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# Release Notes for Cisco 6400 NRP for Cisco IOS Release 12.0(3)DC

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**February 16, 2002**

These release notes describe new features and caveats for the Cisco 6400 universal access concentrator (UAC) node route processor (NRP) supported in Cisco IOS Release 12.0(3)DC1.

Use these release notes in conjunction with the cross-platform *Release Notes for Cisco IOS Release 12.0* located on Cisco Connection Online (CCO) and the Documentation CD-ROM.

For a list of software caveats that apply to this release, refer to the “Caveats” section later in this document.

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- Cisco Connection Online, page 14
- Documentation CD-ROM, page 14

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### Corporate Headquarters

Cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, CA 95134-1706  
USA

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## Introduction

The Cisco 6400 UAC is a broadband concentrator that supports Cisco Systems' end-to-end Asynchronous Transfer Mode (ATM) transmission services and Point-to-Point Protocol (PPP) termination 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.

Detailed software configuration information on the new features and Cisco IOS commands supported by Release 12.0(3)DC1 are available on the Documentation CD-ROM and on the World Wide Web at <http://www.cisco.com>. For more information, refer to the "Related Documentation" section on page 7.

These release notes do not describe features that are available in IOS Release 12.0. For more information about features in IOS Release 12.0, refer to *Release Notes for Cisco IOS Release 12.0*.

## System Requirements

This section describes the system requirements for the Cisco 6400 UAC NRP and includes the following sections:

- Memory Requirements, page 2
- Hardware Supported, page 2
- Feature Set Tables, page 3
- Determining Your Software Release, page 3

## Memory Requirements

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

**Table 1 Cisco 6400 NRP Memory Requirements**

Platforms	Image Name	Minimum Required Flash Disk	Required Main Memory	Runs from
Cisco 6400 NRP	c6400r-g4p5-mz	8 MB Flash	64 MB DRAM	RAM
Cisco 6400 NRP with Web-based service selection	c6400r-g4p5-mz	16 MB Flash	64 MB DRAM	RAM

## Hardware Supported

Cisco IOS Release 12.0(3)DC1 supports the Cisco 6400 NRP. The following interfaces are supported by the Cisco 6400 NRP:

- Single-port ATM segmentation and reassembly (SAR) connected internally to the Cisco 6400 ATM switch fabric
- Ethernet for device management (not a data port)
- Fast Ethernet

## Software Compatibility

The Cisco 6400 NRP for Cisco IOS Release 12.0(3)DC1 works with the Cisco Service Selection Dashboard, version 2.1.

## Determining Your Software Release

To determine the version of Cisco IOS software currently running on your router, log on to the Cisco 6400 NRP and enter the **show version EXEC** command:

```
router> show version
```

An output appears similar to the following. The Cisco IOS version appears in the second line.

```
Cisco Internetwork Operating System Software
IOS (tm) 6400 Software (c6400r-g4p5-mz), Version 12.0(3)DC.....
```

The output includes additional information including processor revision numbers, memory amounts, hardware IDs, and partition information. To upgrade to a new software release, see the “Cisco Connection Online” section.

## Feature Set Tables

The Cisco IOS software is packaged in feature sets (also called 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 c6400r-g4p5-mz. Table 2 lists features supported by the Cisco 6400 NRP image.

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**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.

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**Table 2 Feature List for the Cisco 6400 NRP**

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**Layer 2 and Layer 3 Protocols**

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ARP

---

IPCP

---

IP forwarding

---

IP host

---

IP multicast

---

PPP/ATM

---

TCP

---

Telnet

---

TFTP

---

UDP

---

Transparent bridging

---

VLAN

---

**Table 2 Feature List for the Cisco 6400 NRP (continued)**

**Layer 3 Routing Protocols**

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EIGRP

---

IS-IS

---

OSPF

---

PIM

---

RIP

**Network Management, Security**

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AAA

---

CHAP

---

FTP

---

PAP

---

RADIUS

---

SNMP

---

TACACS

**LAN Interfaces**

---

ATM

---

Ethernet (10BaseT)

---

Fast Ethernet (100BaseTX)

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## New and Changed Information

The following sections list the new features supported by the Cisco 6400 NRP in Cisco IOS Release 12.0(3)DC1.

### New Hardware and Software Features in Release 12.0(3)DC1

No new hardware or software features are supported in Cisco IOS Release 12.0(3)DC1.

### New Features in Release 12.0(3)DC

#### Point-to-Point Protocol over Ethernet

The Cisco 6400 NRP now supports Point-to-Point Protocol over Ethernet (PPPoE), which allows you to configure PPP over Ethernet on ATM using a virtual circuit (VC) multiplexed encapsulation mode. Using a PPPoE client, a PPP session can be initiated on a simple bridged Ethernet connected client through a standard Digital Subscriber Line (DSL) modem. The session is transported over the ATM DSL link via RFC 1483 Ethernet bridged frames and terminated in the Cisco 6400 NRP. The Cisco 6400 NRP does not support PPPoE on the Fast Ethernet port.

## Node Route Processor-Service Selection Gateway

The Node Route Processor-Service Selection Gateway (NRP-SSG) is a switching solution for service providers who offer intranet, extranet and Internet connections to subscribers using high-speed data circuit equipment (DCE) such as Asymmetric Digital Subscriber Line (ADSL) equipment to allow simultaneous access to network services. The NRP-SSG allows the Cisco 6400 to act as a central control point for Layer 2 and Layer 3 services. This can include services available through ATM VCs, virtual private dial-up networks (VPDNs) or normal routing methods. The NRP-SSG feature is designed to work with the Cisco Service Selection Dashboard version 2.1 for Layer 3 services available on CCO.

## Important Notes

Because Cisco Express Forwarding (CEF) is not supported for NRP-SSG traffic, PPPoE subscribers will be processed switched.

Layer 2 Forwarding (L2F) and Layer 2 Tunneling Protocol (L2TP) are not supported in this release.

## Caveats

This section contains open caveats for the current Cisco 6400 NRP release only. Caveats in Cisco IOS Release 12.0 also apply to Release 12.0(3)DC1. For information about caveats in the Cisco IOS Release 12.0, refer to the "Caveats" sections in the *Cross-Platform Release Notes for Cisco IOS Release 12.0* document located on CCO and the Documentation CD-ROM.

## Open Caveats - Release 12.0(3)DC1

There are no open caveats specific to Cisco IOS Release 12.0(3)DC1 that require documentation in the release notes.

## Resolved Caveats - Release 12.0(3)DC1

All the caveats listed in this section are resolved in Release 12.0(3)DC1. This section describes severity 1, 2, and selected 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 12.0(3)DC

This section describes possibly unexpected behavior by Release 12.0(3)DC. This section describes severity 1, 2, and selected severity 3 caveats.

- CSCdm02926

If the provider of a proxy service misconfigures its RADIUS server so that the same IP address is assigned to two subscribers, the NRP-SSG will not detect the misconfiguration. The results will be unpredictable. One possibility is that the last subscriber who receives the IP address will be the only one able to access the service.

- CSCdm36166

Downloading an invalid next hop table (NHT) profile generates an error message indicating that the download failed, even though it may actually have succeeded. If an NHT is not specified correctly in a profile, an error message will indicate the NRP-SSG has failed to download the NHT. A partial NHT may be created in the NRP-SSG system. The NHT can be displayed with the **show ssg next-hop** command. When this happens, the administrator should modify the NHT profile to fix any errors.

- CSCdm17107

User or service filters should not be able to filter traffic to the default network. For PPP subscribers, filters in user or service profiles filter traffic to the default network. Non-PPP subscriber traffic to the default network is not affected by profile filters. To avoid this situation, the administrator should implement profile filters carefully.

- CSCdm34167

Authentication requests should have a unique value for NAS-PORT. The NAS-PORT attribute in an authentication request packet should have a unique value to identify the line where the subscriber is logging in. Currently, it is set to zero. Some service providers may need this value to assign addresses to subscribers or for other purposes. Currently, there is no workaround.

- CSCdm35995

Data debug shows no downstream packet information when sending traffic to the default network. When a subscriber sends traffic to a device in the default network, debug information does not display packet trace messages for the downstream packet.

- CSCdm37765

Transparent passthrough (TPT) filter and NHT download information message should be sent to the logging location. The NRP-SSG notifies the administrator about the status of TPT filters and NHT download. The information messages are not directed to the configured logging location.

- CSCdm25681

Sending 64-byte packets from the NRP to the Cisco 7200 series makes the Cisco 7200 series see CRC errors. If you send 64-byte packets from an NRP to a Cisco 7200 series at 52,000 packets per second, the Cisco 7200 series will print out CRC errors. This problem is still under investigation. One way to workaround the problem is to enable traffic shaping on the NRP.

- CSCdm28269

A high packets per second rate through the NRP causes packet loss and CRC errors. Sending variable length packets (64 - 1518) through the NRP causes CRC errors and a high output drop rate. The traffic is sent from a Cisco 7507 running Pagent Fast Ethernet connected to a Cisco 7200 series. The Cisco 7200 series is connected via an ATM PVC to the NRP. The NRP is then connected to another Cisco 7200 series via an ATM PVC. This Cisco 7200 series is Fast Ethernet connected to a Cisco 7513. Traffic from the NRP to the Cisco 7513 is bridged using IRB. The CRC error is noticed when sending traffic downstream from the Cisco 7507 to the Cisco 7513.

- CSCdm39091

If a PPPoE client is attached to the Fast Ethernet 0/0/0 port on the NRP-SSG, a crash will occur. Since PPPoE clients are not supported on the Ethernet ports, do not attach PPPoE subscribers on these ports.

- CSCdm34187

If a subscriber is attached to the NRP-SSG via PPP over ATM and disconnects, the **show users** command displays the username that was logged in until that Virtual-Access interface is reused.

- CSCdm36015  
If the **show vpdn** command is executed while PPPoE sessions are going up and down, spurious memory access can occur. This only occurs under a high rate of connections. The workaround is to not execute this command while the NRP-SSG has a high rate of connections.
- CSCdm37872  
After establishing 2,000 PPPoE sessions and turning IP CEF off, a CPUHOG message may appear. The workaround for this problem is to not disable CEF while there are active connections.
- CSCdm34130  
PPP over ATM subscribers will be displayed as X.25 when executing the **show user** command from the command-line interface. This is purely cosmetic and does not affect functionality.

## Related Documentation

This section describes the documentation related to the Cisco 6400 UAC NRP, typically including hardware installation guides, software installation guides, Cisco IOS configuration and command references, system error messages, and feature modules that are updates to the Cisco IOS documentation set. Documentation is available as printed manuals or electronic documents, except for the feature modules that are available online only.

You can find the most up-to-date documentation on the Web via Cisco Connection Online (CCO) and the Documentation CD-ROM. These electronic documents might contain updates and modifications made after the hard copy documents were printed.

These release notes should be used with the documents listed in the following sections:

- Platform Documents, page 7
- Feature Modules, page 9
- Cisco IOS Software Document Set, page 9

## Platform 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**

Document Title	Chapter Topics
<i>Cisco 6400 UAC Hardware Installation Guide</i>	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>	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>	Overview of the Cisco 6400 Universal Access Concentrator General Documentation Information Agency Approvals Translated Safety Warnings Cisco Connection Online
<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

**Table 3 Platform Documents for the Cisco 6400 Universal Access Concentrator**

Document Title	Chapter Topics
<i>Cisco 6400 UAC 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 12.0(3)DC1. 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: Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.0: New Feature Documentation: New Features in 12.0-Based Limited Lifetime Releases: New Features in Release 12.0DC: New Features in 12.0(3)DC**

- To reach the feature modules on the Documentation CD-ROM, click on this path:

**Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.0: New Feature Documentation: New Features in 12.0-Based Limited Lifetime Releases: New Features in Release 12.0DC: New Features in 12.0(3)DC**

## Cisco IOS Software Document 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.

To reach these documents on CCO, click on this path:

**Service and Support: Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.0: Configuration Guides and Command References**

To reach these documents on the Documentation CD-ROM, click on this path:

**Cisco IOS Software Configuration: Cisco IOS Release 12.0: Cisco IOS Release 12.0 Configuration Guides and Command References**

To access documentation related to an index entry, click on the page number following the entry.

Release 12.0 Documentation Set

Table 4 details the contents of the Cisco IOS Release 12.0 software documentation set. The document set is available in electronic form, and also in printed form upon request.

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**Note** The most current Cisco IOS documentation can be found on the latest Documentation CD-ROM and on the Web. These electronic documents might contain updates and modifications made after the paper documents were printed.

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To access the Cisco IOS documentation set on CCO, follow this path:

**Service and Support: Technical Documents: Documentation Home Page: Cisco IOS Software Configuration: Cisco IOS Release 12.0**

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

**Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.0**

**Table 4 Cisco IOS Software Release 12.0 Documentation Set**

<b>Books</b>	<b>Chapter Topics</b>
<ul style="list-style-type: none"><li>• <i>Configuration Fundamentals Configuration Guide</i></li><li>• <i>Configuration Fundamentals Command Reference</i></li></ul>	Configuration Fundamentals Overview Cisco IOS User Interfaces File Management System Management
<ul style="list-style-type: none"><li>• <i>Bridging and IBM Networking Configuration Guide</i></li><li>• <i>Bridging and IBM Networking Command Reference</i></li></ul>	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 4 Cisco IOS Software Release 12.0 Documentation Set (continued)**

<b>Books</b>	<b>Chapter Topics</b>
<ul style="list-style-type: none"> <li>• <i>Dial Solutions Configuration Guide</i></li> <li>• <i>Dial Solutions Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>X.25 over ISDN</li> <li>Appletalk Remote Access</li> <li>Asynchronous Callback, DDR, PPP, SLIP</li> <li>Bandwidth Allocation Control Protocol</li> <li>ISDN Basic Rate Service</li> <li>ISDN Caller ID Callback</li> <li>PPP Callback for DDR</li> <li>Channelized E1 &amp; T1</li> <li>Dial Backup for Dialer Profiles</li> <li>Dial Backup Using Dialer Watch</li> <li>Dial Backup for Serial Lines</li> <li>Peer-to-Peer DDR with Dialer Profiles</li> <li>DialOut</li> <li>Dial-In Terminal Services</li> <li>Dial-on-Demand Routing (DDR)</li> <li>Dial Backup</li> <li>Dial-Out Modem Pooling</li> <li>Large-Scale Dial Solutions</li> <li>Cost-Control Solutions</li> <li>Virtual Private Dialup Networks</li> <li>Dial Business Solutions and Examples</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Interface Configuration Guide</i></li> <li>• <i>Cisco IOS Interface Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>Interface Configuration Overview</li> <li>LAN Interfaces</li> <li>Logical Interfaces</li> <li>Serial Interfaces</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Network Protocols Configuration Guide, Part 1</i></li> <li>• <i>Network Protocols Command Reference, Part 1</i></li> </ul>	<ul style="list-style-type: none"> <li>IP Overview</li> <li>IP Addressing and Services</li> <li>IP Routing Protocols</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Network Protocols Configuration Guide, Part 2</i></li> <li>• <i>Network Protocols Command Reference, Part 2</i></li> </ul>	<ul style="list-style-type: none"> <li>AppleTalk</li> <li>Novell IPX</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Network Protocols Configuration Guide, Part 3</i></li> <li>• <i>Network Protocols Command Reference, Part 3</i></li> </ul>	<ul style="list-style-type: none"> <li>Network Protocols Overview</li> <li>Apollo Domain</li> <li>Banyan VINES</li> <li>DECnet</li> <li>ISO CLNS</li> <li>XNS</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Security Configuration Guide</i></li> <li>• <i>Security Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>AAA Security Services</li> <li>Security Server Protocols</li> <li>Traffic Filtering and Firewalls</li> <li>IP Security and Encryption</li> <li>Passwords and Privileges</li> <li>Neighbor Router Authentication</li> <li>IP Security Options</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Cisco IOS Switching Services Configuration Guide</i></li> <li>• <i>Cisco IOS Switching Services Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>Switching Services</li> <li>Switching Paths for IP Networks</li> <li>Virtual LAN (VLAN) Switching and Routing</li> </ul>
<ul style="list-style-type: none"> <li>• <i>Wide-Area Networking Configuration Guide</i></li> <li>• <i>Wide-Area Networking Command Reference</i></li> </ul>	<ul style="list-style-type: none"> <li>Wide-Area Network Overview</li> <li>ATM</li> <li>Frame Relay</li> <li>SMDS</li> <li>X.25 and LAPB</li> </ul>

**Table 4 Cisco IOS Software Release 12.0 Documentation Set (continued)**

<b>Books</b>	<b>Chapter Topics</b>
<ul style="list-style-type: none"><li>• <i>Voice, Video, and Home Applications Configuration Guide</i></li><li>• <i>Voice, Video, and Home Applications Command Reference</i></li></ul>	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"><li>• <i>Quality of Service Solutions Configuration Guide</i></li><li>• <i>Quality of Service Solutions Command Reference</i></li></ul>	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"><li>• <i>Cisco IOS Software Command Summary</i></li><li>• <i>Dial Solutions Quick Configuration Guide</i></li><li>• <i>System Error Messages</i></li><li>• <i>Debug Command Reference</i></li></ul>	

## Service and Support

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.

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**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.

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

## Software Configuration Tips on the Cisco Technical Assistance Center Home Page

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

[http://www.cisco.com/kobayashi/serv\\_tips.shtml](http://www.cisco.com/kobayashi/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—Designed to provide notification of any critical issues regarding Cisco products. These notices include problem descriptions, safety or security issues, and hardware defects
- Hardware—Technical Tips related to specific hardware platforms
- 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 reach FAX-on-demand and receive documents at your FAX machine from the USA, call 888-50-CISCO (888-502-4726). From other areas, call 650-596-4408.
- Internetworking Features—Tips on using and deploying Cisco IOS software features and services
- Sample Configurations—Actual configuration examples—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, including Case Studies, References & RFCs, and Security Advisories.

## 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](http://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](mailto:cco-help@cisco.com). For additional information, contact [cco-team@cisco.com](mailto:cco-team@cisco.com).

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**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 Cisco's Technical Assistance Center (TAC) at 800 553-2447, 408 526-7209, or [tac@cisco.com](mailto: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](mailto:cs-rep@cisco.com).

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## 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 on page 7.

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