendations of the Cisco IOS feature sets for the Cisco uBR10012 series universal broadband routers for Cisco IOS Release 12.2(1)XF1. Cisco uBR10012 series universal broadband routers are available with a 48-MB or 120-MB Type II PCMCIA Flash memory card.

Table 1 Memory Recommendations for the Cisco uBR10012 Series Routers, Cisco Release 12.2(1)XF1 Feature Sets

Feature Set	Software Image	Recommended Flash Memory	Recommended DRAM Memory	Runs From
DOCSIS IP Plus	ubr10k-p6-mz	40 MB Flash	128 MB DRAM	RAM
DOCSIS BPI IP Plus	ubr10k-k8p6-mz	40 MB Flash	128 MB DRAM	RAM

Supported Hardware

For detailed descriptions of the new hardware features, see the "New and Changed Information" section on page 7. Cisco IOS Release 12.2(1)XF1 supports the following hardware on Cisco uBR10012 routers:

Table 2 Cisco uBR10012 Universal Broadband Router Overview

Cable Interface Line cards	Up to eight Cisco uBR-LCP-MC28C line cards (Cisco uBR-MC28C cable interface line card and Cisco Line Card Processor combined) can be housed in a chassis. Each line card supports two domains of 1 downstream and 4 upstreams each, for a total of two downstreams and eight upstreams for each card.
Network Uplink Line Cards	Up to four cards with following WAN choices: • ESR-1GE Gigabit Ethernet (GigE) uplink line card • ESR-1OC12/P-SMI OC-12 POS uplink line card
Timing, Communication and Control Plus (TCC+) card	The TCC+ card can connect to an external reference Stratum 3 clock source that is traceable to a Stratum 1 source. Two such sources can be connected for redundancy. The TCC+ card also monitors the cable line cards and power supply use, as well as control the LCD display screen on the chassis. Two cards can be installed for redundancy.
Performance Routing Engine (PRE)	One PRE module performs layer 2 and layer 3 packet processing, as well as routing and system management functions. Two PRE modules can be installed for redundancy.
DC-input Power Entry Module (PEM)	Two DC PEMs provide power to the chassis. The use of two PEMs provide power balancing and redundancy, as well as the ability to hot-swap a single power supply when needed.
Fan assembly module	The fan assembly module contains four fans that are capable of cooling the chassis even with the failure of a single fan. The fan assembly is dual-speed, providing additional cooling when the chassis temperature exceeds the nominal operating range.

Note The Cisco uBR10012 router is compatible with Cisco Broadband Troubleshooter 2.0 and Cisco Cable Manager 2.0.

Determining Your Software Release

To determine the version of Cisco IOS software running on the Cisco uBR10012 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 XF Software (uBR10000-is-mz), Version 12.2(1)XF1, 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.

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 3 lists the features and feature sets supported by the Cisco uBR10000 series in Cisco IOS Release 12.2(1)XF1 and uses the following conventions:

- Yes—The feature is supported in the software image.
- No—The feature is not supported in the software image.

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. For a list of the 12.1 T-train features in this platform, refer to Feature Navigator. For more information about Feature Navigator, see the "Feature Navigator" section on page 13.

Table 3 Feature List by Feature Sets for Cisco uBR10012 Series Universal Broadband Routers

Feature	Feature Set	
	DOCSIS IP Plus	DOCSIS IP Plus with BPI
IP Routing		
DHCP[1] Server	Yes	Yes
DRP[2] Server Agent	Yes	Yes
IP Enhanced IGRP[3] Route Authentication	Yes	Yes
Management		
Cisco Call History MIB Command Line Interface	Yes	Yes
Cisco IOS Internationalization	Yes	Yes
DOCSIS Ethernet MIB Objects Support (RFC 2665)	Yes	Yes
DOCSIS OSSI[4] Objects Support (RFC 2233)	Yes	Yes
Dynamic Ranging Support	Yes	Yes
Entity MIB, Phase 1	Yes	Yes
Interface Command Enhancements	Yes	Yes
Internal Modem Configuration File Editor	Yes	Yes
MIB Enhancements	Yes	Yes
BPI[5] MIB	No	Yes
LinkUp/Down Traps Support (RFC 2233)	Yes	Yes
RF Interface MIB	Yes	Yes
SNMPv2C[6] and SNMPv3[7]	Yes	Yes
Multimedia		
Bidirectional PIM[8]	Yes	Yes
Stub IP Multicast Routing	Yes	Yes

Table 3 Feature List by Feature Sets for Cisco uBR10012 Series Universal Broadband Routers

Feature	Feature Set	
	DOCSIS IP Plus	DOCSIS IP Plus with BPI
Quality of Service		
Dynamic Upstream Modulation	Yes	Yes
DOCSIS 1.0+[9] QoS Enhancements	Yes	Yes
Downstream QoS Handling	Yes	Yes
Downstream Traffic Shaping	Yes	Yes
Dynamic Map-Advance	Yes	Yes
Improved Upstream QoS	Yes	Yes
Multiple SID Support (static only)	Yes	Yes
QoS Configuration	Yes	Yes
QoS Profile Enforcement	Yes	Yes
Read/Create Implementation of QoS	Yes	Yes
RTP[10] Header Compression	Yes	Yes
Time of Day (ToD) Server	Yes	Yes
Upstream Address Verification	Yes	Yes
Upstream Traffic Shaping	Yes	Yes
Security		
Automated Double Authentication	Yes	Yes
BPI Encryption	No	Yes
Cisco IOS Firewall Enhancements	Yes	Yes
Dynamic Mobile Hosts	Yes	Yes
HTTP[11] Security	Yes	Yes
Named Method Lists for AAA[12] Authorization & Accounting	Yes	Yes
Per-User Configuration	Yes	Yes
VPN		
MPLS VPN Support for Subinterfaces and Interface Bundles	Yes	Yes
WAN Optimization		
PAD[13] Subaddressing	Yes	Yes

1. DHCP = Dynamic Host Configuration Protocol
2. DRP = Director Response Protocol
3. IGRP = Interior Gateway Routing Protocol
4. OSSI = Operations Support System Interface
5. BPI = Baseline Privacy Interface
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 unsolicited grant service (UGS) slot scheduling mechanism 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

Important Notes

The following sections contain important notes about Cisco IOS Release 12.2(1)XF1 that apply to Cisco uBR10012 series universal broadband routers.

Configuring the Routing Protocol Causes a Reset of the Cable Modems

Be aware that when configuring a routing protocol on an interface, the Cisco IOS software must reset the interface 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 interface configuration commands, such as **router rip**, on a cable interface only when a minimum of subscribers would be affected.

New and Changed Information

The following sections list the new hardware and software features supported by the Cisco uBR10000 series routers for Cisco IOS Release 12.2 XF.

No New Hardware Features in Release 12.2(1)XF1

Cisco IOS Release 12.2(1)XF1 does not include support for any new hardware features.

New Software Feature in Release 12.2(1)XF1

Cisco IOS Release 12.2(1)XF1 adds software support for DOCSIS Baseline Privacy Interface (BPI) encryption and authentication.

New Hardware Features in Release 12.2(1)XF

Cisco IOS Release 12.2(1)XF introduces the Cisco uBR10012 router chassis and the FRU components described in *Cisco uBR10000 Series Universal Broadband Router Hardware Installation Guide* and the *Field Replaceable Units (FRUs)* documents.

New Software Feature in Release 12.2(1)XF

Cisco IOS Release 12.2(1)XF introduces software support for the Cisco uBR10012 router, as described in the *Cisco uBR10000 Series Universal Broadband Router Software Configuration 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 web site on Cisco.com at http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

Supported MIBs

The Cisco uBR10000 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 router, 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 uBR10000 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 Cisco uBR10012 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.
- CISCO-ENTITY-VENDORTYPE-OID-MIB

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

Cable-Specific MIBs

Table 4 shows the cable-specific MIBs that are supported on the Cisco uBR10000 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 4 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 4 Cable-Specific MIBs Supported on Cisco uBR10000 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.
CISCO-SMI.my CISCO-SMI-V1SMI.my	This module specifies the 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 *if* 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 DOCS-BPI-MIB-V1SMI.my	This module 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.

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 5.

Table 5 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 5 represent feature sets that are not supported on Cisco uBR10012 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 selected severity 3 caveats are included in the caveats document.

All caveats in Cisco IOS Release 12.2 are also in Cisco IOS Release 12.2(1)XF1.

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

Caveat numbers and brief descriptions are listed in Table 6 and Table 7. For details about a particular caveat, go to Bug Toolkit at:

http://www.cisco.com/kobayashi/bugs/bugs.html

To access this location, you must have an account on Cisco.com. For information about how to obtain an account, go to the "Feature Navigator" section on page 13.

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 for Release 12.2(1)XF1

All the caveats listed in Table 6 are open in Cisco IOS Release 12.2(1)XF1. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 6 Open Caveats for Release 12.2(1)XF1

Caveat ID Number	Description
CSCdu15467	PRE Redundancy: Modems go offline during failover
CSCdt81563	Pkt corruption on MCAST/BCAST echo
CSCdu25108	RP stops communicating with LC, after enabling debug on LC

Closed and Resolved Caveats for Release 12.2(1)XF1

All the caveats listed in Table 7 are resolved in Cisco IOS Release 12.2(1)XF1. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 7 Closed and Resolved Caveats for Release 12.2(1)XF1

Caveat ID Number	Description
CSCdu24213	Malloc failure and interface goes down
CSCdu18867	Interface rest after all modems go offline by RF switch
CSCdt93974	CdxCmtsOnOffNotification

Related Documentation

The following sections describe the documentation available for the Cisco uBR10012 series. These documents consist of hardware and software installation guides, Cisco IOS configuration guides and command references, system error messages, and other documents.

Documentation is available as printed manuals or electronic documents. Use these release notes with these documents:

Release-Specific Documents

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

- Product bulletins, field notices, and other release-specific documents on Cisco.com, beginning under the **Service & Support** heading:

  Technical Documents

- *Caveats for Cisco IOS Release 12.2*

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

  Technical Documents: Cisco IOS Software Configuration: Cisco IOS Release 12.1: Release Notes: Caveats: Caveats for Release 12.2

  On the Documentation CD-ROM:

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

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/.

Platform-Specific Documents

The following related documents are available on Cisco.com and the Documentation CD-ROM:

- *Cisco uBR10012 Series Hardware Installation Guide*
- *Cisco uBR10012 Series Software Configuration Guide*
- *Cisco uBR10012 Series Troubleshooting Guide*
- *Field Replaceable Units (FRUs)*
- *Broadband Command Consolidation*

Note Some of the above documentation will not be available on Cisco.com until the official release of the Cisco uBR10000 series router and its public software release.

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

Technical Documents: Broadband/Cable Solutions: **Cisco uBR10000 Series Universal Broadband Routers**

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

On the Documentation CD-ROM:

Cisco Product Documentation: Broadband/Cable Solutions: **Cisco uBR10000 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 *uBR10012* 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/ubr10k/index.htm.

Feature Navigator

Feature Navigator is a web-based tool that enables you to quickly determine which Cisco IOS software images support a particular set of features and which features are supported in a particular Cisco IOS image.

Feature Navigator is available 24 hours a day, 7 days a week. To access Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, e-mail the Contact Database Administration group at cdbadmin@cisco.com. If you do not have an account on Cisco.com, go to http://www.cisco.com/register and follow the directions to establish an account.

To use Feature Navigator, you must have a JavaScript-enabled web browser such as Netscape 3.0 or later, or Internet Explorer 4.0 or later. Internet Explorer 4.0 always has JavaScript enabled. To enable JavaScript for Netscape 3.x or Netscape 4.x, follow the instructions provided with the web browser. For JavaScript support and enabling instructions for other browsers, check with the browser vendor.

Feature Navigator is updated when major Cisco IOS software releases and technology releases occur. It contains feature information about mainline-, T-, S-, and P-trains. You can access Feature Navigator at the following URL:

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

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. These electronic documents may contain updates and modifications made after the paper documents were printed.

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**.

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 http://www.cisco.com. Translated documentation can be accessed at 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

- 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.

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 web site.

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 web site:

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Technical Assistance Center

The Cisco TAC web site 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 Web Site

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

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 web site to quickly find answers to your questions.

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

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 web site:

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 web site:

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.

This document is to be used in conjunction with the documents listed in the "Related Documentation" section on page 12