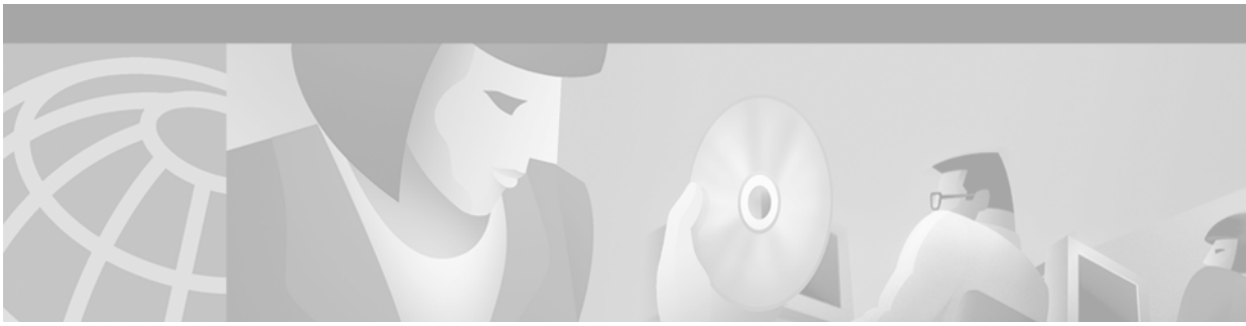

Release Notes for the Cisco 1700 Series Routers for Cisco IOS Release 12.1(5)YB

February 20, 2002

These release notes for the Cisco 1700 series routers describe the enhancements provided in Cisco IOS Release 12.1(5)YB, up to and including Release 12.1(5)YB5. Use these release notes with *Cross-Platform Release Notes for Cisco IOS Release 12.1* located on Cisco.com and the Documentation CD-ROM.

For a list of the software caveats that apply to Cisco IOS Release 12.1(5)YB5, see the "Caveats" section on page 14 and *Caveats for Cisco IOS Release 12.1 T*. The caveats document is updated for every maintenance release and is on Cisco.com and the Documentation CD-ROM.

Contents

These release notes discuss the following topics:

- System Requirements, page 2
- New and Changed Information, page 11
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- Obtaining Technical Assistance, page 29

CISCO SYSTEMS

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System Requirements

This section describes the system requirements for Release 12.1(5)YB5 and includes the following sections:

- Memory Requirements
- Hardware Supported, page 3
- Determining Your Software Release, page 6
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- Feature Set Tables, page 6

Memory Requirements

Table 1 Memory Requirements for the Cisco 1700 Series Routers

Feature Sets	Image Name	Software Image	Recommended Flash Memory[1]	Recommended DRAM Memory
IP Feature Sets	IP	c1700-y-mz	4 MB	24 MB
	IP ADSL	c1700-y7-mz	8 MB	24 MB
	IP Plus ADSL	c1700-sy7-mz	8 MB	32 MB
	IP/Voice Plus ADSL[2]	c1700-sv3y7-mz	16 MB	48 MB
	IP Plus IPSec 56 (DES) ADSL	c1700-sy756i-mz	8 MB	32 MB
	IP/Voice Plus IPSec 56 (DES) ADSL	c1700-sv3y756i-mz	16 MB	48 MB
	IP/Voice Plus	c1700-sv3y-mz	8 MB	32 MB
	IP/FW/IDS	c1700-o3y-mz	4 MB	24 MB
	IP/FW/Voice Plus IPSec 56 (DES) ADSL	c1700-o3sv3y7-mz	16 MB	48 MB
	IP/FW Plus IP Sec 56 (DES) ADSL	c1700-o3sy756i-mz	8 MB	32 MB
	IP/Voice/FW/IDS Plus IPSec 56 ADSL	c1700-o3sv3y756i-mz	16 MB	48 MB
	IP/IPX	c1700-ny-mz	4MB	24 MB
	IP/IPX/FW/IDS Plus ADSL	c1700-no3sy7-mz	8 MB	32 MB
	IP/IPX/Voice/FW/IDS Plus ADSL	c1700-no3sv3y7-mz	16 MB	48 MB
	IP Plus IPSec 3DES ADSL	c1700-k2sy7-mz	8 MB	32 MB
	IP/Voice Plus IPSec 3DES ADSL	c1700-k2sv3y7-mz	16 MB	48 MB
	IP/FW Plus IPSec 3DES ADSL	c1700-k2o3sy7-mz	8 MB	32 MB
	IP/FW/Voice Plus IPSec 3DES ADSL	c1700-k2o3sv3y7-mz	16 MB	48 MB
	IP/IPX/AT/IBM	c1700-bnr2y-mz	8 MB	24 MB
	IP/IPX/AT/IBM Plus ADSL	c1700-bnr2sy7-mz	16 MB	48 MB
	IP/IPX/AT/IBM/FW Plus IPSec 56 (DES) ADSL	c1700-bno3r2sy756i-mz	16 MB	48 MB

Table 1 Memory Requirements for the Cisco 1700 Series Routers

Feature Sets	Image Name	Software Image	Recommended Flash Memory[1]	Recommended DRAM Memory
IP Feature Sets	IP/IPX/AT/IBM/FW/Voice Plus IPSec 56 (DES) ADSL	c1700-bno3r2sv3y756i-mz	16 MB	48 MB
	IP/IPX/AT IBM/FW Plus IPSec 3DES ADSL	c1700-bk2no3r2sy7-mz	16 MB	48 MB
	IP/IPX/AT/IBM/FW/Voice Plus IPSec 3DES ADSL	c1700-bk2no3r2sv3y7-mz	16 MB	48 MB

1. Flash Memory recommendations are for the Cisco 1750 only. The Cisco 1751 has 16 MB and the 1751-V has 32 MB of on-board Flash Memory, which are not upgradeable.
2. For the Cisco 1751 router, the recommended memory for all Release 12.1(5)YB5 voice images is: 16 MB Flash and 48 MB DRAM.

Hardware Supported

Cisco IOS Release 12.1(5)YB5 supports the following Cisco 1700 series routers:

- Cisco 1750—Runs data and data-plus-voice images
- Cisco 1751—Runs data and data-plus-voice images, providing digital and analog voice support
- Cisco 1751-V—Includes all the features needed for immediate integration of data and voice services with support for up to two voice channels

For detailed descriptions of the new hardware features, see the documents listed in the "Platform-Specific Documents" section on page 21.

Cisco 1750

The voice-and-data capable Cisco 1750 router provides global Internet and company intranet access and includes the following:

- Voice-over-IP (VoIP) voice-and-data functionality; the router can carry voice traffic (for example, telephone calls and faxes) over an IP network
- Support for virtual private networking
- Modular architecture
- Network device integration

The Cisco 1750 router has the following hardware components:

- One autosensing 10/100 Fast Ethernet port, which operates in full- or half-duplex mode (with manual override available)
- One voice interface card (VIC) slot—Supports a single voice interface card with two ports per card
- Two WAN interface card (WIC) slots for either WICs or VICs
- Synchronous serial interfaces on serial WICs
- Asynchronous serial interfaces on serial WICs
- ISDN WICs—ISDN dialup and ISDN leased line (IDSL) at 144 kbps; encapsulation over ISDN leased line: Frame Relay and PPP
- One auxiliary (AUX) port (up to 115.2 kbps asynchronous serial)
- One console port

- One internal expansion slot—Supports hardware-assisted services such as encryption (up to T1/E1 speeds)
- RISC Processor—Motorola MPC860T PowerQUICC at 48 MHz
- One security slot that supports Kensington or similar lockdown equipment
- DRAM: 16 MB default, expandable to 48 MB
- Flash memory: 4 MB default, expandable to 16 MB
- Desktop form factor

The Cisco 1750 router supports any combination of one or two of the following WICs, which are shared with the Cisco 1600, 1720, 2600, and 3600 routers:

- WIC-1T—One-port high speed serial (sync/async)(T1/E1)
- WIC-2T—Two-port high speed serial (sync/async) (T1/E1)
- WIC-2A/S—Two-port low speed serial (sync/async) (up to 128 kbps)
- WIC-1B-S/T—One-port ISDN BRI S/T
- WIC-1B-U—One-port ISDN BRI U with integrated NT1
- WIC-1DSU-56K4—One-port integrated 56/64 kbps 4-wire DSU/CSU
- WIC-1DSU-T1—One-port integrated T1 / Fractional T1 DSU/CSU
- WIC-1ADSL—One-port asymmetric digital subscriber line (supported on the Cisco 1700, 2600, and 3600 series routers only)
- WIC-1ENET—One-port 10Base-T Ethernet interface (Only Cisco 1700 series routers support these modules. The Cisco 1750 router supports only one of these modules, placed in slot 0.)

The Cisco 1750 router supports any combination of one or two of the following voice interface cards, which are shared with the Cisco 2600 and 3600 routers:

- VIC-2FXS—Two-port Foreign Exchange Station (FXS) voice/fax interface card for voice/fax network module
- VIC-2FXO—Two-port Foreign Exchange Office (FXO) voice/fax interface card for voice/fax network module
- VIC-2FXO-EU—Two-port FXO voice/fax interface card for Europe
- VIC-2FXO-M3—Two-port Ear & Mouth (E&M) voice/fax interface for Australia
- VIC-2E/M—Two-port E&M voice/fax interface card for voice/fax network module

Cisco 1751 and 1751-V

The voice-and-data capable Cisco 1751 and 1751-V routers provide global Internet and company intranet access and includes the following:

- Voice-over-IP (VoIP) voice-and-data functionality; the router can provide support for digital and analog voice traffic (for example, telephone calls and faxes) over an IP network.
- Support for virtual private networking
- Modular architecture
- Network device integration

The Cisco 1751 and 1751-V routers have the following hardware components:

- One autosensing 10/100 Fast Ethernet port, which operates in full- or half-duplex mode (with manual override available)
- IEEE 802.1Q VLAN support
- One VIC slot—Supports a single voice interface card with two ports per card
- Two WIC slots for either WICs or VICs
- Synchronous serial interfaces on serial WICs
- Asynchronous serial interfaces on serial WICs
- ISDN WICs—ISDN dialup and ISDN leased line (IDSL) at 144 kbps; encapsulation over ISDN leased line: Frame Relay and PPP
- One auxiliary (AUX) port (up to 115.2 kbps asynchronous serial)
- One console port
- One internal expansion slot—Supports hardware-assisted services such as encryption (up to T1/E1 speeds)
- RISC Processor—Motorola MPC860P PowerQUICC at 48.384 MHz
- One security slot that supports Kensington or similar lockdown equipment
- DRAM:
  - 1751: 32 MB default, expandable to 96 MB
  - 1751-V: 64 MB default, expandable to 128 MB
- Flash memory:
  - 1751: 16 MB
  - 1751-V: 32 MB
- Desktop form factor

The Cisco 1751 and 1751-V routers support any combination of one or two of the following WICs, which are shared with the Cisco 1600, 1720, 1750, 2600, and 3600 routers:

- WIC-1T—One-port high speed serial (sync/async)(T1/E1)
- WIC-2T—Two-port high speed serial (sync/async) (T1/E1)
- WIC-2A/S—Two-port low speed serial (sync/async) (up to 128 kbps)
- WIC-1B-S/T—One-port ISDN BRI S/T
- WIC-1B-U—One-port ISDN BRI U with integrated NT1
- WIC-1DSU-56K4—One-port integrated 56/64 kbps 4-wire DSU/CSU
- WIC-1DSU-T1—One-port integrated T1 / Fractional T1 DSU/CSU
- WIC-1ADSL—One-port asymmetric digital subscriber line (supported on the Cisco 1700, 2600, and 3600 series routers only)
- WIC-1ENET—One-port 10Base-T Ethernet interface (Only Cisco 1700 series routers support these modules. The Cisco 1751 or 1751-V routers supports only one of these modules, placed in slot 0.)

The Cisco 1751 and 1751-V routers support any combination of one, two or three of the following VICs, which are shared with the Cisco 2600 and 3600 routers:

- VIC-2FXS—Two-port Foreign Exchange Station (FXS) voice/fax interface card for voice/fax network module
- VIC-2FXO—Two-port Foreign Exchange Office (FXO) voice/fax interface card for voice/fax network module
- VIC-2FXO-EU—Two-port FXO voice/fax interface card for Europe
- VIC-2E/M—Two-port Ear & Mouth (E&M) voice/fax interface card for voice/fax network module
- VIC-2FXO-M3—Two-port E&M voice/fax interface for Australia
- VIC-2BRI-NT/TE—Two-port ISDN interface (supported only on the Cisco 1751and 1751-V routers)

Determining Your Software Release

To determine the version of Cisco IOS software running on your Cisco 1700 series router, log in to the platform, and enter the **show version** EXEC command:

```
router> show version
Cisco Internetwork Operating System Software
IOS (tm) 12.1 XT Software (c1700-y-mz), Version 12.1(5)YB5, RELEASE SOFTWARE
```

Upgrading to a New Software Release

For general information about upgrading to a new software release, see Technical Support for 1700 Series Routers.

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. Release 12.1(5)YB5 supports the same feature sets as Releases 12.1 and 12.1 T, but Release 12.1(5)YB5 include new features supported by the Cisco 1700 series routers.

Caution Cisco IOS images with strong encryption (including, but not limited to 168-bit (3DES) data encryption feature sets) are subject to United States government export controls and have limited distribution. Strong encryption images to be installed outside the United States are likely to require an export license. Customer orders can be denied or subject to delay due to United States government regulations. When applicable, the purchaser/user must obtain local import and use authorizations for all encryption strengths. Please contact your sales representative or distributor for more information, or send an e-mail to export@cisco.com.

Table 2 through Table 5 list the features and feature sets supported by the Cisco 1700 series routers in Cisco IOS Release 12.1(5)YB5. The tables use 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 shows the Cisco IOS release in which the feature was introduced. For example, (2) means a feature was introduced in 12.1(2)T. If a cell in this column is empty, the feature was included in the initial release.

Note These tables 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 hardcopy documents were printed.

Table 2 Feature List by Feature Set for the Cisco 1700 Series Routers, Part 1 of 4

Features	In	Feature Sets					
		IP	IP/ADSL	IP/Plus/ ADSL	IP/Plus/ Voice	IP/Plus/ Voice/ ADSL	IP/Plus/ IPSec 56 (DES)/ ADSL
IP Multicast							
Bidirectional PIM	(2)T	No	No	Yes	Yes	Yes	Yes
IP Routing Protocols							
OSPF flooding reduction	(2)T	Yes	Yes	Yes	Yes	Yes	Yes
Multimedia and Quality of Service							
H.323 V2 enhancements	(3)T	No	No	No	Yes	Yes	No
Quality-of-service voice enhancements	(3)T	No	No	No	Yes	Yes	No
H.323 version 2 phase 2 enhancements	(5)YB	No	No	No	No	No	No
NBAR	(5)YB	No	No	Yes	Yes	Yes	Yes
QDM	(5)YB1	No	No	Yes	Yes	Yes	Yes
Multiservice Applications							
Voice-over-Frame Relay (Cisco 175x only)	(2)T	No	No	No	Yes	Yes	No
Security							
Secure Shell version 1 integrated client	(3)T	No	No	No	No	No	Yes
SSH version 1 server support		Yes	Yes	Yes	Yes	Yes	Yes
Virtual Private Network (VPN) Module for the Cisco 1700 series routers	(2)T	No	No	No	No	No	Yes

Table 2 Feature List by Feature Set for the Cisco 1700 Series Routers, Part 1 of 4 (continued)

Features	In	Feature Sets					
		IP	IP/ADSL	IP/Plus/ ADSL	IP/Plus/ Voice	IP/Plus/ Voice/ ADSL	IP/Plus/ IPSec 56 (DES)/ ADSL
WAN/Voice							
Frame Relay switching enhancements: shaping and policing	(2)T	Yes	Yes	Yes	Yes	Yes	Yes
Single port ethernet WIC for Cisco 1700 Series Routers	(3)XT	Yes	Yes	Yes	Yes	Yes	Yes
Two-port ISDN VIC for Cisco 1751 Routers	(5)YB	No	No	No	Yes	Yes	No

Table 3 Feature List by Feature Set for the Cisco 1700 Series Routers, Part 2 of 4

Features	Feature Sets					
	IP/Voice/Plus/ IPSec 56 (DES)/ ADSL	IP/FW/IDS	IP/FW/Voice/ Plus/IPSec 56 (DES)/ADSL	IP/FW/Plus/ IP Sec 56 (DES)/ADSL	IP/Voice/FW/ IDS/Plus/ IPSec 56/ ADSL	IP/IPX
IP Multicast						
Bidirectional PIM	Yes	No	Yes	Yes	Yes	No
IP Routing Protocols						
OSPF flooding reduction	Yes	Yes	Yes	Yes	Yes	Yes
Multimedia and Quality of Service						
H.323 V2 enhancements	Yes	No	Yes	No	Yes	No
Quality-of-service voice enhancements	Yes	No	Yes	No	Yes	No
H.323 version 2 phase 2 enhancements	Yes	No	Yes	No	Yes	No
NBAR	Yes	No	Yes	Yes	Yes	No
QDM	Yes	No	Yes	Yes	Yes	No
Multiservice Applications						
Voice-over-Frame Relay (Cisco 175x only)	Yes	No	Yes	No	Yes	No
Security						
Secure Shell version 1 integrated client	Yes	No	Yes	Yes	Yes	No
SSH version 1 server support	Yes	Yes	Yes	Yes	Yes	Yes
Virtual Private Network (VPN) Module for the Cisco 1700 series routers	Yes	No	Yes	Yes	Yes	No

Table 3 Feature List by Feature Set for the Cisco 1700 Series Routers, Part 2 of 4 (continued)

Features	Feature Sets					
	IP/Voice/Plus/ IPSec 56 (DES)/ ADSL	IP/FW/IDS	IP/FW/Voice/ Plus/IPSec 56 (DES)/ADSL	IP/FW/Plus/ IP Sec 56 (DES)/ADSL	IP/Voice/FW/ IDS/Plus/ IPSec 56/ ADSL	IP/IPX
WAN/Voice						
Frame Relay switching enhancements: shaping and policing	Yes	Yes	Yes	Yes	Yes	Yes
Single port ethernet WIC for Cisco 1700 Series Routers	Yes	Yes	Yes	Yes	Yes	Yes
Two-port ISDN VIC for Cisco 1751 Routers	Yes	No	Yes	No	Yes	No

Table 4 Feature List by Feature Set for the Cisco 1700 Series Routers, Part 3 of 4

Features		Feature Sets				
	IP/IPX/ FW/IDS/Plus/ ADSL	IP/IPX/ Voice/FW/ IDS/Plus/A DSL	IP/Plus/ IPSec 3DES/ ADSL	IP/Voice/Plus/ IPSec 3DES/ ADSL	IP/FW/Plus/ IPSec 3DES/ ADSL	IP/FW/ Voice/Plus/ IPSec 3DES/ ADSL
IP Multicast						
Bidirectional PIM	Yes	Yes	Yes	Yes	No	Yes
IP Routing Protocols						
OSPF flooding reduction	Yes	Yes	Yes	Yes	Yes	Yes
Multimedia and Quality of Service						
H.323 V2 enhancements	No	Yes	No	Yes	No	Yes
Quality-of-service voice enhancements	No	Yes	No	Yes	Yes	Yes
H.323 version 2 phase 2 enhancements	No	Yes	No	Yes	No	Yes
NBAR	Yes	Yes	Yes	Yes	Yes	Yes
QDM	Yes	Yes	Yes	Yes	Yes	Yes
Multiservice Applications					Yes	Yes
Voice-over-Frame Relay (Cisco 175x only)	No	Yes	No	Yes	Yes	Yes
Security						
Secure Shell version 1 integrated client	No	No	Yes	Yes	Yes	Yes
SSH version 1 server support	Yes	Yes	Yes	Yes	Yes	Yes

Table 4 Feature List by Feature Set for the Cisco 1700 Series Routers, Part 3 of 4 (continued)

Features		Feature Sets				
	IP/IPX/ FW/IDS/Plus/ ADSL	IP/IPX/ Voice/FW/ IDS/Plus/A DSL	IP/Plus/ IPSec 3DES/ ADSL	IP/Voice/Plus/ IPSec 3DES/ ADSL	IP/FW/Plus/ IPSec 3DES/ ADSL	IP/FW/ Voice/Plus/ IPSec 3DES/ ADSL
Virtual Private Network (VPN) Module for the Cisco 1700 series routers	No	No	Yes	Yes	Yes	Yes
WAN/Voice						
Frame Relay switching enhancements: shaping and policing	Yes	Yes	Yes	Yes	Yes	Yes
Single port ethernet WIC for Cisco 1700 Series Routers	Yes	Yes	Yes	Yes	Yes	Yes
Two-port ISDN VIC for Cisco 1751 Routers	No	Yes	No	Yes	No	Yes

Table 5 Feature List by Feature Set for the Cisco 1700 Series Routers, Part 4 of 4

Features	Feature Sets					
	IP/IPX/AT/ IBM	IP/IPX/AT/ IBM/Plus/ ADSL	IP/IPX/AT/ IBM/FW/Plus / IPSec 56 (DES)/ ADSL	IP/IPX/AT/ IBM/FW/ Voice/Plus/ IPSec 56 (DES)/ ADSL	IP/IPX/AT/ IBM/FW/Plus/ IPSec 3DES/ ADSL	IP/IPX/AT/ IBM/FW/ Voice/Plus/ IPSec 3DES/ ADSL
IP Multicast						
Bidirectional PIM	No	Yes	Yes	Yes	Yes	Yes
IP Routing Protocols						
OSPF flooding reduction	Yes	Yes	Yes	Yes	Yes	Yes
Multimedia and Quality of Service						
H.323 V2 enhancements	No	No	No	Yes	No	Yes
Quality-of-service voice enhancements	No	No	No	Yes	No	Yes
H.323 version 2 phase 2 enhancements	No	No	No	Yes	No	Yes
NBAR	No	Yes	Yes	Yes	Yes	Yes
QDM	No	Yes	Yes	Yes	Yes	Yes
Multiservice Applications						
Voice-over-Frame Relay (Cisco 175x only)	No	No	No	No	No	No

Table 5 Feature List by Feature Set for the Cisco 1700 Series Routers, Part 4 of 4 (continued)

Features	Feature Sets					
	IP/IPX/AT/ IBM	IP/IPX/AT/ IBM/Plus/ ADSL	IP/IPX/AT/ IBM/FW/Plus / IPSec 56 (DES)/ ADSL	IP/IPX/AT/ IBM/FW/ Voice/Plus/ IPSec 56 (DES)/ ADSL	IP/IPX/AT/ IBM/FW/Plus/ IPSec 3DES/ ADSL	IP/IPX/AT/ IBM/FW/ Voice/Plus/ IPSec 3DES/ ADSL
Security						
Secure Shell version 1 integrated client	No	No	Yes	Yes	Yes	Yes
SSH version 1 server support	Yes	Yes	Yes	Yes	Yes	Yes
Virtual Private Network (VPN) Module for the Cisco 1700 series routers	No	No	Yes	Yes	Yes	Yes
WAN/Voice						
Frame Relay switching enhancements: shaping and policing	Yes	Yes	Yes	Yes	Yes	Yes
Single port ethernet WIC for Cisco 1700 Series Routers	Yes	Yes	Yes	Yes	Yes	Yes
Two-port ISDN VIC for Cisco 1751 Routers	No	No	No	Yes	No	Yes

New and Changed Information

The following sections list the new hardware and software features supported by the Cisco 1700 routers for Release 12.1(5)YB5.

New Hardware Features Supported in Release 12.1(5)YB1

The following new hardware feature is supported by the Cisco 1751 Routers for Cisco IOS Release 12.1(5)YB1:

Two-Port ISDN VIC

The VIC-2BRI-NT/TE VIC is a two-port ISDN VIC for the Cisco 1751 routers. It provides network- and terminal-side basic rate interface (BRI) ISDN voice capability, using IP or Frame Relay as a transport mechanism for both voice and fax.

For configuration instructions, refer to the document *Configuring the Voice Interface Card for the Cisco 1751 Router.*

New Software Features in Release 12.1(5)YB1

Cisco IOS Release 12.1(5)YB1 supports these new software features for the Cisco 1700 series routers.

Quality-of-Service Device Manager

The QoS Device Manager (QDM) feature provides device-level configuration and real-time monitoring of IP-based QoS functionality within a Cisco router. QDM is stored in Flash Memory and can be run from a workstation as a Java applet in a web browser when the browser is connected to the router's embedded web server.

To install or reinstall QDM, refer to the *Release and Installation Notes for Cisco Quality of Service Device Manager 2.0*.

On Cisco.com:

Technical Documents: **Documentation Home Page**: **Network Management: Quality of Service Device Manager**

On the Documentation CD-ROM:

Cisco Product Documentation: Network Management: Quality of Service Device Manager

New Software Features in Release 12.1(5)YB

Cisco IOS Release 12.1(5)YB supports these new software features for the Cisco 1700 series routers.

Quality of Service Voice Features for the Cisco 1750 and Cisco 1751 Platforms

These features are supported by the Cisco 1750 and Cisco 1751 routers.

Cisco H.323 Version 2 Phase 2

Cisco H.323 Version 2 Phase 2 enhances the Cisco Gateway/Gatekeeper functionality with the following features:

- H.323v2 Fast Connect
- Support of H.245 tunneling of DTMF Relay and hook-flash with Fast Connect
- H.450.3 Call Deflection limited subset, to support Internet Call Waiting
- H.450.2 Call Transfer without consultation subset, to support Internet Call Waiting
- H.235 Security subset
- Gateway support for AlternateEndpoints field in ACF
- Translation of FXS hook-flash to H.245 User Input
- Gatekeeper Transaction Oriented Application Protocol
- C code library providing a generic API for the Gatekeeper Transaction Oriented Application Protocol in a UNIX environment (for third-party implementers).
- Gateway support for network-based billing number and interface description on a per-interface basis

Network-Based Application Recognition

The Network-based Application Recognition (NBAR) feature provides IP packet classification for a wide variety of applications, including web-based and other difficult-to-classify protocols. When an application is recognized and classified by NBAR, a network can invoke services for that specific application. NBAR ensures that network bandwidth is used efficiently by working with Quality-of-service (QoS) features to provide bandwidth guarantees and limits, traffic shaping, and packet marking. Among the classification features within NBAR are the following:

- Classification of applications which dynamically assign TCP/UDP port numbers
- Classification of HTTP traffic by URL, Host, or MIME type
- Classification of Citrix ICA traffic by application name
- Classification of application traffic using subport information
- Classification of static port protocols

Important Notes

The following sections contain important notes that can apply to the Cisco 1700 series routers.

Cisco Express Forwarding

When installed in a Cisco 1700 series router, the Cisco Virtual Private Network (VPN) module does not support Cisco express forwarding (CEF).

Fan Operation in Cisco 1700 Series Routers

The fans in Cisco 1700 series routers stay off until thermally activated.

Flash Defaults to Flash:1 on Multipartition Flash

When using a multipartition Flash card, the various Flash partitions are referred to as flash:1:, flash:2:, etc. If you specify only flash in a multipartition Flash, the parser assumes flash:1:. For example, if you enter **show flash all**, the parser defaults to show flash:1: all, and only the Flash information for the first partition appears. To see information for all Flash partitions, enter **show flash ?**. This lists all of the valid partitions. Then enter **show flash:xx: all** on each valid partition.

Peak Cell Rate and Sustainable Cell Rate Values

On Cisco 1700 routers, specify the Peak Cell Rate (PCR) and Sustainable Cell Rate (SCR) as multiples of 32 Kbps. Other rates are treated as the next lower value of a multiple of 32. For example, an entered PCR value of 150 is considered 128.

Using the boot flash Command

Booting a Cisco 1700 series router with the commands **boot flash** or **boot system flash** results in unpredictable behavior. To work around this problem, be sure to enter a colon (:) following both commands (for example, **boot flash:** or **boot system flash:**).

Caveats

Caveats describe unexpected behavior in Cisco IOS software releases. Severity 1 caveats are the most serious caveats, severity 2 caveats are less serious, and severity 3 caveats are the least serious of these three levels. All caveats in Cisco IOS Release 12.1 and Cisco IOS Release 12.1 T are also in Cisco IOS Release 12.1(5)YB5.

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

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

Resolved Caveats - Release 12.1(5)YB5

This section describes unexpected behavior that is fixed in Release 12.1(5)YB5.

Management

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

Caveats Resolved in Release 12.1(5)YB4

This section describes possibly unexpected behavior by software Release 12.1(5)YB4.

CSCdt36204

Telnet not working through the tunnel using the VPN Module on 1700.

CSCdt03449

ISDN BRI callout results in VOICE ERROR when ALERTING is received.

CSCdt41384

Router Crash at CCBNET3_add_bchan.

CSCdu12757

1750 crashes after configuring service-policy under ATM interface.

CSCds92106

Router hang after repeatedly power cycle.

CSCdu37345

AAA commands are not active for 811/813.

CSCdt57231

SSH SSH_MSG_IGNORE messages for terminal echo tests.

CSCdt93866

Unchecked limits in NTP.

CSCdt93862

Access level issue while using Web interface.

CSCdt46181

Redzone corruption in pptp_tcp_readf().

CSCdu04329

if_dslsar_rcv.c:possible deferencing NULL pointer.

CSCdt92629

Incorrect txbuffers calculation in if_dslsar_tx.c.

CSCdt78390

ADSL Phy retrains on an LOM defect condition.

CSCdt41633

Autoinstall not working.

CSCds59167

Transmit error seen while doing a sh run/version or write mem

CSCds90931

With 2 UBR and 1 VBR PVCs, reset ATM int, UBR PVC unable to transmit.

CSCdu38421

The 827 router crashes when unconfiguring the ATM/Dialer interface.

CSCdt67817

Not passing data well after change to higher profile from dslam side.

CSCdt11503

IOS crashes when large OID (>256 fields) is received.

CSCds56041

Chassis cardTable not populating.

CSCdt85979

PQUICC-1-TOOBIG:PQUICC(0/1), packet too big with WIC-1ASDL.

CSCds85371

Adding new crypto map instance causes all clear traffic to stop.

CSCds37028

Low performance-on GRE+IPSec /w HW enc card compared to IPSec direct.

CSCdu43931

sv3y image doesn't boot with 32MB DRAM and default 25% iomem config.

CSCdt96253

CRC-32 compensation vulnerability.

CSCds69577

Connectivity to some WEB sites is lost when router terminates PPPoE.

CSCdt96253

CRC-32 compensation vulnerability.

CSCdt11503

IOS crashes when large OID (>256 fields) is received.

CSCdt03962

ATM interface takes long time to get up.

CSCds69577

Connectivity to some WEB sites is lost when router terminates PPPoE.

CSCdt73791

No IPSEC traffic if PAT/NAT public addr are included in crypto ACLs.

Caveats for Release 12.1(5)YB3

This section describes possibly unexpected behavior by software releases prior to Release 12.1(5)YB3 that have been resolved in Release 12.1(5)YB3 and above as well as possibly unexpected behavior that might occur in Release 12.1(5)YB3.

Resolved Caveats for Release 12.1(5)YB3

This section describes possibly unexpected behavior by software releases prior to Release 12.1(5)YB3 that have been resolved in Release 12.1(5)YB3 and above.

CSCds92106

A Cisco router might halt after repeated power cycling due to the TI DSP booting up incorrectly under some conditions. This problem is fixed in Cisco IOS Software Release 12.1(5)YB3.

CSCdt77246

When a router is configured for PPPoE and IP NAT, and an incoming packet does not contain an MSS field or its TCP option field is not terminated by 0, the router might stop routing packets.

CSCdu19022

A router might unexpectedly reset if you remove the IP address from an interface while the interface is still attached to the encryption map. This problem is fixed in Cisco IOS Software Release 12.1(5)YB3.

Unresolved Caveats for Release 12.1(5)YB3

This section describes possibly unexpected behavior by Release 12.1(5)YB3.

CSCdu21252

If you shut down an ATM interface in a Cisco router that is configured with VPDN enabled for the PPPoE client, the router might unexpectedly reset.

Caveats for Release 12.1(5)YB1

This section describes possibly unexpected behavior by Release 12.1(5)YB1.

CSCds26729

With **ip rtp header-compression** configured on a Cisco router over Multilink PPP, with CEF or Fast switching enabled, RTP header compression does not occur. This occurs only with IOS versions 12.1(4) or later, on all Multilink PPP connections. The only workaround is to turn off CEF using **no ip cef** in the global configuration and **no route cache** on both the interface and the Virtual Template.

CSCds29702

When a phone on an FXS port is picked up during a ring cycle for a call on an FXS-FXO connection trunk, there might be background ring noise that never stops. This noise may begin immediately, or after a slight delay. If the phone is put on-hook, the ring cycle resumes and never stops. Another problem is that there might be no voice connection established, and if the phone is then put on-hook and off-hook, there is no dial tone. All of these problems are fixed by entering the commands **shut** and **no shut** on the FXS port.

To work around these problems, configure the voice port to use **connection plar** instead of **connection trunk**.

CSCds88737

E&M trunk calls might not be placed because E&M delay-dial might not interoperate with a Lucent PBX. To work around this problem, you can use wink-start or immediate-start signaling on the topology.

CSCds90877

Spurious memory accesses might occur during stress tests. The problem is seen only during stress tests of long duration. It does not affect functionality.

CSCdt41384

If the router is configured for VoIP with the maximum number of calls (8) in progress, a simultaneous hang-up of all eight phones at the call destinations causes an intermittent unexpected reset of the router.

CSCdt63586

On the Cisco 1751 routers, the Virtual LAN (VLAN) feature is configurable for the 10BaseT Ethernet WIC even though this WIC (on its 10BaseT Ethernet interface) does not support VLAN.

CSCdt86998

With a VPN module and a FastEthernet or 10BaseT Ethernet interface, if outbound traffic flow is greater than 524 packets per second and packet size is greater than 1460 bytes, the router reloads or halts (requiring a power cycle to reset it).

For a workaround, if the rate of encrypted outbound traffic is expected to reach 6 Mbps on the FastEthernet or 10BaseT Ethernet interface, disable the VPN module (switch to software encryption). This reduces the encryption throughput and avoids causing the router to reload or halt.

CSCdu10353

A VPN module may not be used with PPPoE on Ethernet or FastEthernet interfaces. The workaround is either not to configure PPPoE or to disable the VPN Module if PPPoE must be used.

CSCdu11589

There is a problem when the router connects an FTP server to an FTP client, with the server on a FastEthernet interface and the client on a 10BaseT Ethernet interface. When the Ethernet interface is configured in full-duplex mode, the download speed (from server to client) slows to about one-third the upload speed (from client to server). The workaround is to configure the 10BaseT Ethernet interface in half-duplex mode.

CSCdu11668

When the 10BaseT-WIC (WIC-1ENET) is in full-duplex mode, it fails to ftp files. The **copy tftp flash** command fails with a “timeout” message. The workaround is to configure the Ethernet interface for half-duplex operation.

CSCdu20199

PPPoE does not work on FastEthernet ports of Cisco 1751 routers. The workaround is to configure PPPoE for use on 10BaseT (WIC-1ENET) ports and use FastEthernet ports for LAN connections.

CSCdu17566

When a phone attached to a PBX calls a phone attached to the router over VoIP using the g729ar8 codec, poor voice quality is observed. The workaround is to use any of the other supported codecs.

CSCdu17621

When a phone attached to a PBX calls a phone attached to the router over VoIP using the g729ar8 codec, and the phone on the router is not answered, the phone on the router continues to ring after the calling phone has terminated the call. The workaround is to use any of the other supported codecs.

Related Documentation

The following sections describe the documentation available for the Cisco 1700 series routers. Typically, these documents consist of hardware and software installation guides, Cisco IOS configuration 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 the documents listed in the following sections:

- Release-Specific Documents
- Platform-Specific Documents
- Feature Modules
- Cisco IOS Software Documentation Set

Release-Specific Documents

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

- *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: **Product Bulletins**

- Caveats for Cisco IOS Release 12.1 and 12.1 T

  As a supplement to the caveats listed in the "Caveats" section on page 14 section in these release notes, see the *Caveats for Cisco IOS Release 12.1* and *Caveats for Cisco IOS Release 12.1 T* documents, which contain caveats applicable to all platforms for all maintenance releases of IOS Releases 12.1 and 12.1 T.

  On Cisco.com:

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

  On the Documentation CD-ROM:

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

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

Platform-Specific Documents

Cisco 1750

These documents are available for the Cisco 1750 router on Cisco.com and the Documentation CD-ROM:

- *Cisco 1750 Router Hardware Installation Guide*
- *Voice-over-IP Quick Start Guide*
- *Cisco 1750 Software Configuration Guides*
- *Cisco WAN Interface Cards Hardware Installation Guide*
- *Cisco 1700 Series Routers Configuration Notes*
- Release Notes for the Cisco 1750 Router
- *Safety Information for Cisco 1600 and 1700 Routers*

On Cisco.com:

Technical Documents: Documentation Home Page: Access Servers and Access Routers: Modular Access Routers: Cisco 1750 Router

On the Documentation CD-ROM:

Cisco Product Documentation: Access Servers and Access Routers: Modular Access Routers: Cisco 1750 Router

Cisco 1751

These documents are available for the Cisco 1751 routers on Cisco.com and the Documentation CD-ROM:

- *Cisco 1751 Router Hardware Installation Guide*
- *Cisco 1751 Router Voice over IP Quick Start Guide*
- *Cisco 1751 Router Software Configuration Guide*
- *Update to Cisco WAN Interface Cards Hardware Installation Guide*
- *Configuring the Voice Interface Card for the Cisco 1751 Router*

On Cisco.com:

Technical Documents: Documentation Home Page: Access Servers and Access Routers: Modular Access Routers: Cisco 1751 Router

On the Documentation CD-ROM:

Cisco Product Documentation: Access Servers and Access Routers: Modular Access Routers: Cisco 1751 Router

Feature Modules

Feature modules describe new features supported by Release 12.1(5)YB5 and above 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**: **New Features in 12.1-Based Limited Lifetime Releases**: **New Features in 12.1X Releases**

On the Documentation CD-ROM:

Cisco Product Documentation: **Cisco IOS Software Configuration**: **Cisco IOS Release 12.1**: **New Feature Documentation**: **New Features in 12.1-Based Limited Lifetime Releases**: **New Features in 12.1X Releases**

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 set up 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. 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 that are shipped with your order in electronic form on the Documentation CD-ROM—unless you specifically ordered printed versions.

Documentation Modules

Each module in the Cisco IOS documentation set consists of two types of books: a configuration guide and a corresponding command reference. Chapters in a configuration guide describe protocols, configuration tasks, 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.

The Cisco IOS software documentation set is available on Cisco.com and on the Documentation CD-ROM.

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

Release 12.1 Documentation Set

Table 6 describes the contents of the Cisco IOS Release 12.1 software documentation set, which is available in both electronic and printed form.

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

On Cisco.com:

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

On the Documentation CD-ROM:

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

Table 6 Cisco IOS Software Release 12.1 Documentation Set

Books	Chapter Topics
• *Cisco IOS Configuration Fundamentals Configuration Guide* • *Cisco IOS Configuration Fundamentals Command Reference*	Configuration Fundamentals Overview Using the Command-Line Interface (CLI) Using Configuration Tools Configuring Operating Characteristics Managing Connections, Menus, and System Banners Using the Cisco Web Browser Using the Cisco IOS File System Modifying, Downloading, & Maintaining Configuration Files Loading and Maintaining System Images Maintaining Router Memory Rebooting a Router Configuring Additional File Transfer Functions Monitoring the Router and Network Troubleshooting a Router Performing Basic System Management System Management Using System Controllers Web Scaling Using WCCP Managing Dial Shelves
• *Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Configuration Guide* • *Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Command Reference*	Overview of Apollo Domain, Banyan VINES, DECNET, ISO CLNS, and XNS Configuring Apollo Domain Configuring Banyan VINES Configuring DECnet Configuring IOS CLNS Configuring XNS

Table 6 Cisco IOS Software Release 12.1 Documentation Set (continued)

Books	Chapter Topics
• *Cisco IOS AppleTalk and Novell IPX Configuration Guide* • *Cisco AppleTalk and Novell IPX Command Reference*	AppleTalk and Novel IPX Overview Configuring AppleTalk Configuring Novell IPX
• *Cisco IOS Bridging and IBM Networking Configuration Guide* • *Cisco IOS Bridging and IBM Networking Command Reference, Volume I* • *Cisco Bridging and IBM Networking Command Reference, Volume II*	Overview of SNA Internetworking Overview of Bridging Configuring Transparent Bridging Configuring Source-Route Bridging Configuring Token Ring Inter-Switch Link Configuring Token Ring Route Switch Module Overview of IBM Networking Configuring Remote Source-Route Bridging Configuring Data-Link Switching Plus+ Configuring Serial Tunnel and Block Serial Tunnel Configuring LLC2 and SDLC Parameters Configuring IBM Network Media Translation Configuring Frame Relay Access Support Configuring NCIA Server Configuring the Airline Product Set Configuring DSPU and SNA Service Point Support Configuring SNA Switching Services Configuring Cisco Transaction Connection Configuring Cisco Mainframe Channel Connection Adapters Configuring CLAW and TCP/IP Offload Support Configuring CMPC and CSNA Configuring CMPC+ Configuring the TN3270 Server
• *Cisco IOS Dial Services Configuration Guide: Terminal Services* • *Cisco IOS Dial Services Configuration Guide: Network Services* • *Cisco IOS Dial Services Command Reference*	Large-Scale Dial Solutions Cost-Control Solutions Virtual Private Networks X.25 on ISDN Solutions Telco Solutions Dial-Related Addressing Services Internetworking Dial Access Scenarios Preparing for Dial Access Modem Configuration and Management ISDN and Signalling Configuration PPP Configuration Dial-on-Demand Routing Configuration Dial-Backup Configuration Terminal Service Configuration
• *Cisco IOS Interface Configuration Guide* • *Cisco IOS Interface Command Guide*	Interface Configuration Overview Configuring LAN Interfaces Configuring Serial Interfaces Configuring Logical Interfaces

Table 6 Cisco IOS Software Release 12.1 Documentation Set (continued)

Books	Chapter Topics
• *Cisco IOS IP and IP Routing Configuration Guide* • *Cisco IOS IP and IP Routing Command Reference*	IP Overview Configuring IP Addressing Configuring DHCP Configuring IP Services Configuring Mobile IP Configuring On-Demand Routing Configuring RIP Configuring IGRP Configuring OSPF Configuring IP Enhanced IGRP Configuring Integrated IS-IS Configuring BGP Configuring Multicast BGP (MBGP) Configuring IP Routing Protocol-Independent Features Configuring IP Multicast Routing Configuring Multicast Source Discovery Protocol Configuring PGM Router Assist Configuring Unidirectional Link Routing Using IP Multicast Tools
• *Cisco IOS Multiservice Applications Configuration Guide* • *Cisco IOS Multiservice Applications Command Reference*	Multiservice Applications Overview Configuring Voice over IP Configuring Gatekeepers (Multimedia Conference Manager) Configuring Voice over Frame Relay Configuring Voice over ATM Configuring Voice over HDLC Configuring Voice-Related Support Features Configuring PBX Signaling Configuring Store and Forward Fax Configuring Video Support Configuring Head-End Broadband Access Router Features Configuring Subscriber-End Broadband Access Router Features Configuring Synchronized Clocking

Table 6 Cisco IOS Software Release 12.1 Documentation Set (continued)

Books	Chapter Topics
• *Cisco Quality of Service Solutions Configuration Guide* • *Cisco IOS Quality of Service Solutions Command Reference*	Quality of Service Overview Classification Overview Configuring Policy-Based Routing Configuring QoS Policy Propagation via Border Gateway Protocol Configuring Committed Access Rate Congestion Management Overview Configured Weighted Fair Queueing Configuring Custom Queueing Configuring Priority Queueing Congestion Avoidance Overview Configuring Weighted Random Early Detection Policing and Shaping Overview Configuring Generic Traffic Shaping Configuring Frame Relay and Frame Relay Traffic Shaping Signalling Overview Configuring RSVP Configuring Subnetwork Bandwidth Manager Configuring RSVP-ATM Quality of Service Internetworking Link Efficiency Mechanisms Overview Configuring Link Fragmentation and Interleaving for Multilink PPP Configuring Compressed Real-Time Protocol IP to ATM CoS Overview Configuring IP to ATM CoS QoS Features for Voice Introduction
• *Cisco IOS Security Configuration Guide* • *Cisco IOS Security Command Reference*	TACACS+ Commands Access Control Lists: Overview and Guidelines Cisco Secure Integrated Software Firewall Overview Configuring Lock-and-Key Security (Dynamic Access Lists) Configuring IP Session Filtering (Reflexive Access Lists) Configuring TCP Intercept (Prevent Denial-of-Service Attacks) Configuring Context-Based Access Control Configuring Cisco Secure Integrated Software Intrusion Detection System Configuring Authentication Proxy Configuring Port to Application Mapping IP Security and Encryption Overview Configuring IPSec Network Security Configuring Certification Authority Interoperability Configuring Internet Key Exchange Security Protocol Configuring Passwords and Privileges Neighbor Router Authentication: Overview and Guidelines Configuring IP Security Options

Table 6 Cisco IOS Software Release 12.1 Documentation Set (continued)

Books	Chapter Topics
• *Cisco IOS Switching Services Configuration Guide* • *Cisco IOS Switching Services Command Reference*	Configuring MPLS Configuring IP Multilayer Switching Configuring IP Multicast Multilayer Switching Configuring IPX Multilayer Switching Configuring Multicast Distributed Switching Routing Between VLANs Overview Configuring Routing Between VLANs with ISL Encapsulation Configuring Routing Between VLANs with IEEE 802.10 Encapsulation Configuring Routing Between VLANs with IEEE 802.1Q Encapsulation LAN Emulation Overview Configuring LAN Emulation Configuring Token Ring LANE MPOA Overview Configuring the MPOA Client Configuring the MPOA Server Configuring Token Ring LANE for MPOA
• *Cisco IOS Wide-Area Networking Configuration Guide* • *Cisco IOS Wide-Area Networking Command Reference*	Wide-Area Networking Overview Configuring ATM Frame Relay Frame Relay-ATM Internetworking Configuring SMDS Configuring X.25 and LAPB
• *Cisco IOS Configuration Guide Master Index* • *Cisco IOS Command Reference Master Index* • *Cisco IOS Command Summary* • *Cisco IOS Debug Command Reference* • *Cisco IOS Dial Services Quick Configuration Guide* • *Cisco IOS New Features Index* (Cisco.com and Documentation CD only) • *Cisco IOS System Error Messages*	

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 the following sites:

- http://www.cisco.com
- http://www-china.cisco.com
- http://www-europe.cisco.com

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 might 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 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.

This document is to be used in conjunction with the documents listed in the "Related Documentation" section on page 20.