



Release Notes for Cisco Signaling Link Terminal for Cisco IOS Release 12.1(1)T

March 27, 2000

These release notes describe Cisco Signaling Link Terminal (SLT), which is designed to perform Signaling System 7 (SS7) signal pre-processing for a Cisco Media Gateway Controller. The Cisco SLT consists of a customized Cisco IOS Release 12.1(1)T image running on a Cisco 2611 router. These release notes are updated as needed to describe new features, memory requirements, hardware support, and related document changes.

Use these release notes with *Cross-Platform Release Notes for Cisco IOS Release 12.1* located on Cisco Connection Online (CCO) and the Documentation CD-ROM.

Contents

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Introduction

The Cisco Signaling Link Terminal (SLT) enables service providers to reliably transport SS7 protocols across an IP network. The Cisco SLT uses the Cisco IOS SS7 Signaling Link Terminal feature set, providing reliable interoperability with the Cisco Media Gateway Controller. The Cisco SLT is responsible for terminating the Message Transfer Part (MTP) 1 and MTP 2 layers of the SS7 protocol stack. Using Cisco's Reliable User Datagram Protocol (RUDP), the Cisco SLT backhauls, or transports, upper-layer SS7 protocols across an IP network to the Cisco Media Gateway Controller (Cisco VSC3000).

In combination with this application-specific version of the Cisco IOS software, the Cisco SLT hardware component leverages the widely deployed Cisco 2600 series multiservice access router. The Cisco 2600 series, driven by a powerful RISC processor, provides the high performance required in complex networking infrastructures.

**Note**

When used as a Cisco Signaling Link Terminal device integrated into a Cisco Media Gateway Controller, the Cisco 2611 has SS7 functionality only; all standard Cisco 2611 software features are disabled when running the Cisco SLT image. In that case, only the document *Cisco Signaling Link Terminal* and Cisco Media Gateway Controller documentation is relevant.

When used for Signaling Link Terminal applications, the modular Cisco 2611 dual-Ethernet port router can be configured with dual serial and the multiflex interface cards. The E1 multiflex interface cards offer integrated DSUs and the T1 multiflex interface cards offer integrated CSU/DSUs. For additional flexibility, the multiflex interface cards can also be ordered with a dual-port drop-and-insert capability. All of these interface cards are Field Replaceable Units (FRUs).

The Cisco SLT supports only the SS7 MTP 2 serial protocol. Therefore, the serial interfaces cannot be configured for other protocols such as HDLC, PPP, X.25, LAPB, and Frame Relay.

The Cisco SLT functions as a component of several solutions currently under development. Participants in lab trials can obtain solution documentation from their Cisco representative. See the “Service and Support” section on page 13 for more information.

System Requirements

This section describes the system requirements for Cisco IOS Release 12.1(1)T:

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- Hardware Supported, page 3
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- Upgrading to a New Release, page 4
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Memory Requirements

Table 1 Memory Requirements for the Cisco 2611 with Cisco SLT

| Feature Set | Image Name | Required Flash Memory | Required DRAM Memory | Runs From |
|-------------|----------------|-----------------------|----------------------|-----------|
| IP/SS7 | c2600-ipss7-mz | 16 MB | 48 MB | RAM |

Hardware Supported

Cisco IOS Release 12.1(1)T supports the Cisco 2611 series routers exclusively. The Cisco SLT feature is not supported with any other Cisco 2600 series chassis.

Table 2 Supported Interfaces for the Cisco SLT Solution Data Rate

| Interface, Network Module, or Data Rate ¹ | Other Platforms Supporting These Modules | |
|--|---|---------------------------------|
| LAN Interfaces | 2-port Ethernet (10BaseT) ² | Cisco 2611 |
| E1/T1 Multiflex Voice/WAN Interface Cards | 1-port T1 multiflex trunk interface (VWIC-1MFT-T1) | All Cisco 2600 series platforms |
| | 1-port E1 multiflex trunk interface (VWIC-1MFT-E1) | All Cisco 2600 series platforms |
| | 2-port T1 multiflex trunk interface (VWIC-2MFT-T1) | All Cisco 2600 series platforms |
| | 2-port E1 multiflex trunk interface (VWIC-2MFT-E1) | All Cisco 2600 series platforms |
| | 2-port T1 multiflex trunk interface with drop-and-insert (VWIC-2MFT-T1-DI) | All Cisco 2600 series platforms |
| | 2-port E1 multiflex trunk interface with drop-and-insert (VWIC-2MFT-E1-DI) | All Cisco 2600 series platforms |
| WAN Interface Cards | 1-port High-Speed Serial (up to 2.048 Mbps) | All Cisco 2600 series platforms |
| | 2-port Dual High-Speed Serial (up to 2.048 Mbps; Asynchronous/ Synchronous support) | All Cisco 2600 series platforms |

1. See E1/T1 Multiflex Voice/WAN Interface Cards in this table.
2. The Cisco SLT does not support SS7/IP over both ethernet ports.

Determining Your Software Release

To determine the version of Cisco IOS software running on the Cisco SLT or any Cisco 2600 series router, log in to the router and enter the **show version EXEC** command:

```
Router> show version
Cisco Internetwork Operating System Software
IOS (tm) 2600 Software (c2600-ipss7-mz), Version 12.1(1)T, RELEASE SOFTWARE
```

Upgrading to a New Release

For general information about upgrading to a new software release, see the product bulletin *Cisco IOS Upgrade Ordering Instructions* on CCO located at:

Service & Support: Software Center: Cisco IOS Software: Product Bulletins: Software

Feature Set Table

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

Table 3 Feature Sets Supported by the Cisco SLT

| Feature Sets | Description | Feature Set Matrix Term | Software Image | Platforms |
|--------------------|-------------------------|-------------------------|----------------|-----------------|
| IP/SS7 Feature Set | Signaling Link Terminal | Basic with SS7 | c2600-ipss7-mz | Cisco 2611 only |

Table 4 lists the features and feature sets supported by the Cisco IOS Release 12.1(1)T for the Cisco 2611 with Cisco SLT.

The table uses the following conventions to identify features:

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



Note

These feature set tables contain only selected lists of features. These tables are not cumulative or complete lists of all the features in each image.



Note

These features only support the Cisco SLT in Cisco IOS Release 12.1(1)T.

Table 4 Feature List by Feature Set for the Cisco 2611 with Cisco SLT

| Features | Feature Set |
|--|-------------|
| | IP/SS7 |
| New Features in the Cisco SLT | |
| Two Links per E1/T1 interface | Yes |
| MTP 2 (ITU/Bell/NTT/TTC) variant and parameter configuration | Yes |
| LPO support for ITU and Bell SS7 Links | Yes |
| New command-line interface (CLI) for Cisco SLT configuration | Yes |

New and Changed Information

New Features

The following sections list the new features supported by the Cisco 2611 with Cisco SLT for Cisco IOS Release 12.1(1)T:

- MTP 2 (ITU/Bell/NTT/TTC) variant and parameter configuration.
- LPO support for ITU and Bell SS7 links.
- New CLI for Cisco SLT configuration

Important Notes

This section contains important information about use of your Cisco IOS Release 12.1(1) T software.

The last maintenance release of the Cisco IOS Release 12.0T release train is 12.0(7)T. The migration path for customers needing bug fixes for Cisco IOS Release 12.0 T features is 12.1 Mainline. Cisco IOS Release 12.1 Mainline has the complete feature content of 12.0T and this release will eventually reach General Deployment (GD).

Cisco IOS Release 12.1T begins with the same set of features as the Cisco IOS Release 12.1 mainline and will continue to add features.

Deprecated MIBs

Older Cisco Management Information Bases (MIBs) will be replaced in a future release. OLD-CISCO-* MIBs are currently migrated into more scalable MIBs—without affecting existing Cisco IOS products or NMS applications. You can update from deprecated MIBs to the replacement MIBs as shown in Table 5.

Table 5 *Deprecated MIBs*

| Deprecated MIB | Replacement |
|--------------------------|----------------------------------|
| OLD-CISCO-APPLETALK-MIB | RFC1243-MIB |
| OLD-CISCO-CHASSIS-MIB | ENTITY-MIB |
| OLD-CISCO-CPUK-MIB | In Development |
| OLD-CISCO-DECNET-MIB | In Development |
| OLD-CISCO-ENV-MIB | CISCO-ENVMON-MIB |
| OLD-CISCO-FLASH-MIB | CISCO-FLASH-MIB |
| OLD-CISCO-INTERFACES-MIB | IF-MIB CISCO-QUEUE-MIB |
| OLD-CISCO-IP-MIB | In Development |
| OLD-CISCO-MEMORY-MIB | CISCO-MEMORY-POOL-MIB |
| OLD-CISCO-NOVELL-MIB | NOVELL-IPX-MIB |
| OLD-CISCO-SYS-MIB | (Compilation of other OLD* MIBs) |

Table 5 Deprecated MIBS (continued)

| Deprecated MIB | Replacement |
|----------------------|-----------------------|
| OLD-CISCO-SYSTEM-MIB | CISCO-CONFIG-COPY-MIB |
| OLD-CISCO-TCP-MIB | CISCO-TCP-MIB |
| OLD-CISCO-TS-MIB | In Development |
| OLD-CISCO-VINES-MIB | CISCO-VINES-MIB |
| OLD-CISCO-XNS-MIB | In Development |

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.

All caveats in Cisco IOS Release 12.1(1)T are also in Release 12.0 T, up to and including 12.0(7)T.

For information on caveats in Cisco IOS Release 12.0, see *Caveats for Cisco IOS Release 12.0*, which lists severity 1 and 2 caveats, and is located on CCO and the Documentation CD-ROM.

Exception While Creating New Channel-Group

CSCdm28532

Workaround: Shut down the E1/T1 interface and the Ethernet interface, then configure the channel-group, then no-shut the E1/T1 and finally the Ethernet interface.

Serial Port Configuration Causes Link Failure

CSCdp79921

The following config CLI command causes the link to fail momentarily with an indication of a physical interface failure to the VSC:

```
Router(config)# int s0/0
Router(config-if)# no ip address
```

This triggers link changeover. This behavior is dangerous because it occurs if the user types **copy startup-config running-config**. When running MTP2 encapsulation, the serial port should not be reset by this command.

Workaround: Do not run **copy startup-config running-config** when running MTP2 encapsulation.



Note

If you have an account with CCO, you can use Bug Navigator II to find caveats of any severity for any release. Click on this path: **Software Center: Cisco IOS Software: Cisco IOS Bug Toolkit: Cisco Bug Navigator II**. You can also find Bug Navigator II at <http://www.cisco.com/support/bugtools>

Related Documentation

The following sections describe the documentation available for the Cisco 2600 series. 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 CCO and the Documentation CD-ROM.

Use these release notes with these documents:

- Cisco SLT-Specific Documents, page 7
- Release-Specific Documents, page 7
- Platform-Specific Documents, page 8
- Cisco IOS Software Documentation Set, page 9

Cisco SLT-Specific Documents

The following documents are specific to configuration of Cisco SLT on the Cisco 2611:

- Cisco Signaling Link Terminal

Release-Specific Documents

The following documents are specific to or support Cisco IOS Release 12.1(1) and are located on CCO and the Documentation CD-ROM:

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

On CCO, beginning under the **Service & Support** heading:

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

On the Documentation CD-ROM at:

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

- Product bulletins, field notices, and other release-specific documents

To reach these documents, refer to the Service & Support section at this path on CCO:

Technical Documents

- *Caveats for Cisco IOS Release 12.1*

On CCO, beginning under the **Service & Support** heading:

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

On the Documentation CD-ROM at:

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



Note

If you have an account with CCO, you can use Bug Navigator II to find caveats of any severity for any release. Click on this path: **Software Center: Cisco IOS Software: Cisco IOS Bug Toolkit: Cisco Bug Navigator II**. You can also find Bug Navigator II at <http://www.cisco.com/support/bugtools>

Platform-Specific Documents



Note

These documents are available for the Cisco 2600 series on CCO and the Documentation CD-ROM.

When used as a Cisco Signaling Link Terminal device integrated into Cisco Media Gateway Controller, the Cisco 2611 has SS7 functionality only, since all standard Cisco 2611 software features are disabled when running the Cisco SLT image. In that case, only the document *Cisco Signaling Link Terminal* and Cisco Media Gateway Controller documentation is relevant.

- *Quick Start Guide Cisco 2600 Series Cabling and Setup*
- *Cisco 2600 Series Hardware Installation Guide*
- *Cisco Network Modules Hardware Installation Guide*
- *Update to Cisco Network Module Hardware and Software Guides*
- *Cisco WAN Interface Cards Hardware Installation Guide*
- *Update to Cisco WAN Interface Cards Hardware Installation Guide*
- *Software Configuration Guide For Cisco 3600 and Cisco 2600 Series Routers*
- New and Changed Show Commands for the Cisco 2600 Series Routers
- Cisco 2600 Series Configuration Notes
- Analog Modem Firmware
- Analog modem firmware release notes and AT command set
- Cisco 2600 Series Cabling Specifications
- Cisco Modular Access Router Cable Specifications

On CCO, beginning under the **Service & Support** heading:

Technical Documents: Documentation Home Page: Access Servers and Access Routers: Modular Access Routers: Cisco 2600 Series Routers

On the Documentation CD-ROM at:

Cisco Product Documentation: Access Servers and Access Routers: Modular Access Routers: Cisco 2600 Series Routers

Feature modules describe new features supported by Cisco IOS Release 12.1, and are updates to the Cisco IOS documentation set. A feature module consists of a brief overview of the feature, benefits, configuration tasks, and a command reference. As updates, the feature modules are available online only. Feature module information is incorporated in the next printing of the Cisco IOS documentation set.

On CCO, beginning under the **Service & Support** heading:

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

On the Documentation CD-ROM at:

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

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

Documentation Modules

Each module in the Cisco IOS documentation set consists of two 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.

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

On CCO, beginning under the **Service & Support** heading:

Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.1: Configuration Guides and Command References: Cisco IOS Interface Configuration Guide or Cisco IOS Interface Command Reference

On the Documentation CD-ROM at:

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

Release 12.1 Documentation Set

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



Note

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

You can reach the Cisco IOS documentation set on CCO, beginning under the **Service & Support** heading:

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

You can reach the Cisco IOS documentation set on the Documentation CD-ROM at:

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

Table 6 Cisco IOS Software Release 12.1 Documentation Set

| Books | Chapter Topics |
|---|---|
| <ul style="list-style-type: none"> • <i>Cisco IOS Configuration Fundamentals Configuration Guide</i> • <i>Cisco IOS Configuration Fundamentals Command Reference</i> | Configuration Fundamentals Overview Cisco IOS User Interfaces File Management System Management |
| <ul style="list-style-type: none"> • <i>Cisco IOS Bridging and IBM Networking Configuration Guide</i> • <i>Cisco IOS Bridging and IBM Networking Command Reference, Volume I</i> • <i>Cisco IOS Bridging and IBM Networking Command Reference, Volume II</i> | Transparent Bridging Source-Route Bridging Token Ring Inter-Switch Link Remote Source-Route Bridging DLSw+ STUN and BSTUN LLC2 and SDLC IBM Network Media Translation DSPU and SNA Service Point SNA Frame Relay Access Support APPN Cisco Database Connection NCIA Client/Server Topologies Cisco Mainframe Channel Connection Airline Product Set |

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

| Books | Chapter Topics |
|---|--|
| <ul style="list-style-type: none"> • <i>Cisco IOS Dial Services Configuration Guide: Terminal Services</i> • <i>Cisco IOS Dial Services Configuration Guide: Network Services</i> • <i>Cisco IOS Dial Services Command Reference</i> | X.25 over ISDN Appletalk Remote Access Asynchronous Callback, DDR, PPP, SLIP Bandwidth Allocation Control Protocol ISDN Basic Rate Service ISDN Caller ID Callback PPP Callback for DDR Channelized E1 & T1 Dial Backup for Dialer Profiles Dial Backup Using Dialer Watch Dial Backup for Serial Lines Peer-to-Peer DDR with Dialer Profiles DialOut Dial-In Terminal Services Dial-on-Demand Routing (DDR) Dial Backup Dial-Out Modem Pooling Large-Scale Dial Solutions Cost-Control Solutions Virtual Private Dialup Networks Dial Business Solutions and Examples |
| <ul style="list-style-type: none"> • <i>Cisco IOS Interface Configuration Guide</i> • <i>Cisco IOS Interface Command Reference</i> | Interface Configuration Overview LAN Interfaces Logical Interfaces Serial Interfaces |
| <ul style="list-style-type: none"> • <i>Cisco IOS IP and IP Routing Configuration Guide</i> • <i>Cisco IOS IP and IP Routing Command Reference</i> | IP Overview IP Addressing and Services IP Routing Protocols |
| <ul style="list-style-type: none"> • <i>Cisco IOS Appletalk and Novell IPX Configuration Guide</i> • <i>Cisco IOS Appletalk and Novell IPX Command Reference</i> | AppleTalk Novell IPX |
| <ul style="list-style-type: none"> • <i>Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Configuration Guide</i> • <i>Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Command Reference</i> | Network Protocols Overview Apollo Domain Banyan VINES DECnet ISO CLNS XNS |
| <ul style="list-style-type: none"> • <i>Cisco IOS Security Configuration Guide</i> • <i>Cisco IOS Security Command Reference</i> | AAA Security Services Security Server Protocols Traffic Filtering and Firewalls IP Security and Encryption Passwords and Privileges Neighbor Router Authentication IP Security Options |
| <ul style="list-style-type: none"> • <i>Cisco IOS Switching Services Configuration Guide</i> • <i>Cisco IOS Switching Services Command Reference</i> | Switching Services Switching Paths for IP Networks Virtual LAN (VLAN) Switching and Routing |

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

| Books | Chapter Topics |
|--|--|
| <ul style="list-style-type: none"> • <i>Cisco IOS Wide-Area Networking Configuration Guide</i> • <i>Cisco IOS Wide-Area Networking Command Reference</i> | Wide-Area Network Overview ATM Frame Relay SMDS X.25 and LAPB |
| <ul style="list-style-type: none"> • <i>Cisco IOS Multiservice Applications Configuration Guide</i> • <i>Cisco IOS Multiservice Applications Command Reference</i> | Voice over IP Voice over Frame Relay Voice over ATM Voice over HDLC Frame Relay-ATM Internetworking Synchronized Clocks Video Support Universal Broadband Features |
| <ul style="list-style-type: none"> • <i>Cisco IOS Quality of Service Solutions Configuration Guide</i> • <i>Cisco IOS Quality of Service Solutions Command Reference</i> | Policy-Based Routing QoS Policy Propagation via BGP Committed Access Rate Weighted Fair Queueing Custom Queueing Priority Queueing Weighted Random Early Detection Scheduling Signaling RSVP Packet Drop Frame Relay Traffic Shaping Link Fragmentation RTP Header Compression |
| <ul style="list-style-type: none"> • <i>Cisco IOS Command Summary</i> • <i>Cisco IOS Command Reference Master Index</i> • <i>Cisco IOS Configuration Guide Master Index</i> • <i>Cisco IOS Dial Services Quick Configuration Guide</i> • <i>Cisco IOS New Feature Index</i> • <i>Cisco IOS System Error Messages</i> • <i>Cisco IOS Debug Command Reference</i> | |



Note

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

Service and Support

For service and support for a product purchased from a reseller, contact the reseller, who offers a wide variety of Cisco service and support programs described in “Service and Support” of *Cisco Information Packet* shipped with your product.



Note

If you purchased your product from a reseller, you can access CCO as a guest. CCO is Cisco Systems’ primary real-time support channel. Your reseller offers programs that include direct access to CCO services.

For service and support for a product purchased directly from Cisco, use CCO.

Software Configuration Tips on Cisco’s Technical Assistance Center Home Page

If you have a CCO login account, you can access the following URL, which contains links and tips on configuring your Cisco products:

http://www.cisco.com/kobayashi/technotes/serv_tips.shtml

This URL is subject to change without notice. If it changes, point your Web browser to CCO and click on this path: **Products & Technologies: Products: Technical Tips.**

The following sections are provided from the Technical Tips page:

- Access Dial Cookbook—Contains common configurations or recipes for configuring various access routes and dial technologies.
- Field Notices—Notifies you of any critical issues regarding Cisco products and includes problem descriptions, safety or security issues, and hardware defects.
- Frequently Asked Questions—Describes the most frequently asked technical questions about Cisco hardware and software.
- Hardware—Provides technical tips related to specific hardware platforms.
- Hot Tips—Describes popular tips and hints gathered from the Cisco Technical Assistance Center (TAC). Most of these documents are available from the TAC Fax-on-demand service. To reach Fax-on-demand and receive documents at your fax machine from the United States, call 888-50-CISCO (888-502-4726). From other areas, call 650-596-4408.
- Internetworking Features—Lists tips on using and deploying Cisco IOS software features and services.
- Sample Configurations—Provides actual configuration examples that are complete with topology and annotations.
- Software Products—Contains Cisco IOS Software Bulletins, Cisco TCP/IP Suite 100, General Cisco IOS, Internet/Intranet Applications and Software, Network Management, Network Protection Software Tips, and WAN Switching Products and Software.
- Special Collections—Lists other helpful documents, including Case Studies, References & Request for Comments (RFCs), and Security Advisories.

Obtaining Documentation

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at <http://www.cisco.com>, <http://www-china.cisco.com>, or <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. Therefore, it is probably more current than printed documentation. The CD-ROM package is available as a single unit or as an annual subscription.

Ordering Documentation

Registered CCO users can order the Documentation CD-ROM and other Cisco Product documentation through our online Subscription Services at <http://www.cisco.com/cgi-bin/subcat/kaojump.cgi>.

Nonregistered CCO users can order documentation through a local account representative by calling Cisco's corporate headquarters (California, USA) at 408 526-4000 or, in North America, call 800 553-NETS (6387).

Obtaining Technical Assistance

Cisco provides Cisco Connection Online (CCO) as a starting point for all technical assistance. Warranty or maintenance contract customers can use the Technical Assistance Center. All customers can submit technical feedback on Cisco documentation using the web, e-mail, a self-addressed stamped response card included in many printed docs, or by sending mail to Cisco.

Cisco Connection Online

Cisco continues to revolutionize how business is done on the Internet. Cisco Connection Online 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.

CCO's broad range of features and services helps customers and partners to streamline business processes and improve productivity. Through CCO, you will find information about Cisco and our networking solutions, services, and programs. In addition, you can resolve technical issues with online support services, 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 CCO to obtain additional personalized information and services. Registered users may order products, check on the status of an order and view benefits specific to their relationships with Cisco.

You can access CCO in the following ways:

- WWW: www.cisco.com
- Telnet: [cco.cisco.com](telnet://cco.cisco.com)
- Modem using standard connection rates and the following terminal settings: VT100 emulation; 8 data bits; no parity; and 1 stop bit.
 - From North America, call 408 526-8070
 - From Europe, call 33 1 64 46 40 82

You can e-mail questions about using CCO to cco-team@cisco.com.

Technical Assistance Center

The Cisco Technical Assistance Center (TAC) is available to warranty or maintenance contract customers who need technical assistance with a Cisco product that is under warranty or covered by a maintenance contract.

To display the TAC web site that includes links to technical support information and software upgrades and for requesting TAC support, use www.cisco.com/techsupport.

To contact by e-mail, use one of the following:

| Language | E-mail Address |
|------------------|--|
| English | tac@cisco.com |
| Hanzi (Chinese) | chinese-tac@cisco.com |
| Kanji (Japanese) | japan-tac@cisco.com |
| Hangul (Korean) | korea-tac@cisco.com |
| Spanish | tac@cisco.com |
| Thai | thai-tac@cisco.com |

In North America, TAC can be reached at 800 553-2447 or 408 526-7209. For other telephone numbers and TAC e-mail addresses worldwide, consult the following web site:
<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>.

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 and value your comments.

This document is to be used in conjunction with the documents listed in the “Related Documentation” section on page 7.

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