



Release Notes for the Cisco PDSN 2.0 Feature in Cisco IOS Release 12.3(8)XW

July 2004

Cisco IOS Release 12.3(8)XW is a special release that is based on Cisco IOS Release 12.3, with the addition of enhancements to the Cisco Packet Data Serving Node (Cisco PDSN) feature. The Cisco IOS Release 12.3(8)XW is a release optimized for the Cisco PDSN Release 2.0 feature on the Cisco 7206VXR router, the Cisco 7609 Internet Router, the Cisco NPE-G1 router, and Cisco 6500 Catalyst Switch platform.

Contents

These release notes include important information and caveats for the Cisco PDSN software feature provided in Cisco IOS 12.3(8)XW for the Cisco 7206VXR series router, the Cisco 7609 Internet Router, and Cisco 6500 Catalyst Switch platforms.

Caveats for Cisco IOS Release 12.3 can be found on CCO at:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/index.htm>

Release notes for Cisco 7000 Family for Release 12.3T can be found on CCO at:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123reInt/7000/index.htm>

Release notes for the Cisco 6000 Family for 12.3T can be found on CCO at:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123reInt/cat6000/index.htm>

This release note includes the following topics:

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Introduction

Cisco PDSN is an IOS software feature that enables a Cisco 7206VXR router, or a Multi-Processor WAN Application Module (MWAM) on a Catalyst 6500 Switch or 7600 Internet router, or the Cisco NPE-G1 router to function as a gateway between the wireless Radio Access Network (RAN) and the Internet. With Cisco PDSN enabled on a router, a stationary or roaming mobile user can access the Internet, a corporate network intranet, or Wireless Application Protocol (WAP) services. Cisco PDSN supports both Simple IP operation and Mobile IP operation.

System Requirements

This section describes the system requirements for Cisco IOS Release 12.3(8)XW:

- [Memory Requirements, page 2](#)
- [Hardware Supported, page 4](#)
- [Software Compatibility, page 4](#)
- [Determining the Software Version, page 4](#)
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Memory Requirements

[Table 1](#) shows the memory requirements for the PDSN Software Feature Set that supports the Cisco 7206VXR router. The table also lists the memory requirements for the IP Standard Feature Set (for the Home Agent [HA]).

Table 1 Memory Requirements for the Cisco 7206VXR Router and MWAM on the 6500 Catalyst Switch and 7600 Router

Platform	Software Feature Set	Image Name	Flash Memory Required	DRAM Memory Required	Runs From
Cisco 7206VXR Router	PDSN Software Feature Set	c7200-c6is-mz.123-8.XW c7200-h1is-mz.123-8.XW c7200-c6ik9s-mz.123-8.XW c7200-h1ik9s-mz.123-8.XW	20 MB	512 MB	RAM
Cisco 6500 Catalyst Switch	PDSN Software Feature Set	c6svc-5mwam-c6is-b21_11.123-8.XW.bin (This is a bundled image) c6svc-5mwam-h1is-b21_11.123-8.XW.bin	40MB	512MB	RAM

Table 1 Memory Requirements for the Cisco 7206VXR Router and MWAM on the 6500 Catalyst Switch and 7600 Router

Platform	Software Feature Set	Image Name	Flash Memory Required	DRAM Memory Required	Runs From
Cisco 7600 Internet Router	PDSN Software Feature Set	c6svc-5mwam-c6is-b21_11.123-8.XW.bin (This is a bundled image) c6svc-5mwam-h1is-b21_11.123-8.XW.bin	40MB	512MB	RAM
Cisco NPE-G1 Router	PDSN Software Feature Set	c7200-c6is-mz.123-8.XW c7200-h1is-mz.123-8.XW c7200-c6ik9s-mz.123-8.XW c7200-h1ik9s-mz.123-8.XW	40MB	512MB	RAM

Hardware Supported

Cisco IOS Release 12.3(8)XW is optimized for PDSN Release 2.0 on the Cisco 7206VXR router, the MWAM card on the Cisco 6500 Catalyst Switch platform and the 7600 Internet router platform, and the Cisco NPE-G1 router.

A Hardware-Software Compatibility Matrix is available on CCO for users with CCO login accounts. This matrix allows users to search for supported hardware components by entering a Cisco platform and IOS Release. The Hardware-Software Compatibility Matrix tool is available at the following URL:

<http://www.cisco.com/cgi-bin/front.x/Support/HWSWmatrix/hswmatrix.cgi>

Software Compatibility

Cisco IOS Release 12.3(8)XW is a special release that is developed on Cisco IOS Release 12.3.

Cisco IOS Release 12.3(8)XW supports the same features that are in Cisco IOS Release 12.3, with the addition of the PDSN Release 2.0 feature.

Determining the Software Version

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

```
Router#show version
Cisco Internetwork Operating System Software
IOS (tm) MWAM Software (MWAM-C6IS-M), Version 12.3(8)XW, EARLY DEPLOYMENT RELEASE SOFTWARE
(fc1)      Synched to technology version 12.3(8)T
TAC Support: http://www.cisco.com/tac
Copyright (c) 1986-2003 by cisco Systems, Inc.
```

Upgrading to a New Software Release

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

http://www.cisco.com/warp/public/cc/pd/iosw/prodlit/957_pp.htm

MIBs

Old Cisco Management Information Bases (MIBs) will be replaced in a future release. Currently, OLD-CISCO-* MIBs are being converted into more scalable MIBs—without affecting existing Cisco IOS products or NMS applications. You can update from deprecated MIBs to the replacement MIBs as shown in [Table 2](#).

Table 2 *Deprecated and Replacement MIBs*

Deprecated MIB	Replacement
OLD-CISCO-APPLETALK-MIB	RFC1243-MIB
OLD-CISCO-CHASSIS-MIB	ENTITY-MIB

Table 2 *Deprecated and Replacement MIBs (continued)*

Deprecated MIB	Replacement
OLD-CISCO-CPUK-MIB	To be decided
OLD-CISCO-DECNET-MIB	To be decided
OLD-CISCO-ENV-MIB	CISCO-ENVMON-MIB
OLD-CISCO-FLASH-MIB	CISCO-FLASH-MIB
OLD-CISCO-INTERFACES-MIB	IF-MIB CISCO-QUEUE-MIB
OLD-CISCO-IP-MIB	To be decided
OLD-CISCO-MEMORY-MIB	CISCO-MEMORY-POOL-MIB
OLD-CISCO-NOVELL-MIB	NOVELL-IPX-MIB
OLD-CISCO-SYS-MIB	(Compilation of other OLD* MIBs)
OLD-CISCO-SYSTEM-MIB	CISCO-CONFIG-COPY-MIB
OLD-CISCO-TCP-MIB	CISCO-TCP-MIB
OLD-CISCO-TS-MIB	To be decided
OLD-CISCO-VINES-MIB	CISCO-VINES-MIB
OLD-CISCO-XNS-MIB	To be decided

Cisco IOS Feature Sets

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

Cisco IOS Release 12.3(8)XW supports the same feature sets as Cisco Release 12.3, with the exception that Cisco Release 12.3(8)XW includes the PDSN feature. The PDSN feature is optimized for the Cisco 7206VXR router, the Cisco MWAM card on the 6500 Catalyst Switch and 7600 Internet router, and the Cisco NPE-G1 router.



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 may be denied or subject to delay due to United States government regulations. When applicable, 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.

Packet Data Serving Node Software Features in Release 12.3(8)XW

The Cisco IOS Release 12.3(8)XW supports the same feature sets as Cisco Release 12.3, with the exceptions that Cisco Release 12.3(8)XW includes the PDSN feature. The PDSN 2.0 feature is optimized for the Cisco 7206VXR router, the Cisco MWAM card on the 6500 Catalyst Switch and 7600 Internet Router, and the Cisco NPE-G1 router, and includes the following features:

- Resource Revocation for Mobile IP
- Packet of Disconnect,
- IS-835 Prepaid Support
- Prepaid Billing
- Mobile IP Call Processing Per Second Improvements
- IS-835-B Compliant Static IPsec
- On-Demand Address Pools (ODAP)
- Always On Feature
- NPE-G1 Platform Support
- PDSN Cluster Controller / Member Architecture
- PDSN MIB Enhancement
- Conditional Debugging Enhancements

All other software features in Cisco IOS Release 12.3 are described in the documentation for Cisco IOS Release 12.3, which can be found at:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/index.htm>

Caveats

Caveats describe unexpected behavior in Cisco IOS software releases. Severity 1 caveats are the most serious caveats; severity 2 caveats are less serious.

Caveats for Cisco IOS Releases 12.3 can be found on CCO at <http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123reInt/xprn123t/123tcavs.htm>

The “Open Caveats” section lists open caveats that apply to the current release and might also apply to previous releases.

The “Resolved Caveats” section lists caveats resolved in a particular release, which may have been open in previous releases.



Note

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

Open Caveats

The following caveats are unresolved in Cisco IOS Release 12.3(8)XW

- CSCed86177—Tracebacks Found on PDSN While Opening Simple IP Session (Simple IP session)

Cisco routers running Packet Data Serving Node software may show traceback when the compression stack is enabled while opening simple IP sessions.

Workaround: none.

- CSCee13372—IPSec Tunnel Goes Down Before Receiving ACK for Revocation Request (Resource Revocation)

On clearing the IP mobile bindings manually on PDSN, ipsec tunnel goes down before waiting for the acknowledgement for the Resource Revocation from HA

This condition is observed under the following conditions

- a. Clear the ip mobile bindings manually on PDSN,
- b. PDSN sends Resource revocation message to HA.
- c. IPSec tunnel goes down before ACK from HA.

Workaround: none.

3. CSCed86144—Tracebacks Found in Clustering (Clustering)

A Cisco router running Packet Data Serving Node (PDSN) software in cluster controller member environment may show tracebacks on backup controller.

This occurs under the rare condition when controllers are present in a redundancy environment with a active and standby controller, and simple IP sessions are opened. Tracebacks may appear on the backup controller after sessions are opened.

Workaround: none.

- CSCed86177—Tracebacks Found on PDSN (ip_feature_fastswitch) (Clustering)

A Cisco router running 12.3T R2.0 Release PDSN software sometimes produces tracebacks while sending bidirectional traffic from mobile node to reflector in SIP flow with compress stack enabled and CEF switched

The condition occurs when sending bidirectional traffic from mobile node to reflector in SIP flow with compress stack enabled, and CEF switched tracebacks can be seen on PDSN console.

Workaround: none.

- CSCin78876—MIP CPS Low With Mobile IP Global Configuration

A Cisco router running PDSN 2.0 Release software (Cisco IOS 12.3T) has a lower CPS rate for Mobile IP calls

Symptom: The number of MIP calls that can be established per second is below 30.

Workaround: none.

Related Documentation

Except for feature modules, documentation is available as printed manuals or electronic documents. Feature modules are available online on CCO and the Documentation CD-ROM.

Use these release notes with these documents:

- [Release-Specific Documents, page 8](#)
- [Platform-Specific Documents, page 9](#)
- [Feature Modules, page 9](#)
- [Cisco IOS Software Documentation Set, page 9](#)

Release-Specific Documents

The following documents are specific to Cisco IOS Release 12.2(8)ZB:

- *Packet Data Serving Node (PDSN) Release 2.0* at the following url:
<http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123newft/123limit/123x/123xw/123xw8/pdsn20/index.htm>

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

- *Cross-Platform Release Notes for Cisco IOS Release 12.2*

On CCO at:

Technical Documents: Cisco IOS Software Configuration: Cisco IOS Release 12.3: Release Notes: Cross-Platform Release Notes

- *Caveats for Cisco IOS Release 12.3 T*

See *Caveats for Cisco IOS Release 12.3T*, which contain caveats applicable to all platforms for all maintenance releases of Release 12.3.

On CCO at:

Technical Documents: Cisco IOS Software Configuration: Cisco IOS Release 12.3: Caveats



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

- Product bulletins, field notices, and other release-specific documents on CCO at:

Technical Documents

Platform-Specific Documents

Documentation specific to the Cisco 7206 Router is located at the following locations:

- On CCO at: <http://www.cisco.com/univercd/cc/td/doc/product/core/7200vx/index.htm>

Documentation specific to the Cisco 7600 Router is located at the following location:

- On CCO at: <http://www.cisco.com/univercd/cc/td/doc/product/core/cis7600/index.htm>

Documentation specific to the Cisco Catalyst 6500 Switch is located at the following location:

- <http://www.cisco.com/univercd/cc/td/doc/product/lan/cat6000/index.htm>

Feature Modules

Feature modules describe new features supported by Release 12.3 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 at:

Technical Documents: Cisco IOS Software Configuration: Cisco IOS Release 12.3: New Feature Documentation

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 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 at:

Technical Documents: Cisco IOS Software Configuration: Cisco IOS Release 12.2: Configuration Guides and Command References

Release 12.3 Documentation Set

Table 3 describes the contents of the Cisco IOS Release 12.3 software documentation set, which is available in electronic form and in printed form when 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.

On CCO at:

Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.3

Table 3 Cisco IOS Software Release 12.3 Documentation Set

Books	Major Topics
<ul style="list-style-type: none"> <i>Cisco IOS Configuration Fundamentals Configuration Guide</i> <i>Cisco IOS Configuration Fundamentals Command Reference</i> 	<ul style="list-style-type: none"> Cisco IOS User Interfaces Cisco IOS File Management Cisco IOS 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> 	<ul style="list-style-type: none"> Using Cisco IOS Software Overview of SNA Internetworking Bridging IBM Networking
<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> 	<ul style="list-style-type: none"> 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 Large-Scale Dial Solutions Cost-Control Solutions Virtual Private Networks X.25 on ISDN Solutions Telco Solutions Dial-Related Addressing Services Interworking Dial Access Scenarios
<ul style="list-style-type: none"> <i>Cisco IOS Interface Configuration Guide</i> <i>Cisco IOS Interface Command Reference</i> 	<ul style="list-style-type: none"> Interface Configuration Overview Configuring LAN Interfaces Configuring Serial Interfaces Configuring Logical Interfaces

Table 3 Cisco IOS Software Release 12.3 Documentation Set (continued)

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

Table 3 Cisco IOS Software Release 12.3 Documentation Set (continued)

Books	Major 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 Networking Overview Configuring ATM Configuring Frame Relay Configuring Frame Relay-ATM Interworking Configuring SMDS Configuring X.25 and LAPB
<ul style="list-style-type: none"> <i>New Features in 12.3-Based Limited Lifetime Releases</i> <i>New Features in Release 12.3 T</i> Release Notes (Release note and caveat documentation for 12.3-based releases and various platforms) <i>Cisco IOS Debug Command Reference</i> <i>Cisco IOS Dial Services Quick Configuration Guide</i> 	



Note

Cisco Management Information Base (MIB) User Quick Reference is no longer published. If you have an account with CCO, you can find the current list of MIBs supported by Cisco. To reach the *Cisco Network Management Toolkit*, go to CCO, press **Login: Technical Support: Software Center: Network Mgmt Software: Cisco Network Management Toolkit: Cisco MIBs**.

Obtaining Documentation

World Wide Web

You can access the most current Cisco documentation on the World Wide Web (WWW) at <http://www.cisco.com>, <http://www-china.cisco.com>, or <http://www-europe.cisco.com>.

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

Cisco Connection Online

CCO 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 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 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 <http://www.cisco.com/public/support/tac>.

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

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>.

Software Configuration Tips on the Cisco 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: **Technical Assistance Center: 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 Cisco IOS software features and services.
- **Sample Configurations**—Provides actual configuration examples that are complete with topology and annotations.

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.

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