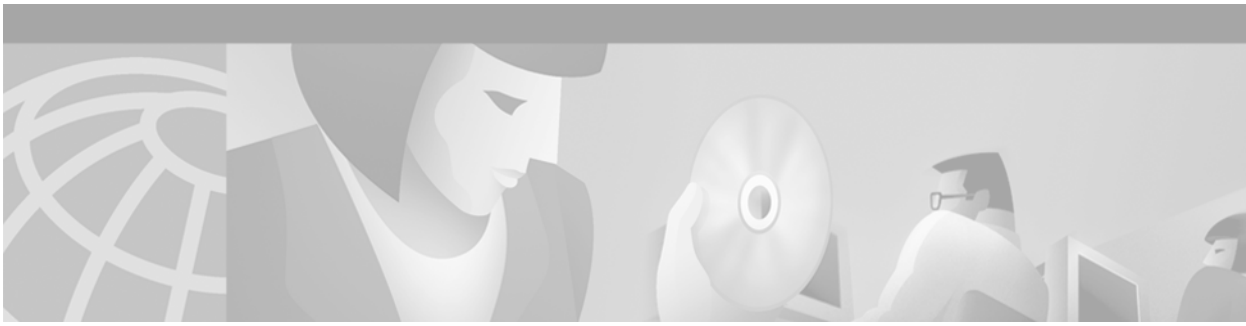

Release Notes for the Cisco 1700 Series Routers for Cisco IOS Release 12.2(2)XK

May 20, 2002

These release notes describe new features and significant software components for the Cisco 1700 series routers that support Cisco IOS Release 12.2 T, up to and including 12.2(2)XK3. These release notes are updated as needed to describe new memory requirements, new features, new hardware support, software platform deferrals, microcode or modem code changes, related document changes, and any other important changes. Use these release notes with the *Cross-Platform Release Notes for Cisco IOS Release 12.2 T* located on CCO and the Documentation CD-ROM.

For a list of the software caveats that apply to 12.2(2)XK3, refer to the section "Caveats" and to the online *Caveats for Cisco IOS Release 12.2 T* document. The caveats document is updated for every 12.2 T maintenance release and is located on Cisco Connection Online (CCO) and the Documentation CD-ROM.

Contents

These release notes discuss the following topics:

System Requirements

This section describes the system requirements for 12.2(2)XK3 and includes the following sections:

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Memory Requirements

This section describes the memory requirements for the Cisco IOS feature sets supported by Cisco IOS 12.2(2)XK3 on the Cisco 1700 series routers.

Table 1 Recommended Memory for the Cisco 1700 Series Routers

Platform	Image Name	Feature Set	Image	Recommended Flash Memory	Recommended DRAM Memory	Runs from
Cisco 1720, 1750, 1751 and 1760	Cisco 1700 IOS IP/ ADSL/IPX/AT/IBM/ FW/IDS Plus IPSec 56	IP/ADSL/IPX/AT/ IBM/ FW/ IDS Plus IPSec 56	c1700-bk8no3r2sy7-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/ ADSL/IPX/AT/IBM/ FW/IDS Plus IPSec 3DES	IP/ADSL/IPX/AT/ IBM/ FW/ IDS Plus IPSec 3DES	c1700-bk9no3r2sy7-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/ ADSL/IPX/AT/IBM Plus	IP/ADSL/IPX/AT/ IBM Plus	c1700-bnr2sy7-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/IPX/ AT/IBM	IP/IPX/AT/IBM	c1700-bnr2y-mz	8 MB	32 MB	RAM
	Cisco 1700 IOS IP/ ADSL/FW/IDS Plus IPSec 56	IP/ADSL/FW/IDS Plus IPSec 56	c1700-k8o3sy7-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/ ADSL Plus IPSec 56	IP/ADSL Plus IPSec 56	c1700-k8sy7-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/ ADSL/FW/IDS Plus IPSec 3DES	IP/ADSL/FW/IDS Plus IPSec 3DES	c1700-k9o3sy7-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/ ADSL Plus IPSec 3DES	IP/ADSL Plus IPSec 3DES	c1700-k9sy7-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/ ADSL/IPX/FW/IDS Plus	IP/ADSL/IPX/ FW/IDS Plus	c1700-no3sy7-mz	16 MB	48 MB	RAM
Cisco 1720, 1750, 1751 and 1760 (continued)	Cisco 1700 IOS IP/IPX	IP/IPX	c1700-ny-mz	8 MB	24 MB	RAM
	Cisco 1700 IOS IP/FW/ IDS	IP/FW/IDS	c1700-o3y-mz	8 MB	24 MB	RAM
	Cisco 1700 IOS IP/ ADSL Plus	IP/ADSL Plus	c1700-sy7-mz	8 MB	32 MB	RAM
	Cisco 1700 IOS IP	IP	c1700-y-mz	8 MB	24 MB	RAM

Table 1 Recommended Memory for the Cisco 1700 Series Routers (continued)

Platform	Image Name	Feature Set	Image	Recommended Flash Memory	Recommended DRAM Memory	Runs from
	Cisco 1700 IOS IP/ ADSL	IP/ADSL	c1700-y7-mz	8 MB	24 MB	RAM
Cisco 1750, 1751 and 1760	Cisco 1700 IOS IP/ ADSL/IPX/AT/IBM/ Voice/FW/IDS Plus IPSec 56	IP/ADSL/IPX/ AT/IBM/Voice/ FW/IDS Plus IPSec 56	c1700-bk8no3r2sv3y7-mz	32 MB	64 MB	RAM
	Cisco 1700 IOS IP/ ADSL/IPX/AT/IBM/ Voice/FW/IDS Plus IPSec 3DES	IP/ADSL/IPX/AT/ IBM/ Voice/FW/ IDS Plus IPSec 3DES	c1700-bk9no3r2sv3y7-mz	32 MB	64 MB	RAM
	Cisco 1700 IOS IP/ ADSL/Voice/FW/ IDS Plus IPSec 56	IP/ADSL/Voice/ FW/IDS Plus IPSec 56	c1700-k8o3sv3y7-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/ ADSL/Voice Plus IPSec 56	IP/ADSL/Voice Plus IPSec 56	c1700-k8sv3y7-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/ ADSL/Voice/FW/ IDS Plus IPSec 3DES	IP/ADSL/Voice/ FW/IDS Plus IPSec 3DES	c1700-k9o3sv3y7-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/ ADSL/Voice Plus IPSec 3DES	IP/ADSL/Voice Plus IPSec 3DES	c1700-k9sv3y7-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/ADSL/IPX/Voice/ FW/IDS Plus	IP/ADSL/IPX/ Voice/FW/IDS Plus	c1700-no3sv3y7-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/ ADSL/Voice/FW/ IDS Plus	IP/ADSL/Voice/ FW/IDS Plus	c1700-o3sv3y7-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/Voice Plus	IP/Voice Plus	c1700-sv3y-mz	16 MB	48 MB	RAM
	Cisco 1700 IOS IP/ ADSL/Voice Plus	IP/ADSL/Voice Plus	c1700-sv3y7-mz	16 MB	48 MB	RAM

Hardware Supported

Cisco IOS Release 12.2(2)XK3 supports the following Cisco 1700 series routers:

- Cisco 1720 router
- Cisco 1750, 1750-2V, and 1750-4V routers
- Cisco 1751 and 1751-V routers
- Cisco 1760 and 1760-V routers

The Cisco 1720 router runs data images only. The Cisco 1750, 1750-2V, and 1750-4V routers run data and data-and-voice images, providing analog voice support. Cisco 1751, 1751-V, 1760, and 1760-V routers run data and data-and-voice images, providing digital and analog voice support.

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

Cisco 1720 Routers

The 1720 router provides Internet and intranet access and includes the following:

- Support for virtual private networking.
- Modular architecture.
- Network device integration.

The Cisco 1720 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).
- Two WAN interface card slots.
- One auxiliary (AUX) port (up to 115.2 kbps asynchronous serial).
- One console port.
- RISC Processor for high performance encryption.
- One internal expansion slot for support of hardware-assisted services such as encryption (up to T1/E1) and compression.
- DRAM memory: 32 MB default, expandable to 48 MB.
- Flash memory: 8 MB default, expandable to 16 MB.
- Desktop form factor.

The Cisco 1720 router supports any combination of one or two of the following WAN interface cards:

- WIC-1T—One port high speed serial (sync/async).
- WIC-2T—Two port high speed serial (sync/async).
- 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.
- 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-1ENET—One-port 10Base-T Ethernet interface.
- WIC-ADSL--One-port asymmetrical digital subscriber line.

Cisco 1750, 1750-2V, and 1750-4V Routers

The voice-and-data capable Cisco 1750, 1750-2V and 1750-4V routers provide 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, 1750-2V and 1750-4V 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).
- 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, 1750-2V and 1750-4V routers support any combination of one or two of the following WICs:

- 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.
- WIC-1ENET—One-port 10Base-T Ethernet interface.

The Cisco 1750, 1750-2V and 1750-4V routers support any combination of one or two of the following voice interface cards:

- 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 E&M voice/fax interface card for voice/fax network module.

- VIC-2FXO-M1—Two-port FXO for the United States with battery reversal.
- VIC-2FXO-M2—Two-port FXO for Europe with battery reversal.
- VIC-2FXO-M3—Two-port Ear & Mouth (E&M) voice/fax interface for Australia.

Cisco 1751 and 1751-V Routers

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:
  - Cisco 1751: 32 MB default, expandable to 96 MB.
  - Cisco 1751-V: 64 MB default, expandable to 128 MB.
- Flash memory:
  - Cisco 1751: 16 MB.
  - Cisco 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:

- 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.
- WIC-1ENET—One-port 10Base-T Ethernet interface.

The Cisco 1751 and 1751-V routers support any combination of one, two or three of the following VICs:

- 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-M1—Two-port FXO for the United States with battery reversal.
- VIC-2FXO-M2—Two-port FXO for Europe with battery reversal.
- VIC-2FXO-M3—Two-port E&M voice/fax interface for Australia.
- VIC-2BRI-NT/TE—Two-port ISDN interface.
- VIC-2DID—Two-port direct inward-dialing voice interface card.

Cisco 1760 and 1760-V Routers

The voice-and-data capable Cisco 1760 and 1760-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.
- Cisco 1760-V routers integrate data and voice services with support for multiple voice channels.
- VoIP and Voice-over-Frame Relay (VoFR) connections.
- Support for virtual private networking.
- Modular architecture.
- Network device integration.
- Support for the following network management tools and applications:
  - Simple Network Management Protocol (SNMP).
  - AutoInstall (for downloading configuration files to the router over a WAN connection).

The Cisco 1760 and 1760-V routers have the following hardware components:

- One autosensing 10/100 Fast Ethernet port, which operates in full- or half-duplex mode (with software override support).
- IEEE 802.1Q VLAN support.
- Two VIC slots—Support voice interface cards 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.
- One auxiliary (AUX) port (to support a modem connection to the router, which can be configured and managed from a remote location, up to 115.2 kbps asynchronous serial).
- One console port (for router configuration and management from a connected terminal or PC, up to 115.2 kbps).
- One internal expansion slot—Supports hardware-assisted services such as encryption (up to T1/E1 speeds).
- RISC Processor—Motorola MPC860P PowerQUICC at 40 MHz externally and 80MHz internally.
- DRAM:
  - Cisco 1760: 32 MB default, expandable to 96 MB.
  - Cisco 1760-V: 64 MB default, expandable to 96 MB.
- Flash memory:
  - Cisco 1760: 16 MB default, expandable to 64 MB.
  - Cisco 1760-V: 32 MB default, expandable to 64 MB.

The Cisco 1760 and 1760-V routers support any combination of one or two of the following WICs:

- 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.
- WIC-1ENET—One-port 10Base-T Ethernet interface.

The Cisco 1760 and 1760-V routers support any combination of one, two, three, or four of the following VICs:

- 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-M1—Two-port FXO for the United States with battery reversal.
- VIC-2FXO-M2—Two-port FXO for Europe with battery reversal.
- VIC-2FXO-M3—Two-port E&M voice/fax interface for Australia.
- VIC-2BRI-NT/TE—Two-port ISDN interface.
- VIC-2DID—Two-port direct inward-dialing voice interface card.

Determining Your Software Release

To determine the version of Cisco IOS software currently running on your Cisco 1700 series router, log in to the router and enter the **show version** EXEC command. The following sample output from the **show version** command indicates the version number on the second output line:

```
router> show version
Cisco Internetwork Operating System Software
IOS (tm) c1700 Software (c1700-y-mz), Version 12.2(2)XK3, RELEASE SOFTWARE
```

Upgrading to a New Software Release

For general information about upgrading to a new software release, see *Software Installation and Upgrade Procedures* located at: http://www.cisco.com/warp/public/130/upgrade_index.shtml.

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. 12.2(2)XK3 supports the same feature sets as Releases 12.2 and 12.2 T, but 12.2(2)XK3 includes 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 (Parts 1 and 2) and Table 3 (Parts 1 and 2) list the features and feature sets supported by the Cisco 1700 series routers in Cisco IOS 12.2(2)XK3. The table uses the following conventions:

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

Note All of the features listed in Table 2 and Table 3 were introduced on Cisco 1700 series routers in Release 12.2(2)XK. However, these tables are not cumulative and therefore do not list all the previously-released features in each image. Additional features are listed in the *Cross-Platform Release Notes for Cisco IOS Release 12.2 T* and Release 12.2 T Cisco IOS documentation.

Table 2 Feature List by Feature Set for Cisco 1720, 1750, 1751, and 1760 Routers, Part 1 of 2

Feature	Feature Set					
	IP/ADSL/ IPX/ AT/ IBM/FW/ IDS Plus IPSec 56	IP/ADSL/ IPX/AT/ IBM/FW/ IDS Plus IPSec 3DES	IP/ADSL/ IPX/AT/IBM Plus	IP/ADSL/ IPX/AT/IBM Plus	IP/ADSL/ FW/IDS Plus IPSec 56	IP/ADSL Plus IPSec 56
Quality of Service						
Class-Based IP Packet Marking	Yes	Yes	Yes	Yes	Yes	Yes
Low Latency Queuing (LLQ)[1]	Yes	Yes	Yes	Yes	Yes	Yes
RSVP support for LLQ	Yes	Yes	Yes	Yes	Yes	Yes

1. Support for LLQ through an ADSL WIC on Cisco 1700 series routers first appeared in Cisco IOS Release 12.2(2)XQ1.

Table 2 Feature List by Feature Set for Cisco 1720, 1750, 1751, and 1760 Routers, Part 2 of 2

Feature	Feature Set				
	IP/ADSL/FW/IDS Plus IPSec 3DES	IP/ADSL Plus IPSec 3DES	IP/ADSL/IPX/ FW/IDS Plus	IP/ADSL/IPX/ FW/IDS Plus	IP/FW/IDS
Quality of Service					
Class-Based IP Packet Marking	Yes	Yes	Yes	Yes	No
Low Latency Queuing (LLQ)[1]	Yes	Yes	Yes	Yes	No
RSVP support for LLQ	Yes	Yes	Yes	Yes	No

1. Support for LLQ through an ADSL WIC on Cisco 1700 series routers first appeared in Cisco IOS Release 12.2(2)XQ1.

Table 3 Feature List by Feature Set for Cisco 1750, 1751 and 1760 Routers, Part 1 of 2

Feature	Feature Set						
	IP/ADSL/IPX/ AT/IBM/Voice/ FW/ IDS Plus IPSec 56	IP/ADSL/IPX/ ATIBM/Voice/ FW/IDS Plus IPSec 3DES	IP/ADSL/ Voice/FW/ IDS Plus IPSec 56	IP/ADSL/ Voice Plus IPSec 56	IP/ADSL/ Voice/FW/ IDS Plus IPSec 3DES	IP/IPX	IP/ADSL
Quality of Service							
Class-Based IP Packet Marking	Yes	Yes	Yes	Yes	Yes	No	No
Low Latency Queuing (LLQ)[1]	Yes	Yes	Yes	Yes	Yes	No	No
RSVP support for LLQ	Yes	Yes	Yes	Yes	Yes	No	No

1. Support for LLQ through an ADSL WIC on Cisco 1700 series routers first appeared in Cisco IOS Release 12.2(2)XQ1.

Table 3 Feature List by Feature Set for Cisco 1750, 1751 and 1760 Routers, Part 2 of 2

Feature	Feature Set					
	IP/ADSL/IPX/Voice/ FW/IDS Plus	IP/ADSL/IPX/Voice/ FW/IDS Plus	IP/Voice Plus	IP/ADSL/ Voice Plus	IP/ADSL Plus	IP
Quality of Service						
Class-Based IP Packet Marking	Yes	Yes	Yes	Yes	Yes	No
Low Latency Queuing (LLQ)[1]	Yes	Yes	Yes	Yes	Yes	No
RSVP support for LLQ	Yes	Yes	Yes	Yes	Yes	No

1. Support for LLQ through an ADSL WIC on Cisco 1700 series routers first appeared in Cisco IOS Release 12.2(2)XQ1.

New and Changed Information

The following sections list the new hardware and software features supported by the Cisco 1700 series for 12.2(2)XK3.

New Hardware Features in Release 12.2(2)XK

The following sections list the new hardware features supported by the Cisco 1700 series for Release 12.2(2)XK.

Cisco 1760 and 1760-V Routers

The Cisco 1760 router is a voice-and-data-capable router that can carry voice traffic (for example, telephone calls and faxes) over an IP network, thus providing Voice-over-IP (VoIP) functionality. The router links small-to-medium-size remote Ethernet and Fast Ethernet LANs to central offices using one or two WAN connections. Cisco 1760 routers run data and data-plus-voice images, to provide digital and analog voice support. Cisco 1760-V routers integrate data and voice services with support for multiple voice channels.

New Software Features in Release 12.2(2)XK

The following sections describe the new software features supported by the Cisco 1700 series for Release 12.2(2)XK:

- Class-Based IP Packet Marking
- Low Latency Queuing
- RSVP support for LLQ

Class-Based IP Packet Marking

The Class-Based Packet Marking feature in Release 12.2(2)XK provides efficient packet marking on Cisco 1700 series routers by differentiating packets based on user-designated markings. This feature allows you to perform the following tasks:

- Mark packets by setting the IP Precedence bits or the IP differentiated services code point (DSCP) in the IP ToS byte.
- Associate a local QoS group value with a packet.

The Class-Based Packet Marking feature supports the following RFCs:

- RFC 2474, Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers
- RFC 2475, An Architecture for Differentiated Services Framework
- RFC 2597, Assured Forwarding PHB
- RFC 2598, An Expedited Forwarding PHB

IP Precedence and IP DSCP Marking

Associating a packet with an IP Precedence or IP DSCP marking allows users to classify traffic based on IP Precedence and IP DSCP value, depending on which value is marked. These markings can be used to identify traffic within the network, and other interfaces can match traffic based on the IP Precedence or DSCP markings. IP Precedence and DSCP markings are used to decide how packets should be treated in Weighted Random Early Detection (WRED). The IP DSCP value is the first 6 bits in the ToS byte, while the IP Precedence value is the first 3 bits in the ToS value. The IP Precedence value is actually part of the IP DSCP value. Therefore, both values cannot be set simultaneously. If both values are set simultaneously, the packet is marked with the IP DSCP value.

If you need to mark packets in your network and all of your devices support IP DSCP marking, use the IP DSCP marking to mark your packets, since the IP DSCP markings provide more packet marking options. If marking by IP DSCP is undesirable, however, or if you are unsure if the devices in your network support IP DSCP values, use the IP precedence value to mark your packets. The IP precedence You can set up to 8 different IP precedence markings and 64 different IP DSCP markings.

QoS Group Value Marking

Associating a packet with a local QoS group allows you to associate a group ID with a packet. You can use the group ID to classify packets into QoS groups based on prefix, autonomous system, or community string. This QoS group marking can only be used to classify traffic within a router, and cannot be used to mark packets leaving the router. You can set up to 100 different QoS group markings.

Additional Statistics

With the Class-Based Packet Marking feature, output from the show policy-map interface command is enhanced to provide additional statistics such as the incoming traffic rate, the dropped packet rate, the number of matched packets, and the number of matched bytes for traffic classes that are attached to the specified interface.

Low Latency Queuing

Low Latency Queuing (LLQ) brings strict priority queueing to Class-Based Weighted Fair Queueing (CBWFQ) on Cisco 1700 series routers. Strict priority queueing allows delay-sensitive data such as voice to be dequeued and sent first (before packets in other queues are dequeued), giving delay-sensitive data preferential treatment over other traffic.

Caution The LLQ feature does not function with Point-to-Point Protocol over Ethernet (PPPoE) configured on an Ethernet WIC.

RSVP support for LLQ

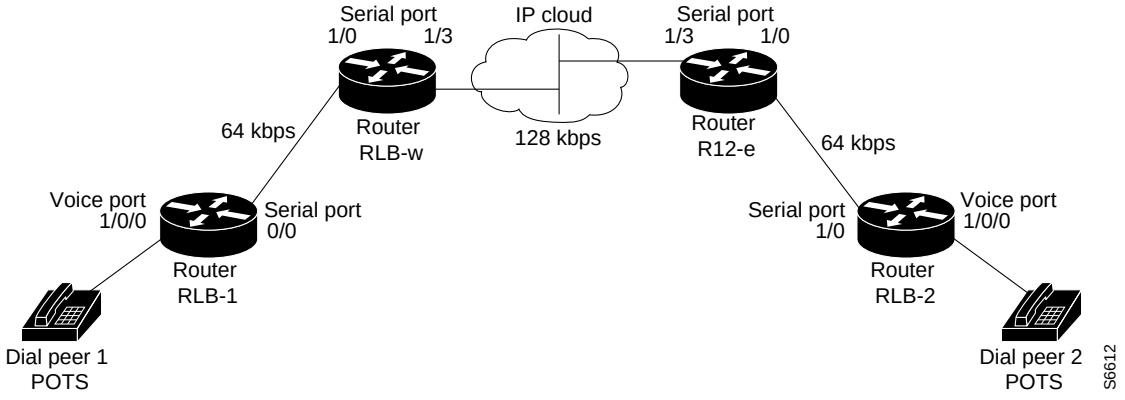
Cisco IOS Release 12.2(2)XK supports Resource Reservation Protocol (RSVP) low latency queueing (LLQ) on Cisco 1700 series routers. RSVP is a network-control protocol that provides a means for reserving network resources—primarily bandwidth—to guarantee that applications sending end-to-end across networks achieve the desired Quality of Service (QoS). The RSVP enables real-time traffic (which includes voice flows) to reserve resources necessary for low latency and bandwidth guarantees.

Voice traffic has stringent delay and jitter requirements. It must have very low delay and minimal jitter per hop to avoid degradation of end-to-end QoS. This requirement calls for an efficient queueing implementation, such as low latency queueing (LLQ), that can service voice traffic at almost strict priority in order to minimize delay and jitter. RSVP uses weighted fair queueing (WFQ) to provide fairness among flows and to assign a low weight to a packet to attain priority. However, the preferential treatment provided by RSVP is insufficient to minimize the jitter because of the nature of the queueing algorithm itself. As a result, the low latency and jitter requirements of voice flows might not be met in the prior implementation of RSVP and WFQ.

RSVP provides admission control. However, to provide the bandwidth and delay guarantees for voice traffic and get admission control, RSVP must work with LLQ. The RSVP Support for LLQ feature allows RSVP to classify voice flows and queue them into the priority queue within the LLQ system while simultaneously providing reservations for non-voice flows by getting a reserved queue.

Figure 1 shows how RSVP operates with other Voice over IP (VoIP) features, such as IP RTP Priority, using the same queueing mechanism, LLQ.

Figure 1 RSVP Support for LLQ



RSVP is the only protocol that provides admission control based on the availability of network resources such as bandwidth. LLQ provides a means to forward voice traffic with strict priority ahead of other data traffic. When combined, RSVP support for LLQ provides admission control and forwards voice flows with the lowest possible latency and jitter.

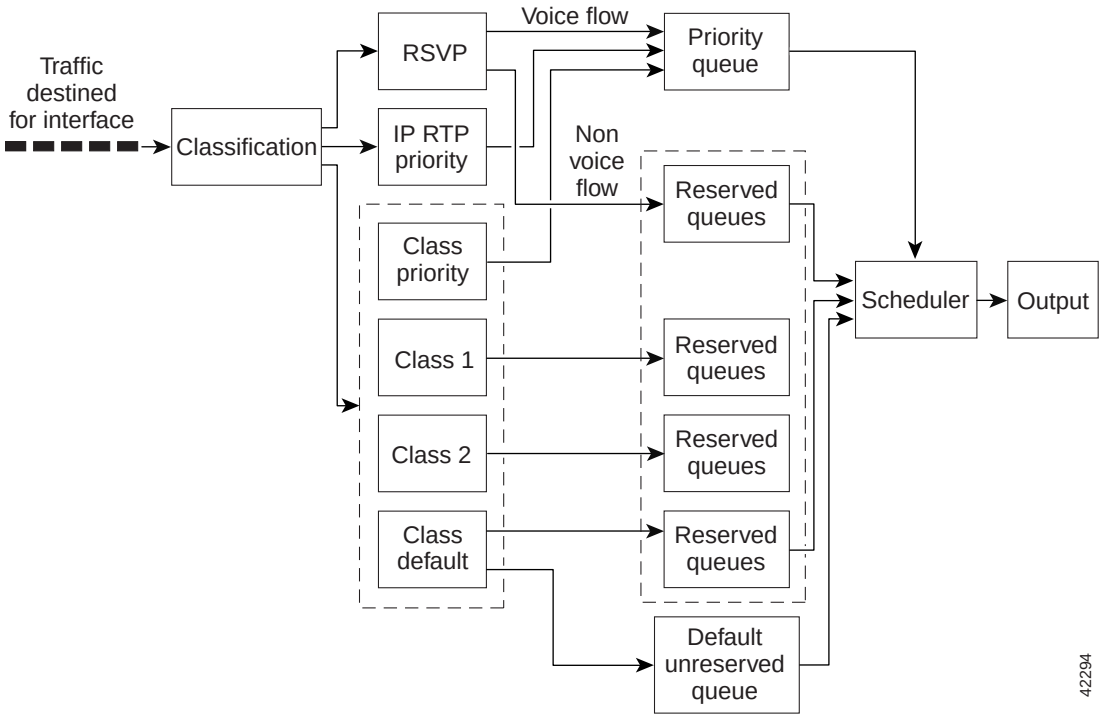
High priority non-voice traffic from mission-critical applications can continue to be sent without being adversely affected by voice traffic. Nonconformant traffic receives best-effort treatment, thereby avoiding any degradation that might otherwise occur for all traffic.

Note If the source is incapable of supporting RSVP, the router can proxy on behalf of the source.

Caution The RSVP support for LLQ feature is not supported on Ethernet WIC cards.

Figure 2 shows a sample network topology with LLQ running on each interface. This configuration guarantees QoS for voice traffic.

Figure 2 Topology Showing LLQ on Each Interface



New Software Features in Release 12.2(2)T

For information regarding the features supported in Cisco IOS Release 12.2 T, refer to the Cross-Platform Release Notes and New Feature Documentation links at the following location on CCO:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122relnt/xprn122t/index.htm

This URL is subject to change without notice. If it changes, point your web browser to CCO, and click the following path:

Service & Support: **Technical Documents**: **Cisco IOS Software**: **Release 12.2**: **Release Notes**: **Cross-Platform Release Notes** (Cisco IOS Release 12.2T)

Important Notes

The following sections contain important notes about Cisco IOS Release 12.2(2)XK3 that can apply to the Cisco 1700 series. (Also, see the "Caveats" section on page 15.)

Fan Operation in Cisco 1700 Series Routers

The fans in some Cisco 1700 series routers stay off until thermally activated. The fans in Cisco 1760 and 1760-V routers are always on.

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 displays. To see information for all flash partitions, enter **show flash ?**. This will list 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 or defects 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 severity levels.

All caveats in Release 12.2 T are also in 12.2(2)XK3. For information on caveats in Cisco IOS Release 12.2 T, refer to the *Caveats for Cisco IOS Release 12.2 T* document. For information on caveats in Cisco IOS Release 12.2, refer to the *Caveats for Cisco IOS Release 12.2* document. These documents list severity 1 and 2 caveats, and are located on CCO 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 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.

Resolved Caveats - Releases 12.2(2)XK3

This section describes unexpected behavior that is fixed in Releases 12.2(2)XK3.

Miscellaneous

CSCdu24635

IPSec Antireplay Checking Ineffective 32-64 sequence numbers back

CSCdu81936

Received gratuitous ARP overwrites interface MAC address in ARP tbl published already at http://www.cisco.com/warp/public/707/IOS-arp-overwrite-vuln-pub.shtml

CSCdv48261

Improvements to IOS FW ------Need to commit this bug

CSCdv87405

Malformed PPTP packet causes recursive mallocs, exhausts all memory: Day one PPTP issue. PPTP was introduced in 12.1T

CSCdw33027

SSH CRC check fails: Affected if contain SSH feature (k2, 56i, k8, k9 images in 12.1 and above)

CSCdx17916

RTR: RTT packet with wrong values causes router to crash.

Resolved Caveats - Releases 12.2(2)XK2

This section describes unexpected behavior that is fixed in Releases 12.2(2)XK2.

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

Resolved Caveats—Cisco IOS Release 12.2(2)XK1

Cisco IOS Release 12.2(2)XK1 is a rebuild release for Cisco IOS Release 12.2(2)XK. The caveats in this section are resolved in Cisco IOS Release 12.2(2)XK1 but might be open in previous Cisco IOS releases.

CSCdv62649

The command **ip tacacs source-interface** does not work correctly. If a router is configured to use “loopback interface” for TACACS packets, the router might still use “interface address”.

CSCdu62677

The command **ip addr dhcp hostname** is now disabled.

Caveats for Release 12.2(2)XK

This section describes possibly unexpected behavior by Release 12.2(2)XK. Only severity 1 through 3 caveats are included.

CSCdt55603

The object **cikeTunRemoteName** is always an IP address regardless whether the peers have the **isakmp** key as a **name** peer or **ipaddress** peer. This caveat is a duplicate to caveat CSCds04437.

CSCdt93933

Cisco routers return a zero-length string when queried for the SNMP object **isdnBearerPeerAddress**, instead of the actual value. The command **show call active voice bried** displays the **PeerAddress** value.

CSCdt93965

Not able to create new rows in **isdnSignalingTable**. This caveat is a duplicate to caveat CSCdp57230.

CSCdu55044

The CISCO-VOICE-DIAL-CONTROL-MIB object **cvCallActiveCallerIDBlock** returns incorrect values.

CSCdu55062

The object **cvCallActiveSessionTarget** returns incorrect values.

CSCdu56183

The CISCO-VOICE-DIAL-CONTROL-MIB values cannot be set through SNMP for the object **cvVoIPPeerCfgFaxBytes**.

CSCdu56201

Setting the CISCO-VOICE-DIAL-CONTROL-MIB object **cvVoIPPeerCfgDigitRelay** results in an error.

CSCdu73718

The IPSec MIB variables **cikeGlobalOutNotifys**, **cikeTunOutNotifys**, **cikeTunHistOutNotifys**, **cikeGlobalOutP2SaDelRequests**, **cikeTunOutP2SaDelRequests** and **cikeTunHistOutP2SaDelRequests** return incorrect values.

CSCdu74709

The objects **cikeGlobal[In/Out]P2Exchgs** and **cikeTun[In/Out]P2Exchgs** return incorrect values.

CSCdu83902

The CISCO-IPSEC-MIB object **cips3DesCapable** returns incorrect values.

CSCdv00104

The CISCO-IPSEC-FLOW-MONITOR-MIB object **cipSecTunHistTotalSas** returns incorrect values. This caveat is a duplicate to caveat CSCds10702.

CSCdv01412

Voice loopback does not work.

CSCdv02381

The IPSEC-FLOWMONITOR-MIB objects **cipSecTunLifeSize** and **cipSecTunLifeTime** return incorrect values.

CSCdv17664

The **demandNbrName** MIB object is not populated when initially queried. To work around this problem, use SNMP to set the variable.

CSCdv17679

The traps **demandNbrCallDetails** and **demandNbrCNANotification** are not sent when ISDN calls are made on the Voice NT or TE BRI interfaces.

CSCdv20646

The objects **entPhysicalVendorType** and **entPhysicalContainedIn** return incorrect values.

CSCdv20689

The object **entPhysicalTable** returns empty strings as a result of some entries.

CSCdv22493

After a voice-capable Cisco 1700 series router reloads, when a fractional T1 WIC is installed in Slot 0 and a BRI is installed in Slot 2, the FXS port in Slot 1 intermittently fails to come up. To work around this problem, reload the router again.

CSCdv23896

Under heavy traffic conditions using two parallel serial links, load balancing does not work correctly; serial Slot and port 0/0 drops noticeably more packets than the other serial interface.

CSCdv24610

Cisco 1751 and Cisco 1760 routers unexpectedly reset if the command **service-policy** {**input** | **output**} *policy-map-name* is configured for a permanent virtual circuit (PVC) or virtual-template interface.

CSCdv35467

When configuring **mtu 1500** for an ATM interface in a Cisco router, after the router reloads the PVC associated with the ATM interface remains in the INAC state.

CSCdv58588

During heavy traffic, OAM cells are dropped for non-quality-of-service (QoS) PVCs. To work around this problem, configure the ATM interface with the QoS feature LLQ.

CSCdv52056

To make calls, the E&M connection trunk requires a second command **shut**, followed by the command **no shut**.

CSCdv54699

Calls can be made when a Cisco router is reloaded if the phone is off-hook.

CSCdv47222

A software-forced reload error occurs if an unsupported VIC is inserted into the VIC-only slot.

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

Release-Specific Documents

The following documents are specific to Release 12.2 and apply to Release 12.2(2)XK3. They are located on Cisco.com and the Documentation CD-ROM (under the heading **Service & Support**):

- To reach the *Release Notes for the Cisco 1700 Series Routers for Cisco IOS Release 12.2(2)XK*, click this path:

  Technical Documents: **Cisco IOS Software**: **Release 12.2**: **Release Notes**: **Cisco 1700 Series Routers**: **Cisco 1700 Series - Release Notes for Release 12.2(2)XK**

- To reach the *Cross-Platform Release Notes for Cisco IOS Release 12.2 T*, click this path:

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

- To reach product bulletins, field notices, and other release-specific documents, click this path:

  Technical Documents: **Product Bulletins**

- To reach the *Caveats for Cisco IOS Release 12.2* and *Caveats for Cisco IOS Release 12.2 T* documents, which contain caveats applicable to all platforms for all maintenance releases of Release 12.2, click this path:

  Technical Documents: **Cisco IOS Software**: **Release 12.2**: **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 1720 Series Routers

These documents are available for the Cisco 1720 router on CCO and the Documentation CD-ROM at **Technical Documents**: **Access Servers and Access Routers**: **Modular Access Routers**: **Cisco 1720 Series Routers**:

- *Installing Your Cisco 1700 Router Quick Start Guide*
- *Cisco 1720 Series Router Hardware Installation Guide*
- *Cisco 1700 Series Router Software Configuration Guide*
- *Cisco 1720 Series Router Release Notes*
- *Installing and Upgrading the Boot ROM in Cisco 1720 Routers*
- *Cisco 1700 Series* (Cisco IOS) *Router Release Notes*
- *Configuration Notes for Cisco 1700 Series Routers*
- *WAN Interface Cards Hardware Installation Guide*

Cisco 1750 Series Routers

These documents are available for the Cisco 1750 router on CCO and the Documentation CD-ROM at **Technical Documents**: **Access Servers and Access Routers**: **Modular Access Routers**: **Cisco 1750 Series Routers**:

- *Installing Your Cisco 1700 Router Quick Start Guide*
- *Cisco 1750 Series Router Hardware Installation Guide*
- *Cisco 1700 Series Router Software Configuration Guide*
- *Cisco 1750 Series Router Release Notes*
- *Cisco 1750 Router Voice-over-IP quick start guide*
- *Cisco 1750 Voice-over-IP Software Configuration Guide*
- *Cisco 1700 Series* (Cisco IOS) *Router Release Notes*
- *Configuration Notes for Cisco 1700 Series Routers*
- *WAN Interface Cards Hardware Installation Guide*

Cisco 1751 Series Routers

These documents are available for the Cisco 1751 and 1751-V routers on CCO and the Documentation CD-ROM at **Technical Documents**: **Access Servers and Access Routers**: **Modular Access Routers**: **Cisco 1751 Series Routers**:

- *Installing Your Cisco 1700 Router Quick Start Guide*
- *Cisco 1751 Router Hardware Installation Guide*
- *Cisco 1751 Router Software Configuration Guide*
- *Cisco 1700 Series Router Software Configuration Guide*
- *Cisco 1751 Router Hardware Release Notes*

- *Configuring the Voice Interface Card for the Cisco 1751 Router*
- *Installing and Removing Packet Voice/fax DSP Modules*
- *Cisco 1700 Series* (Cisco IOS) *Router Release Notes*
- *Configuration Notes for Cisco 1700 Series Routers*
- *WAN Interface Cards Hardware Installation Guide*

Cisco 1760 and 1760-V Routers

These documents are available for the Cisco 1760 and 1760-V routers on CCO and the Documentation CD-ROM at **Technical Documents**: **Access Servers and Access Routers**: **Modular Access Routers**: **Cisco 1760 Series Routers**:

- *Quick Start Guide for Installing Your Cisco 1760 Modular Access Router*
- *Cisco 1760 Modular Access Router Hardware Installation Guide*
- *Cisco 1751 Router Software Configuration Guide*
- *Cisco 1700 Series Router Software Configuration Guide*
- *Configuration Notes for Cisco 1700 Series Routers*
- *Configuring the Voice Interface Card for the Cisco 1751 Router*
- *Installing and Removing Packet Voice/fax DSP Modules*
- *WAN Interface Cards Hardware Installation Guide*

Obtaining Documentation and Technical Assistance

The *Cross-Platform Release Notes for Cisco IOS Release 12.2 T* contains the latest descriptions and locations of the following sources for obtaining documentation and technical assistance from Cisco Systems. See the section "Release-Specific Documents" for the location of the *Cross-Platform Release Notes for Cisco IOS Release 12.2 T*.

- World Wide Web, Cisco.com—Cisco Systems website: http://www.cisco.com.
- Documentation CD—Cisco documentation and additional literature are available in a CD package, which ships with your product.
- Ordering documentation—Methods for ordering documentation include Networking Products MarketPlace, the online Subscription Store, and calling a local account representative using the Cisco corporate headquarters or North America phone numbers.
- Documentation feedback—When using the World Wide Web, you can submit technical comments electronically. You can also send e-mail, mail in the response card that is behind the front cover of many documents, or send correspondence to Cisco Systems. We appreciate your comments.
- Technical Assistance Center (TAC)—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. You can contact the TAC using Cisco.com or by phone. Toll-free numbers are available for many countries.

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

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