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Release Notes for Cisco 6400 Node Route Processor (NRP) for Cisco IOS Release 11.3(9)DB3

February 18, 2002

These release notes for the Cisco 6400 node route processor (NRP) support Cisco IOS Release 11.3DB, up to and including Release 11.3(9)DB3. These release notes are updated as needed to describe new features, memory requirements, hardware support, software platform deferrals, and changes to the microcode or modem code and related documents.

For a list of the software caveats that apply to Release 11.3(9)DB3, see the “Caveats” section on page 5 and *Caveats for Cisco IOS Release 11.3 T*. The caveats document is updated for every maintenance release and is located on Cisco Connection Online (CCO) and the Documentation CD-ROM.

Use these release notes with *Cross-Platform Release Notes for Cisco IOS Release 11.3* located on CCO and the Documentation CD-ROM.

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Introduction

The Cisco 6400 universal access concentrator (UAC) is a broadband concentrator that supports Cisco Systems' end-to-end ATM transmission services, PPP termination services, and tunneling services. The NRP is the routing processor for the Cisco 6400 UAC. It receives traffic from interfaces connected to one or more node switch processor (NSP) switch ports, reassembles the ATM cells into packets, routes packets, segments routed packets, and sends them back to the ATM switch for output to the network.

For information on new features and Cisco IOS commands supported by Release 11.3 T, see the "New and Changed Information" section on page 4 and "Related Documentation" section on page 8.

System Requirements

This section describes the system requirements for Release 11.3:

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Memory Requirements

Table 1 describes the memory requirements for the Cisco 6400 NRP.

Table 1 Cisco 6400 NRP Memory Requirements

Platforms	Software Image	Flash Memory Required	DRAM Memory Required	Runs from
Cisco 6400 NRP	c6400-p5-mz	8 MB Flash	64 MB DRAM	RAM

When used in a redundant configuration, the primary and backup NRPs should have identical hardware configurations, including DRAM size and Flash memory size. To learn about redundancy in the Cisco 6400, see "Configuring Redundancy and SONET APS" in the *Cisco 6400 UAC Software Configuration Guide*.

Hardware Supported

Cisco IOS Release 11.3(9)DB3 supports the Cisco 6400 NRP.



Caution NRPs with a part number of 800-03655-04 or higher will only work with Cisco IOS Release 11.3(8)DB1 or newer. To upgrade to a new software release, see the "Cisco Connection Online" section on page 14.

The following interfaces are supported by the Cisco 6400 NRP:

- Single-port ATM SAR connecting internally to the Cisco 6400 ATM switch fabric.
- Ethernet device management (not a data port).
- Fast Ethernet.

Software Compatibility

A Cisco 6400 NRP with Release 11.3(9)DB3 software requires the use of Cisco IOS Release 12.0(4)DB for the Cisco 6400 node switch processor (NSP). For information about Release 12.0(4)DB for the NSP, see *Release Notes for Cisco 6400 Node Switch Processor (NSP) for Cisco IOS Release 12.0(4)DB*.

Determining the Version of Your Software Release

To determine the version of Cisco IOS software currently running on the Cisco 6400 NRP, log on to the NRP and enter the **show version EXEC** command. The following is sample output from the **show version** command performed on the Cisco 6400. The version number is indicated on the second line as shown below:

```
Cisco Internetwork Operating System Software
IOS (tm) 6400 Software (c6400-p5-mz), Version 11.3(9)DB3.....
```

The output includes additional information including processor revision numbers, memory amounts, hardware IDs, and partition information.

Upgrading to a New Software Release

For information about upgrading to a new software release, see the *Cisco IOS Software Release 11.3 Upgrade Paths and Packaging Simplification* product bulletin located on CCO at:

Service & Support: Product Bulletins: Software

Under **Cisco IOS 11.3**, click **Cisco IOS Software Release 11.3 Upgrade Paths (#703: 12/97)**

This product bulletin does not contain information specific to Cisco IOS Release 11.3 but provides generic upgrade information that may apply to Cisco IOS Release 11.3.

Feature Set Table

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. The following section lists the feature set matrix and the features supported by each feature set. The Cisco 6400 NRP can only use a single image called c6400-p5-mz. Table 2 lists the features supported by the Cisco 6400 NRP image.

Note This feature set table contains only a selected list of features. This table is not a cumulative or complete list of all the features in this image.

Table 2 Feature List for the Cisco 6400 Node Route Processor

Layer 2 and Layer 3 Protocols

ARP

L2F

IPCP

IP forwarding

IP host

IP multicast

PPP/ATM

TCP

Telnet

TFTP

Transparent bridging

UDP

VLAN

Layer 3 Routing Protocols

EIGRP

IS-IS

OSPF

PIM

RIP

Network Management, Security

AAA

CHAP

FTP

RADIUS

SNMP

TACACS

LAN Interfaces

ATM

Ethernet (10BaseT)

Fast Ethernet (100BaseTX)

New and Changed Information

The following sections list the new features supported by the Cisco 6400 NRP for Release 11.3.

New Hardware and Software Features in Release 11.3(9)DB3

No new hardware and software features are support by the Cisco 6400 NRP for Release 11.3(9)DB3.

New Software Features in Release 11.3(9)DB2

The following new software features are supported by the Cisco 6400 NRP for Release 11.3(9)DB2.

RADIUS VC Logging

The RADIUS VC Logging feature is used by the Cisco 6400 Universal Access Concentrator to accurately record the VPI/VCI of an incoming subscriber session. This information is logged in the RADIUS accounting record created at session start-up.

Layer 2 Forwarding

The Cisco 6400 supports the Layer 2 Forwarding (L2F) protocol with up to 1000 concurrent PPP sessions, divided over a maximum of 25 tunnels, at any given time. The Cisco 6400 also supports concurrent use of the L2F and PPP over ATM protocols. The total number of PPP sessions (PPP over ATM and PPP over L2F) should not exceed 2000 at any given time.

Note Layer 2 Tunnel Protocol (L2TP) is not supported in this release.

No New Features in Release 11.3(8)DB1

There are no new features supported by the Cisco 6400 NRP in Cisco IOS Release 11.3(8)DB1.

No New Features in Release 11.3(7)DB

There are no new features supported by the Cisco 6400 NRP in Cisco IOS Release 11.3(7)DB.

No New Features in Release 11.3(5)DB1

There are no new features supported by the Cisco 6400 NRP in Cisco IOS Release 11.3(5)DB1.

Caveats

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

This section contains open and resolved caveats only for the current Cisco IOS maintenance release.

All caveats in Release 11.3 and Release 11.3 T are also in Release 11.3(9)DB3.

For information on caveats in Cisco IOS Release 11.3, see “Important Notes and Caveats for Release 11.3” in *Release Notes for Cisco IOS Release 11.3* on CCO and the Documentation CD-ROM. These release notes list severity 1 and 2 caveats affecting all maintenance releases.

For information on caveats in Cisco IOS Release 11.3 T, see *Caveats for Cisco IOS Release 11.3 T* on CCO and the Documentation CD-ROM.

Open Caveats—Cisco IOS Release 11.3(9)DB3

There are no open caveats specific to Cisco IOS Release 11.3(9)DB3 that require documentation in the release notes.

Resolved Caveats—Release 11.3(9)DB3

All the caveats listed in this section are resolved in Cisco IOS Release 11.3(9)DB3. This section describes only severity 1 and 2 caveats and select severity 3 caveats.

- 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>

Open Caveats—Release 11.3(9)DB2

This section describes possibly unexpected behavior by Release 11.3(9)DB2. This section describes severity 1, 2, and selected severity 3 caveats.

- CSCdm47900

Occasionally PPP PVCs do not come up at the PPP client router. To workaround this issue, delete the offending PVC and reconfigure the PVC at the PPP client router.

- CSCdm52121

PPP sessions may drop in small numbers, renegotiate and come back up. As a workaround, use the **no ilmi-enable** command to disable ILMI on the NRP.

- CSCdm92015

NRP crashes when acting as a NAS during port flapping w/traffic. This may have impact on customers configuring NRP as NAS which is relatively common. The crash is intermittent and only occurs under constant heavy traffic. To reduce the number of sessions and off traffic load may help if feasible.

- CSCdm92537

A few sessions may drop when acting as a NAS with constant heavy traffic. The impact is minimal. To help the situation, one can reduce the number of sessions and off some load if feasible.

- CSCdp13427

When multilink PPP support is configured and multilink PPP sessions are actually terminated on NRP home gateway, virtual access interface may fail to function due to an incorrectly incremented input queue size. So even for non-multilink PPP session, as long as the same access interface is used, "L2X: Coalesce failed..." error may occur.

To work around the problem, turn off multilink PPP support on NRP and reboot.

- CSCdp18572

An NRP that is terminating a large number of RFC1483 PVCs (more than 1000) may experience high CPU utilization in the HyBridge input process

- CSCdp25103

When configuring a large number of PPP over ATM VCs on a single subinterface using VC classes, some of the VCs may end up with a virtual-access interface number of 0. To workaround this issue, delete and reconfigure the VC.

The following issues only affect NRPs that are configured as an L2F home gateway (HGW):

- CSCdm91385
NRP crashes when NSP switches over and NRP is configured as L2F home gateway.
- CSCdp00427
NRP crashes when running NRP as L2F home gateway with a large number of tunnel sessions and constant interface flapping.
- CSCdp17373
NOIDB error occurs and then NRP crashes when running NRP as L2F home gateway with a large number of tunnel sessions and constant interface flapping.
- CSCdp18191
Malloc failure occurs when running NRP as L2F home gateway with a large number of tunnel sessions and constant interface flapping.
- CSCdp20520
An NRP configured as an L2F home gateway may crash if one uses the **show processes cpu** command continuously (4 or 5 times) when CPU utilization is 100%.

Resolved Caveats—Release 11.3(9)DB2

All the caveats in this section are resolved in Release 11.3(9)DB2. This section describes severity 1, 2, and selected severity 3 caveats.

- CSCdk67566
You may see a crash due to a bus error in the ATM fastsend routing when sending data from an L2F tunnel with one session. A fix is available in the next maintenance release.
- CSCdm39077
When changing traffic shaping parameter in presence of traffic going through, NRP may have a software crash. There is already a fix, but not in 11.3(9)DB2. One may choose to shutdown the interface during configuration update as a workaround.
- CSCdm53112
By turning on fast switching on an ATM subinterface doing rfc1483 routing, IP connectivity is lost.
- CSCdm94174
If a PVC/VCI is added to a subinterface, and then the identifier is added the router may reload with memory corruption after exiting configuration mode. To avoid this reload, please remove the PVC first, before reconfiguring it with the identifier.
- CSCdm94242
If you configure ATM vc-per-vp to 2048 the range of VPIs you are allowed is 127. To be able to configure VPIs up to 255, you need to configure ATM vc-per-vp to 1024.

Related Documentation

The following sections describe the documentation available for the Cisco 6400. 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:

- Release-Specific Documents, page 8
- Platform-Specific Documents, page 9
- Feature Modules, page 10
- Cisco IOS Software Documentation Set, page 11

Release-Specific Documents

The following documents are specific to Release 11.3. They are located on CCO and the Documentation CD-ROM:

- *Release Notes for Cisco IOS Release 11.3*

You can reach *Release Notes for Cisco IOS Release 11.3* on CCO at:

Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Release Notes for Cisco IOS Release 11.3

You can reach *Release Notes for Cisco IOS Release 11.3* on the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Release Notes for Cisco IOS Release 11.3

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

To reach these documents from the CCO home page, click on this path:

Service & Support: Technical Documents

- *Caveats for Cisco IOS Release 11.3 T*

As a supplement to the caveats listed in “Caveats” in these release notes, see *Caveats for Cisco IOS Release 11.3 T*, which contains caveats applicable to all platforms for all maintenance releases of Release 11.3 T.

You can reach the caveats document on CCO at:

Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Product-Specific Release Notes for Cisco IOS Release 11.3: Caveats for Cisco IOS Release 11.3 T

You can reach the caveats document on the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Product-Specific Release Notes for Cisco IOS Release 11.3: Caveats for Cisco IOS Release 11.3 T

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: **Service & Support: Online Technical Support: Software Bug Toolkit**. You can also find Bug Navigator II at <http://www.cisco.com/support/bugtools>.

Platform-Specific Documents

The documents listed in Table 3 are available for the Cisco 6400 UAC. These documents are also available online at Cisco Connection Online (CCO) and on the Documentation CD-ROM.

To access Cisco 6400 documentation on CCO, follow this path:

Service and Support: Technical Documents: Documentation Home Page: DSL Products: Cisco 6400

To access Cisco 6400 documentation on the Documentation CD-ROM, follow this path:

DSL Products: Cisco 6400

Table 3 Platform Documents for the Cisco 6400 Universal Access Concentrator

Book	Chapter Topics
<i>Cisco 6400 UAC Hardware Installation Guide</i>	<ul style="list-style-type: none"> About This Manual Hardware Description Preparing for Installation Installing the Cisco 6400 Troubleshooting Maintaining the Cisco 6400 System Specifications Glossary Configuration Worksheets Installing the AC-Input Power Shelf and Power Supply
<i>Cisco 6400 UAC Command Reference Guide</i>	This guide describes all of the commands specific to the Cisco 6400, organized in alphabetic order.
<i>Cisco 6400 UAC Site Planning Guide</i>	<ul style="list-style-type: none"> About This Guide Cisco 6400 Overview Site Planning Considerations System Specifications Cabling Specifications Glossary
<i>Regulatory Compliance and Safety Information for the Cisco 6400</i>	<ul style="list-style-type: none"> Overview of the Cisco 6400 Universal Access Concentrator General Documentation Information Agency Approvals Translated Safety Warnings Cisco Connection Online

Table 3 Platform Documents for the Cisco 6400 Universal Access Concentrator

Book	Chapter Topics
<i>Cisco 6400 UAC Software Configuration Guide</i>	About This Manual Understanding the Command Line Interface for the Cisco 6400 UAC Configuring Terminal Lines and Modem Support Using the Cisco 6400 Web Console Application for System Configuration Initially Configuring the Cisco 6400 Configuring Redundancy and SONET APS Configuring Interfaces Configuring the NRP Configuring Virtual Connections Configuring System Management Functions Configuring Operation, Administration, and Maintenance Configuring Resource Management Configuring ILMI Configuring ATM Routing and PNNI Using Access Control Configuring IP-Over-ATM and LAN Emulation Configuring ATM Accounting and ATM RMON Configuring Tag Switching Configuring Signaling Features Configuring Special Features PNNI Migration Examples Cisco 6400 MIB Information Resolving Error Messages Glossary
<i>Cisco 6400 FRU Installation and Replacement</i>	Tools and Equipment Required General Safety Precautions and Maintenance Guidelines Replacing the Front Cover Powering Down the System Backing Up the PCMCIA Card Maintaining the Air Filter Replacing an NSP Module Replacing an NRP Module Installing or Replacing a Half-Height NLC Replacing a PEM Replacing the Blower Module and Fans Verifying Plug-In Module and Component Installation

Feature Modules

Feature modules describe new features supported by Release 11.3 DB. Feature modules are available online only. In the next printing of the Cisco IOS documentation set, feature modules will be included as updates to the Cisco IOS Documentation set. Each feature module consists of a brief overview of the feature, benefits, configuration tasks, and a command reference.

- To reach the feature modules on the CCO home page, click on this path:
Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Cisco IOS 11.3 DB New Features
- To reach the feature modules on the Documentation CD-ROM, click on this path:
Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Cisco IOS 11.3 DB New Features

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. These documents 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, and Cisco IOS software functionality and contain comprehensive configuration examples. Chapters in a command reference provide complete command syntax information. Each configuration guide can be used in conjunction with its corresponding command reference.

On CCO and the Documentation CD-ROM, two master hot-linked index provide information for the Cisco IOS software documentation set: configuration guides and command references.

You can reach these documents on the CCO at:

Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Cisco IOS 11.3 Configuration Guides, Command References: Configuration Guide Master Index or Command Reference Master Index

You can reach these documents on the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.3: Cisco IOS 11.3 Configuration Guides, Command References: Configuration Guide Master Index or Command Reference Master Index

Release 11.3 Documentation Set

Table 4 details the contents of the Cisco IOS Release 11.3 software documentation set. The document set is available in electronic form, and also in printed form upon request.

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 paper documents were printed.

You can reach the Cisco IOS documentation set from CCO at:

Service & Support: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 11.3

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

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 11.3

Table 4 Cisco IOS Software Release 11.3 Documentation Set

Books	Chapter Topics
• <i>Configuration Fundamentals Configuration Guide</i>	Configuration Fundamentals Overview
• <i>Configuration Fundamentals Command Reference</i>	Cisco IOS User Interfaces
	File Management
	System Management

Related Documentation

Table 4 Cisco IOS Software Release 11.3 Documentation Set (continued)

Books	Chapter Topics
<ul style="list-style-type: none">• <i>Network Protocols Configuration Guide, Part 1</i>• <i>Network Protocols Command Reference, Part 1</i>	IP Addressing IP Services IP Routing Protocols
<ul style="list-style-type: none">• <i>Network Protocols Configuration Guide, Part 2</i>• <i>Network Protocols Command Reference, Part 2</i>	AppleTalk Novell IPX
<ul style="list-style-type: none">• <i>Network Protocols Configuration Guide, Part 3</i>• <i>Network Protocols Command Reference, Part 3</i>	Apollo Domain Banyan VINES DECnet ISO CLNS XNS
<ul style="list-style-type: none">• <i>Wide-Area Networking Configuration Guide</i>• <i>Wide-Area Networking Command Reference</i>	ATM Frame Relay SMDS X.25 and LAPB
<ul style="list-style-type: none">• <i>Security Configuration Guide</i>• <i>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 Interface Configuration Guide</i>• <i>Cisco IOS Interface Configuration Guide</i>	Interface Configurations
<ul style="list-style-type: none">• <i>Dial Solutions Configuration Guide</i>• <i>Dial Solutions Command Reference</i>	Dial-In Port Setup Dial-In Terminal Services Dial-on-Demand Routing (DDR) Dial Backup Dial-Out Modem Pooling Large-Scale Dial Solutions Cost-Control Solutions ISDN X.25 over ISDN VPDN Dial Business Solutions and Examples
<ul style="list-style-type: none">• <i>Cisco IOS Switching Services Configuration Guide</i>• <i>Cisco IOS Switching Services Command Reference</i>	Switching Paths for IP Networks Virtual LAN (VLAN) Switching and Routing

Table 4 Cisco IOS Software Release 11.3 Documentation Set (continued)

Books	Chapter Topics
<ul style="list-style-type: none"> • <i>Bridging and IBM Networking Configuration Guide</i> • <i>Bridging and IBM Networking Command Reference</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
<ul style="list-style-type: none"> • <i>Voice, Video, and Home Applications Configuration Guide</i> • <i>Voice, Video, and Home Applications Command Reference</i> 	Voice over IP Voice over Frame Relay Voice over ATM Voice over HDLC Video Support Universal Broadband Features
<ul style="list-style-type: none"> • <i>Quality of Service Solutions Configuration Guide</i> • <i>Quality of Service Solutions Command Reference</i> 	Classification Scheduling Packet Drop Traffic Shaping ATM QoS SNA QoS Line Protocols
<ul style="list-style-type: none"> • <i>Configuration Guide Master Index</i> • <i>Command Reference Master Index</i> 	
<ul style="list-style-type: none"> • <i>Cisco IOS Software Command Summary</i> • <i>Cisco IOS System Error Messages</i> • <i>Debug Command Reference</i> • <i>Dial Solutions Quick Configuration Guide</i> 	

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

Service and Support

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

For service and support for a product purchased from a reseller, contact the reseller. Resellers offer a wide variety of Cisco service and support programs, which are described in the section “Service and Support” in the information packet shipped with your product.

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

Software Configuration Tips on the Cisco TAC Home Page

The following URL contains links to access helpful tips on configuring your Cisco products:

http://www.cisco.com/public/serv_tips.shtml

This URL is subject to change without notice. If it changes, point your web browser to <http://www.cisco.com/>, and follow this path: Software & Support, Technical Support, Technical Tips.

The following sections are provided from the Technical Tips page:

- Access Dial Cookbook—Contains common configurations or recipes to configure various access routers and dial technologies.
- Field Notices—Designed to provide notification of any critical issues regarding Cisco products. These include problem descriptions, safety or security issues, and hardware defects.
- FAQs—Collection of the most frequently asked questions about Cisco hardware and software.
- Hot Tips—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 access FAX-on-demand and receive documents at your FAX machine from the USA, call 888-50-CISCO (888-502-4726). From other areas, call 415-596-4408.
- Hardware—Technical Tips related to specific hardware platforms.
- Internetworking Features—Tips on using and deploying Cisco IOS software features and services.
- Sample Configurations—Actual configuration examples complete with topology and annotations.
- Software Products—MultiNet & Cisco Suite 100, Network Management, Cisco IOS Software Bulletins, and CiscoPro Configurations.
- Special Collections—Other Helpful Documents, Frequently Asked Questions, Security Advisories, References & RFCs, Case Studies, and the CiscoPro Documentation CD-ROM.

Cisco Connection Online

Cisco Connection Online (CCO) is Cisco Systems' primary, real-time support channel. Maintenance customers and partners can self-register on CCO to obtain additional information and services.

Available 24 hours a day, 7 days a week, CCO provides a wealth of standard and value-added services to Cisco's customers and business partners. CCO services include product information, product documentation, software updates, release notes, technical tips, the Bug Navigator, configuration notes, brochures, descriptions of service offerings, and download access to public and authorized files.

CCO serves a wide variety of users through two interfaces that are updated and enhanced simultaneously: a character-based version and a multimedia version that resides on the World Wide Web (WWW). The character-based CCO supports Zmodem, Kermit, Xmodem, FTP, and Internet

e-mail, and it is excellent for quick access to information over lower bandwidths. The WWW version of CCO provides richly formatted documents with photographs, figures, graphics, and video, as well as hyperlinks to related information.

You can access CCO in the following ways:

- WWW: <http://www.cisco.com>
- WWW: <http://www-europe.cisco.com>
- WWW: <http://www-china.cisco.com>
- Telnet: cco.cisco.com
- Modem: From North America, 408 526-8070; from Europe, 33 1 64 46 40 82. Use the following terminal settings: VT100 emulation; databits: 8; parity: none; stop bits: 1; and connection rates up to 28.8 kbps.

For a copy of CCO's Frequently Asked Questions (FAQ), contact cco-help@cisco.com. For additional information, contact cco-team@cisco.com.

Note If you are a network administrator and need personal technical assistance with a Cisco product that is under warranty or covered by a maintenance contract, contact the Cisco Technical Assistance Center (TAC) at 800 553-2447, 408 526-7209, or tac@cisco.com. To obtain general information about Cisco Systems, Cisco products, or upgrades, contact 800 553-6387, 408 526-7208, or cs-rep@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, a member of the Cisco Connection Family, is updated monthly. Therefore, it might be more current than printed documentation. To order additional copies of the Documentation CD-ROM, contact your local sales representative or call customer service. The CD-ROM package is available as a single package or as an annual subscription. You can also access Cisco documentation on the World Wide Web at <http://www.cisco.com>, <http://www-china.cisco.com>, or <http://www-europe.cisco.com>.

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

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