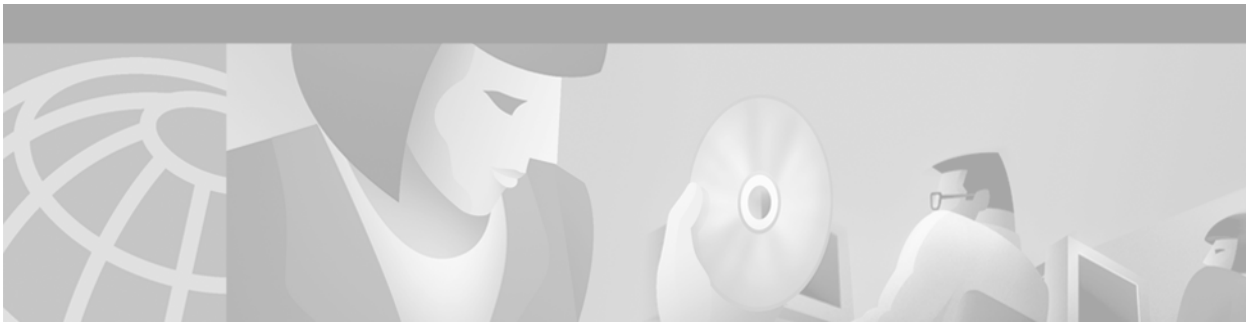

Release Notes for Cisco AS5400 Universal Gateways for Cisco IOS Release 12.2 XA

February 7, 2002

Cisco IOS Release 12.2(2) XA5

78-12755-01 Rev. G0

These release notes for the Cisco AS5400 universal gateways describe the enhancements provided in Cisco IOS Release 12.2(2) XA5. These release notes are updated as needed.

Cisco IOS Release12.2(2) XA5 supports the same feature sets as Cisco IOS Release 12.1(5) XM and Cisco IOS Release 12.1(5) T.

For a list of the software caveats that apply to Cisco IOS Release 12.2(2) XA5, see the "Caveats for Cisco IOS Release 12.2 XA" section on page 14 and *Caveats for Cisco IOS Release 12.1 T*. The caveats document is updated for every maintenance release and is located on Cisco.com and the Documentation CD-ROM.

Use these release notes with *Release Notes for Cisco AS5300 Universal Access Servers for Cisco IOS Release 12.1 T* located on Cisco.com and the Documentation CD-ROM.

Contents

These release notes describe the following topics:

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

Introduction

The Cisco AS5400 Universal Gateway is a two-rack unit, 8, 12, or 16 T1/E1, 1 CT3 gateway that provides universal port data, voice, and fax services on any port at any time. The Cisco AS5400 offers high performance and high reliability in a compact, modular design. This cost-effective platform is intended for Internet service providers (ISPs) and enterprises requiring innovative universal services.

For information on new features and Cisco IOS commands supported by Cisco IOS Release 12.2(2) XA5, see the "New and Changed Information" section on page 5 and the "Related Documentation" section on page 20.

System Requirements

This section describes the system requirements for Cisco IOS Release 12.2(2) XA5:

Memory Recommendations

Table 1 Memory Recommendations for the Cisco AS5400 Universal Gateways

Image Name	Software Image	Recommended Flash Memory	Recommended DRAM Memory	Runs From
IP Plus	c5400-is-mz	32 MB	256 MB	RAM
IP Plus Sec 56	c5400-ik8s-mz	32 MB	256 MB	RAM
Enterprise Plus	c5400-js-mz	32 MB	256 MB	RAM
Enterprise Plus IPSec 56	c5400-jk8s-mz	32 MB	256 MB	RAM

Supported Hardware

Cisco IOS Release 12.2(2) XA5 supports the Cisco AS5400. The supported interfaces and dial feature cards are detailed in Table 2.

For detailed descriptions of the new hardware features, see the "New and Changed Information" section on page 5.

Table 2 Supported Interfaces for the Cisco AS5400

Interfaces and Dial Feature Cards	Product Description
Dial Feature Cards	AS54-DFC-8CT1/CE1 (8PRI CT1/CE1)
	AS54-DFC-CT3
	AS54-DFC-108NP
	AS54-DFC-60NP
LAN Interfaces	Fast Ethernet 10/100BaseT (RJ-45)
Trunk/Backhaul Interface Options	8PRI CT1/CE1 DFC
	CT3 DFC

Determining the Software Version

To determine the version of Cisco IOS software running on your Cisco AS5400, log in to the Cisco AS5400 and enter the **show version** EXEC command:

```
router> show version
Cisco Internetwork Operating System Software
IOS (tm) 12.2 Software (c5400-is-mz), Version 12.2(2) XA5, RELEASE SOFTWARE
```

Upgrading to a New Software Release

For general information about upgrading to a new software release, refer to *Upgrading the Cisco IOS Software Release in Cisco Routers and Modems* located at:

http://www.cisco.com/warp/public/130/upgrade_index.shtml

Feature Set Tables

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

Cisco IOS Release12.2(2) XA5 supports the same feature sets as Cisco IOS Release 12.1(5) XM and Cisco IOS Release 12.1(5) T, but Cisco IOS Release 12.2(2) XA5 can include new features supported by the Cisco AS5400.

Note If you have a Cisco.com login account, you can find image and release information regarding features in Cisco IOS Release 12.1(5) T and earlier by using the Feature Navigator tool at http://www.cisco.com/go/fn.

Caution Cisco IOS images with strong encryption (including, but not limited to, 168-bit Triple DataEncryption Standard [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 because of United States government regulations. When applicable, purchaser and user must obtain local import and use authorizations for all encryption strengths. Please contact your sales representative or distributor for more information, or send an e-mail to export@cisco.com.

Table 3 lists the features and feature sets supported by the Cisco AS5400 in Cisco IOS Release 12.2(2) XA5 and uses the following conventions:

- Yes—The feature is supported in the software image.
- No—The feature is not supported in the software image.
- In—The number in the "In" column indicates the Cisco IOS release in which the feature was introduced.

Table 3 Feature List by Feature Set for the Cisco AS5400

Features	In	Software Images by Feature Set			
		IP Plus	IP Plus IPSec56	Enterprise Plus	Enter prise Plus IPSec 56
Dial					
V.92 Modem on Hold for Cisco AS5350 and Cisco AS5400 Universal Gateways and Cisco AS5800 Universal Access Servers	12.2(2)XA	Yes	Yes	Yes	Yes
V.92 Quick Connect for Cisco AS5350 and Cisco AS5400 Universal Gateways and Cisco AS5800 Universal Access Servers	12.2(2)XA	Yes	Yes	Yes	Yes
V.44 LZJH Compression for Cisco AS5350 and Cisco AS5400 Universal Gateways and Cisco AS5800 Universal Access Servers	12.2(2)XA	Yes	Yes	Yes	Yes
Universal Port Resource Pooling for Voice and Data Services	12.2(2)XA	Yes	Yes	Yes	Yes
Voice					
Cisco SS7 Interconnect for Voice Gateways Solution 1.3	12.2(2)XA	Yes	Yes	Yes	Yes
Cisco Wholesale Voice Solution	12.2(2)XA	Yes	Yes	Yes	Yes
Enhancements to SIP for VoIP on Cisco Access Platforms, see Session Initiation Protocol (SIP) Gateway	12.2(2)XA	Yes	Yes	Yes	Yes
H.323 Scalability and Interoperability Enhancements	12.2(2)XA	Yes	Yes	Yes	Yes
ISDN/SIP/CAS Internetworking	12.2(2)XA	Yes	Yes	Yes	Yes
Session Initiation Protocol (SIP) Gateway	12.2(2)XA	Yes	Yes	Yes	Yes
SIP Gateway Support for Third Party Call Control (CSCdr32290)	12.2(2)XA	Yes	Yes	Yes	Yes
SIP User Agent MIB	12.2(2)XA	Yes	Yes	Yes	Yes

New and Changed Information

The following sections list the new hardware and software features supported by the Cisco AS5400 for Cisco IOS Release 12.2(2) XA5.

New Hardware and Software Features in Cisco IOS Release 12.2(2) XA5

There are no new hardware and software features in the Cisco AS5400 for Cisco IOS Release 12.2(2) XA5.

New Hardware and Software Features in Cisco IOS Release 12.2(2) XA4

There are no new hardware and software features in the Cisco AS5400 for Cisco IOS Release 12.2(2) XA4.

New Hardware and Software Features in Cisco IOS Release 12.2(2) XA3

There are no new hardware and software features in the Cisco AS5400 for Cisco IOS Release 12.2(2) XA3.

New Hardware and Software Features in Cisco IOS Release 12.2(2) XA2

There are no new hardware and software features in the Cisco AS5400 for Cisco IOS Release 12.2(2) XA2.

New Hardware and Software Features in Cisco IOS Release 12.2(2) XA1

There are no new hardware and software features in the Cisco AS5400 for Cisco IOS Release 12.2(2) XA1.

New Hardware Features in Cisco IOS Release 12.2(2) XA

There are no new hardware and software features in the Cisco AS5400 for Cisco IOS Release 12.2(2) XA.

New Software Features in Cisco IOS Release 12.2(2) XA

The following new software features are supported in the Cisco AS5400 for Cisco IOS Release 12.2(2) XA.

Call Admission Control for H.323 VoIP Gateways

Before the call admission control feature, gateways did not have a mechanism to gracefully prevent calls from entering when certain resources were not available to process the call. This causes the new call to fail with unreported behavior, and could potentially cause the calls that are in progress to have quality related problems.

This feature set provides the ability to support resource-based call admission control processes. These resources include system resources such as CPU, memory, and call volume, and interface resources such as call volume.

If system resources are not available to admit the call, two kinds of actions are provided: system denial (which busyouts all of T1 or E1) or per call denial (which disconnects, hairpins, or plays a message or tone). If the interface-based resource is not available to admit the call, the call is dropped from the session protocol (such as H.323).

User Selected Threshold

This feature allows a user to configure call admission thresholds for local resources as well as memory and CPU resources. The list of local resources that are configured for call admission are described in the command description of "call threshold poll-interval".

With the call admission command, a user is allowed to configure two thresholds, high and low, for each resource. Call treatment is triggered when the current value of a resource goes beyond the configured high. The call treatment remains in effect until current resource value falls below the configured low. Having high and low thresholds prevents call admission flapping and provides hysteresis in call admission decision making.

With the **call spike** command, a user is allowed to configure the limit for incoming calls during a specified time period. A call spike is the term for when a large number of incoming calls arrive from the PSTN in a very short period of time (for example:100 incoming calls in 10 milliseconds).

Configurable Call Treatment

With the call treatment command, users are allowed to select how the call should be treated when local resources are not available to handle the call. For example, when the current resource value for any one of the configured triggers for call admission has reached beyond the configured threshold, the call treatment choices are as follows:

- TDM hairpinning — Hairpins the calls through the POTS dial peer.
- Reject — Disconnects the call.
- Play message or tone — Plays a configured message or tone to the user.

Resource Unavailable Signaling

This feature set supports the autobusyout feature where channels are busied out when local resources are not available to handle the call.

Autobusyout is supported on both channel associated signaling (CAS) and Primary Rate Interface (PRI) channels.

- CAS — Uses busyout to signal "local resources are unavailable."
- PRI — Uses either service messages or disconnect with correct cause-code to signal "resources are unavailable."

PSTN Fallback

The goal of PSTN fallback is to monitor congestion in the IP network and either redirect calls to the PSTN or reject calls based on the network congestion. Calls can be re-routed to an alternate IP destination or to the PSTN if the IP network is found unsuitable for voice traffic at that time. The user defines the congestion thresholds based on the configured network. This functionality enables the service provider to give a reasonable guarantee about the quality of the conversation to their VoIP users at the time of call admission.

Note PSTN fallback does not provide assurances that a VoIP call that proceeds over the IP network is protected from the effects of congestion. This is the function of the other Quality of Service (QoS) mechanisms such as IP Real-Time Transport Protocol (RTP) priority or low latency queuing (LLQ).

PSTN fallback includes the following features:

- Offers flexibility to define the congestion thresholds based on the network.
  - Defines a threshold based on Calculated Planning Impairment Factor (ICPIF), which is derived as part of International Telecommunication Union (ITU) G.113.
  - Defines a threshold based solely on packet delay and loss measurements.
- Uses Response Time Reporter (RTR) probes to provide packet delay, jitter, and loss information for the relevant IP addresses. Based on the packet loss, delay, and jitter encountered by these probes, an ICPIF or delay and loss values are calculated.
- Is supported by calls of any codec. Only G.729 and G.711 have accurately simulated probes. Calls of all other codecs are emulated by a G.711 probe.

For further details, please see http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122x/122xa/122xa_2/ft_pfavb.htm.

H.323 Scalability and Interoperability Enhancements

The Cisco H.323 Scalability and Interoperability Enhancements feature upgrades the Cisco H.323 Gatekeeper (GK) and Cisco H.323 Gateway to comply with H.323 Version 3. The enhancements in this release include:

- Support for mandatory H.323 Version 3 elements in the gateway and GK, including:
  - multipleCalls
  - maintainConnection
  - alternateTransportAddresses
  - useSpecifiedTransport
- Support for H.225 call signalling over UDP.
- Address resolution using border elements (BE).
- Support for bandwidth request (BRQ) messages.
- Support for concurrent calls over a single H.225 call signalling channel.

For further details, please see http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122x/122xa/122xa_2/ft323sca.htm.

V.92 Modem on Hold for Cisco AS5350 and Cisco AS5400 Universal Gateways and Cisco AS5800 Universal Access Servers

V.92 Modem on Hold allows a dial-in customer to suspend a modem session to answer an incoming voice call or to place an outgoing call while engaged in a modem session. When the dial-in customer uses Modem on Hold to suspend an active modem session to engage in an incoming voice call, the Internet service provider (ISP) modem listens to the original modem connection and waits for the dial-in customer's modem to resume the connection. When the voice call ends, the modem signals the telephone system to end the second call and return to the original modem connection, then the modem signals the ISP modem that it is ready to resume the modem call. Both modems renegotiate the connection, and the original exchange of data continues.

Note This feature is designed for use on telephone lines that are configured for call-waiting service; call-waiting signals trigger the suspension of the modem session. If call-waiting service is not present on the subscriber's line, other callers receive a busy signal, and the modem session is not interrupted.

For further details, please see http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122x/122xa/122xa_2/ftv92moh.htm.

V.92 Quick Connect for Cisco AS5350 and Cisco AS5400 Universal Gateways and Cisco AS5800 Universal Access Servers

V.92 Quick Connect speeds up the client-to-server startup negotiation, reducing the overall connect time up to 30 percent. The client modem retains line condition information and characteristics of the connection to the Internet service provider (ISP), which reduces connect time by avoiding some of the initial signal handshaking.

For further details, please see http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122x/122xa/122xa_2/ftv92qc.htm.

V.44 LZJH Compression for Cisco AS5350 and Cisco AS5400 Universal Gateways and Cisco AS5800 Universal Access Servers

V.44 LZJH is a new compression standard based on Lempel-Ziv that uses a new string-matching algorithm that increases upload and download speeds to make Internet access and Web browsing faster. The V.44 call success rate (CSR) is similar to V.42bis with significant compression improvement for most file types, including HTML files. V.44 applies more millions of instructions per second (MIPS) than V.42bis toward the same application data stream and yields better compression rates in almost any data stream in which V.42bis shows positive results.

V.44 supports automatic switching between compressed and transparent modes on NextPort DFC-108NP-bearing platforms. Automatic switching allows overall performance gain without loss in throughput for file streams that are not compressible.

V.44 is globally controlled through dialed number ID service (DNIS), calling line ID (CLID), and resource pool manager server (RPMS) virtual groups, and performance improvement is determined by the LZJH algorithms. The NextPort Dial Feature Card (DFC) is responsible for the ITU implementation of V.44 and the collection of statistics related to the new feature.

To support V.44 LZJH compression, the control switch module (CSM) has been modified. MIBs that show the status of V.42bis have been extended to show V.44 configuration status. New disconnect reasons help manage V.44 session status and debugging.

For further details, please see http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122x/122xa/122xa_2/ft_v44.htm.

Universal Port Resource Pooling for Voice and Data Services

Cisco Resource Pool Manager (RPM) enables telephone companies and Internet service providers (ISPs) to share resources for wholesale and retail network services in a single network access server (NAS) or across multiple NAS stacks. With Cisco RPM, service providers can count, control, and manage resources and provide accounting for shared resources when implementing different service-level agreements.

For further details, please see http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122newft/122limit/122x/122xa/122xa_2/ftuprp.htm.

Software Solutions in Cisco IOS Release 12.2(2) XA

The following solutions are supported in the Cisco AS5400 for Cisco IOS Release 12.2(2) XA:

Cisco Wholesale Voice Solution

The Cisco Wholesale Voice Solution provides service providers (SPs) with the required architecture design, network components, software features, functional areas, and provisioning methodologies needed to run a VoIP wholesale service. With an understanding of the concepts underlying the architecture, including interconnect topologies, components, and a variety of important issues that must be considered, the SP can then deploy options from a set of configuration templates. The result is a wholesale network that allows the SP to sell unbranded voice services to retailers, such as Internet telephony service providers (ITSPs), application service providers (ASPs), interexchange carriers (IXCs), or Post Telephone and Telegraph administrations (PTTs).

For further details, please see http://www.cisco.com/univercd/cc/td/doc/product/access/sc/rel7/soln/wv_rel1/wsv_rn.htm.

Cisco SS7 Interconnect for Voice Gateways Solution 1.3

The Cisco SS7 Interconnect for Voice Gateways Solution is a distributed system that provides SS7 connectivity for Voice-over-IP (VoIP) access gateways by using the Cisco Signaling Controller (also referred to as the Cisco SC2200 product) and the access gateways as a bridge from the H.323 IP network to the PSTN network. This solution interacts over the IP network with other Cisco H.323 VoIP access gateways. In addition, the Cisco SS7 Interconnect for Voice Gateways Solution can interoperate with H.323 endpoints, using non-SS7 signaling such as ISDN PRI and channelized T1.

Software Features Ported from Other Platforms in Cisco IOS Release 12.2(2) XA

The following features have been previously released on other Cisco access servers and high availability platforms. Therefore the individual platform name may not be referenced for the Universal Gateways. Other differences may exist for the various platforms that are documented. For example, the Universal Gateways use SPE software and do not use VCWare. Please note the following discrepancies when referencing the feature modules:

- The AS5400 does not support the Mica Modem Card, Metrocom Modem Card, or VoIP Feature Card. Voice and modem functions are provided by the Universal Port Dial Feature Card running SPE firmware. See the Cisco AS5400 Card Installation Guide for more information.
- All references to the AS5300 in these documents apply to the AS5400 platform with the following exceptions:
  - Use the AS54-DFC-108NP card instead of the Mica or Microcom modem cards.
  - Use the dial feature card (DFC) instead of voice feature cards (VFC).
  - Use SPE firmware instead of portware or vcware.
  - Run Cisco IOS Release software, for VoIP functionality, that is compatible with the recommended Cisco IOS version software in your platform software configuration guide.

Session Initiation Protocol (SIP) Gateway

The SIP Gateway consists of the SIP feature, which is an alternative to H.323 Enhancements to the SIP for VoIP on Cisco Access Platforms feature, which adds call transfer and call hold capabilities and more headers to the SIP feature

For details, please see the following chapters in *Configuring Voice Video, and Fax* of the *Cisco IOS 12.2 Documentation Set*:

- *Configuring Session Initiation Protocol for Voice Over IP*

  http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122cgcr/fvvfax_c/vvfsip.htm
- *Session Initiation Protocol for Voice over IP on Cisco Access Platforms*

  http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121t/121t1/0251clmb.htm

ISDN/SIP/CAS Internetworking

For details, please see *Interworking Signaling Enhancements for H.323 and SIP VoIP* at:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121t/121t5/dt4t323.htm.

SIP Gateway Support for Third Party Call Control (CSCdr32290)

This feature adds SDP changes for third party call control in SIP for click-to-dial, mid-call announcements, voice mail, and a timed conference bridge initiation.

For further details, please see *SIP Gateway Support for Third Party Call Control* at http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121rel/sipcfs/caribou.htm.

SIP User Agent MIB

The Session Initiation Protocol (SIP) User agent client and user agent server should be managable by an SNMP-based network management platform, such as Cisco Voice Manager. The SIP UAC/UAS exists on the AS5300, C2600 and C36xx platforms. The SIP MIB has been defined, will be submitted to the IETF and will be implemented on those platforms.

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB web site on Cisco.com at http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

Call Admission Control for H.323 VoIP Gateways

See Call Admission Control for H.323 VoIP Gateways, page 6.

H.323 Scalability and Interoperability Enhancements

See H.323 Scalability and Interoperability Enhancements, page 7.

MIBs

Current MIBs

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml.

Deprecated and Replacement 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 4.

Deprecated MIB	Replacement
OLD-CISCO-APPLETALK-MIB	RFC1243-MIB
OLD-CISCO-CHASSIS-MIB	ENTITY-MIB
OLD-CISCO-CPUK-MIB	To be determined
OLD-CISCO-DECNET-MIB	To be determined
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 determined
OLD-CISCO-MEMORY-MIB	CISCO-MEMORY-POOL-MIB

Deprecated MIB	Replacement
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 determined
OLD-CISCO-VINES-MIB	CISCO-VINES-MIB
OLD-CISCO-XNS-MIB	To be determined

Limitations and Restrictions

The MICA and microcom modems are not supported on the Cisco AS5400. Only modem and voice services are supported by using the NextPort dial feature card.

Important Notes

The following sections contain important notes about Cisco IOS Release 12.2(2) XA5 that can apply to the Cisco AS5400.

Building Integrated Timing Supply (BITS) Interface Port Clock Reference

The BITS interface port requires a T1 line **composite** clock reference set at 1.544 MHz and an E1 line **composite** clock reference set at 2.048 MHz.

H.323 and SIP Coexistence

Cisco IOS Software Release 12.2(2)XA provides support for session initiation protocol (SIP) and H.323 coexistence on the Cisco IOS gateway. SIP and H.323 coexistence is supported for the Cisco AS5300 and Cisco AS5350 platforms. The following H.323, SIP, and other features function simultaneously on the Cisco IOS gateway.

H.323 Features

- Cisco SS7 Interconnect for Voice Gateways Solution features
- Netspeak interoperability (Internet call waiting)
- PC to phone interoperability (Click to dial)
- Netspeak Cleartoken object ID (OID)
- Q.SIG
- Call deflection (H.450.3)
- Call transfer (H.450.2)
- H.235 call security

- Dual Tone Multi-Frequency (DTMF) tunneling
- Public Switched Telephone Network (PSTN) fallback based on Voice Over IP (VoIP) network congestion
- Call admission control; programmable call treatment
- T.38 fax relay and fax relay reliability
- Time division multiplex (TDM) hairpinning
- Programmable interactive voice response (IVR)
- Rotary dial peers
- Alternate gatekeeper support on the gateway
- Multiple redirecting numbers (RDNs)
- IP address bind
- New resource availability indication (RAI) algorithm
- Frame size negotiation
- Codec negotiation and support

SIP Features

- SIP via user datagram protocol (UDP)
- Primary rate interface (PRI)
- Call transfer
- Call hold
- UDP connected socket
- Privacy indicator
- Mapping PRI within 180/183 SIP messaging
- Call control redirect/diversion
- Domain name server (DNS)
- Codec negotiation and support

Other Features

- Call history
- Quality of Service: IP precedence and Priority Queue Weighted Fair Queuing (PQWFQ)
- AAA/Radius server
- Network side PRI for 5ESS, DMS100, NI2, and NET5 switch types

FastNet Interface Configuration Issues

Voice testing with the Cisco AS5400 and the FastNet interface requires the following configurations:

- The config set must be:

speed auto
duplex auto

- Fast switching must remain at its default **ip route-cach** configuration.

Caveats for Cisco IOS Release 12.2 XA

Caveats describe unexpected behavior in Cisco IOS software releases. Severity 1 caveats are the most serious caveats; severity 2 caveats are less serious. Severity 3 caveats are moderate caveats, and only select severity 3 caveats are included in the caveats document.

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

All caveats in Cisco IOS Release 12.1 and Cisco IOS Release 12.1T are also in Cisco IOS Release 12.2(2) XA5.

Note The Cisco IOS Release 12.1 documentation set is used for these release notes because Cisco IOS Release 12.2(2) XA5 is based on Cisco IOS Release 12.1(5) T.

For information on caveats in Cisco IOS Release 12.1T, see *Caveats for Cisco IOS Release 12.1T.*

For information on caveats in Cisco IOS Release 12.1, see *Caveats for Cisco IOS Release 12.1*, which lists severity 1 and 2 caveats and select severity 3 caveats for Cisco IOS Release 12.1 and is located on Cisco.com and the Documentation CD-ROM.

Caveat numbers and brief descriptions of caveats in Cisco IOS Release 12.2(2) XA5 are listed in Table 4. For details about a particular caveat, go to Bug Toolkit at:

http://www.cisco.com/cgi-bin/Support/Bugtool/launch_bugtool.pl

To access this location, you must have an account on Cisco.com. If you have forgotten or lost your account information, e-mail the Contact Database Administration group at cdbadmin@cisco.com. If you do not have an account on Cisco.com, go to http://www.cisco.com/register and follow the directions to establish an account.

Note If you have an account with Cisco.com, you can use Bug Navigator II to find caveats of any severity for any release. To reach Bug Navigator II, l**og in** to Cisco.com and click **Service and Support: Technical Assistance Center: Select & Download Software: Jump to a software resource: Software Bug Toolkit/Bug Watcher**. Another option is to go to http://www.cisco.com/cgi-bin/Support/Bugtool/launch_bugtool.pl.

Open Caveats—Cisco IOS Release12.2(2)XA5

There are no open caveats specific to Cisco IOS Release 12.2(2)XA5 that require documentation in the release notes.

Resolved Caveats—Cisco IOS Release12.2(2)XA5

All the caveats listed in Table 4 are resolved in Cisco IOS Release 12.2(2)XA5. This section describes only severity 1 and 2 caveats and select severity 3 caveats.

- SNMP

Table 4 Resolved Caveats for Release 12.2(2) XA5

Caveat ID Number	Description
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—Cisco IOS Release 12.2(2) XA4

All the caveats listed in Table 5 are resolved in Cisco IOS Release 12.2(2) XA4. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 5 Open Caveats for Release 12.2(2) XA4

Caveat ID Number	Description
CSCdv63891	ISDN overlap-receiving call fails - Failed to vdev_allocate
CSCdv26918	AS5400/5350: Transponder COT fails with DMS switch
CSCdv50182	Router crash during fax load run.
CSCdv86433	Pre-auth route voice calls to radius server for data.
CSCdv75890	Interruptions in FE interface leads to memory leak in 5400
CSCdv84404	SPE recovery port-action recovery does not seemed to work
CSCdv89007	5400 Crashed on WSD with teardown/setup at 9cps
CSCdv76568	ASSERTION FAILED /as/if_as_tsp.c lin 250, TDM switching CAS to SS7
CSCdv11344	Call threshold total-calls does not account modem/digital calls
CSCdv83185	AAA preauth caused low CSR for voice calls
CSCdv33993	As5400 reloads with Bus error Exception
CSCdv57090	AS5350 does not compress outbound traffic when configd for MPPC
CSCdv80024	Controllers bounce when Nas loaded with hairpin calls
CSCdw00536	Info digits received in the ingress FGD trunk is passed to egress
CSCdv42032	Shutdown to a NFAS serial interface deletes the D-channel.
CSCdu63658	DS0s/NFAS groups do not retrieve after reload or contr shut/noshut
CSCdv04500	as5400: NAS sends invalid calling number for TDM hairpinned calls.

Resolved Caveats—Cisco IOS Release 12.2(2) XA4

All the caveats listed in Table 6 are resolved in Cisco IOS Release 12.2(2) XA4. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 6 Resolved Caveats for Release 12.2(2) XA4

Caveat ID Number	Description
CSCdv39711	Outbound modem calls fail with %CSM-1-NO_VDEV: No modems associated:
CSCdu06427	Cleanup fix for CSCdt11503
CSCdv56410	Incorrect DiscwithPI handling causes memory leak and crash
CSCdv65099	OLI-SIP:5400 platform fails to pass valid FG-D oli information
CSCdu81936	Received gratuitous ARP overwrites interface MAC address in ARP tbl
CSCdv42346	All DSLs except primary advertised as OOS in GSM after RLM reinit
CSCdv43578	SIP: Incorrect Timestamps in SIP msgs
CSCdv48261	Improvements to dynamic acls for ios fw
CSCdv45770	Hairpinning fails TDM HPM CALL INFO QUE is empty
CSCdv24237	After CAC threshold is crossed calls that are dropped left IS Idle
CSCdv50143	Nas crashes with arithmetic exception while hairpinning calls
CSCdv35992	IP addresses from ip local pool not freed after user disconnects
CSCdv35240	SNMP set command sent to T3 & T1 controller adds blank descr command
CSCdu87662	AS5400 reloads during stress test with process_handle_watchdog error
CSCdv57310	Calltracker: memory leak
CSCdt44593	Two L2TP tunnels for 2 users with same domain-name
CSCdu89203	Interface service indicates wrong nfas int in Group Service message
CSCdu83260	SPE 0.6.103.0 causing Exec process infinite loop for modem calls
CSCdu38797	Disabling Voice-fastpath does not stay after reload
CSCdv89981	AS5400 crashed when config ds0-group 30 on last controller
CSCdv71465	No busy tone for E1/R2 SIP call
CSCdv47983	TTY lines stuck in modem autoconfigure state
CSCdv66688	VDPN authen-before-forward is broken in 0.34.0 build
CSCdv59110	AS5400 reloaded due to memory Corruption
CSCdt97078	AS5400 crashed at call_prog_notif_fe_tcp_hostfailed
CSCdv85426	Need to Commit NextPort Firmware 2.8.5.9 into XA

Open Caveats—Cisco IOS Release 12.2(2) XA3

All the caveats listed in Table 7 are open in Cisco IOS Release 12.2(2) XA3. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 7 Open Caveats for Release 12.2(2) XA3

Caveat ID Number	Description
CSCdv21960	PPP encap causes voice call failures on 24th channel

Resolved Caveats—Cisco IOS Release 12.2(2) XA3

All the caveats listed in Table 8 are resolved in Cisco IOS Release 12.2(2) XA3. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 8 Resolved Caveats for Release 12.2(2) XA3

Caveat ID Number	Description
CSCdv41159	Remote IP address in H.323 CDR shows media instead of signaling addr

Open Caveats—Cisco IOS Release 12.2(2) XA2

All the caveats listed in Table 9 are open in Cisco IOS Release 12.2(2) XA2. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 9 Open Caveats for Release 12.2(2) XA2

Caveat ID Number	Description
CSCds86189	Dialer profile in idle state with one active ppp/mlp channel
CSCdu72813	ALIGN-3-SPURIOUS: csm_check_neq_dchan_idb
CSCdv05516	Calls not disconnected after T309 timer
CSCdv20653	Multiple tracebacks generated during failed-COT calls
CSCdv24469	COT failure with retry using resend-setup fails
CSCdv26918	AS5400/5350: Transponder COT fails with DMS switch
CSCdv29253	CAC does not busy 24th channel in SS7 configuration
CSCdv33993	as5400 reloads with Bus error Exception
CSCdv35992	IP addresses from ip local pool not freed after user disconnects
CSCdv36061	Software Forced Crash, memory corruption
CSCdv41159	Remote IP address in H.323 CDR shows media instead of signaling addr

Resolved Caveats—Cisco IOS Release 12.2(2) XA2

All the caveats listed in Table 10 are resolved in Cisco IOS Release 12.2(2) XA2. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 10 Resolved Caveats for Release 12.2(2) XA2

Caveat ID Number	Description
CSCdu72214	Nas returns wrong operation in Cot confirm message
CSCdu72226	TDM switching makes wrong connection with RPMS enabled
CSCdu83242	Wrong data path for TDM switched synchronous 64K digital calls
CSCdu83755	Twenty-fifth TDM switched call connected to wrong inbound ds0

Table 10 Resolved Caveats for Release 12.2(2) XA2 (continued)

Caveat ID Number	Description
CSCdv01881	ppp negotiation keep running
CSCdv24190	Continuous SS7 RSC sent on busy cics despite receipt of RLC

Open Caveats—Cisco IOS Release 12.2(2) XA1

All the caveats listed in Table 11 are open in Cisco IOS Release 12.2(2) XA1. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 11 Open Caveats for Release 12.2(2) XA1

Caveat ID Number	Description
CSCdu42268	Signal-end-to-end is not working
CSCdu44402	ISDN holding CCBs and call confirm err after interface shut/noshut
CSCdu57102	Removing bearers on an nfas group causes nas to crash
CSCdu63658	DS0s/NFAS groups do not retrieve after reload or contr shut/noshut
CSCdu86939	Attributes 5.30 and 61 are not sent with CAS preauth request msg
CSCdv11426	Crashed at PC = 0x6036b068 clock_diff_signed64

Resolved Caveats—Cisco IOS Release 12.2(2) XA1

All the caveats listed in Table 12 are resolved in Cisco IOS Release 12.2(2) XA1. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 12 Resolved Caveats for Release 12.2(2) XA1

Caveat ID Number	Description
CSCdt59455	vty-async virtual-template does not work with no peer default ip addr
CSCdt78894	Original stack is lost upon crash if there is another crash
CSCdt88329	port modem startup-test, test port modem back-to-back fail on AS5400
CSCdt93862	Access level issue while using Web interface
CSCdt97078	AS5400 crashed at call_prog_notif_fe_tcp_hostfailed
CSCdu08214	Calltracker MIB returns NULL for userid when DNIS/ANI is not present
CSCdu09342	ISDN network-side continuously sends RESTART after user-side reloads
CSCdu29411	CSR drop of 10-12% for E1R2 on XA w/ H323 calls only
CSCdu30345	DSP stopped collection digits - phone # with 0 length
CSCdu37882	IOS is not marking port bad after NP session abort
CSCdu44836	AS5400: Unallocated numbers(no dial-peer) connect to modem.
CSCdu46942	NU tone is not heard on ivr calls
CSCdu52551	output of sh spe shows incorrect number of free ports

Table 12 Resolved Caveats for Release 12.2(2) XA1 (continued)

Caveat ID Number	Description
CSCdu56186	H323 GW:RSVP and Signal only call cleared by TGW after ACF received
CSCdu57066	CONN_LOST event needs to be handled in ACC_FASTSTART_PROGRESS state
CSCdu57102	Removing bearers on an nfas group causes nas to crash
CSCdu57265	memory leak in EST msg processing during stress test
CSCdu57844	H.245 Memory Leak - h245InitUserCB
CSCdu59975	Glare Conditions are not detected in vtsp
CSCdu61652	E1 - R2 Signalling does not send ANI
CSCdu61720	Watchdog timeout on RADIUS process
CSCdu62482	E1 R2 is broken when call treatment configured
CSCdu62721	Candidate fails to bring up B-channels (not du42219)
CSCdu66544	%NP_VSM-3-OUT_OF_RANGE_VALUE: VAD value:20 is out of range
CSCdu70230	No data path for TDM switched Synchronous 64K digital data calls
CSCdu70661	all channels except 24th channel stay busied out after configuration
CSCdu74065	DSPless hairpin call fails if RPMS is enabled
CSCdu75796	5400 rejected the following modem calls after 16 users with 1F00
CSCdu82224	V120 calls were mis-identified as PIAFS calls
CSCdu87080	Attach domain name to TGCP
CSCdu87975	Bus Error crash after doing a shut on RLM at rlm_reopen_links
CSCdu87662	as5400 reloads during stress test with process_handle_watchdog error
CSCdu88095	after configuring NFAS, bchans do not come IS, NAS does not send GSMs
CSCdv01493	NAS Send MLP bundle ID for non-MLP VPDN call.
CSCuk21553	telnet client fails to perform DNS lookup of hostname

Open Caveats—Cisco IOS Release 12.2(2) XA

All the caveats listed in Table 13 are open in Cisco IOS Release 12.2(2) XA. This table lists only severity 1 and 2 caveats and select severity 3 caveats.

Table 13 Open Caveats for Release 12.2(2) XA

Caveat ID Number	Description
CSCdt78894	Original stack is lost upon crash if there is another crash.
CSCdt88329	Port modem startup test fails for 50% of modems.
CSCdu29411	CSR drop of 100-12% for E1R2 on XA with H.323 calls only.
CSCdu30415	System running on high CPU usage (100/100)
CSCdu35774	Memory leak when all RADIUS servers down (aaa_res_acct_call_setup).
CSCdu41090	Non-contiguous NFAS member interface caused B-channel to be OOS.

Table 13 Open Caveats for Release 12.2(2) XA

Caveat ID Number	Description
CSCdu46654	%SYS-2-MALLOCFAIL of 756 bytes with 440 stress calls.
CSCdu57323	Crash during reliability test (5350 - thundervoice).
CSCdu57844	H.245 Memory Leak - h.245InitUserCB.
CSCdu58212	Low cpu resources lead to a crash (mid-load stress test).
CSCdv28221	Gateway cannot accept RTP before FastStart elements received

Resolved Caveats—Cisco IOS Release 12.2(2) XA

There are no resolved caveats specific to Cisco IOS Release 12.2(2) XA that require documentation in the release notes.

Related Documentation

The following sections describe the documentation available for the Cisco AS5400. These documents consist of hardware and software installation guides, Cisco IOS configuration and command references, system error messages, feature modules, and other documents.

Documentation is available as printed manuals or electronic documents, except for feature modules, which are available online on Cisco.com and the Documentation CD-ROM.

Use these release notes with these documents:

- Release-Specific Documents, page 20
- Platform-Specific Documents, page 21
- Feature Modules, page 21
- Cisco IOS Software Documentation Set, page 22

Release-Specific Documents

Note The Cisco IOS Release 12.1 documentation set is used for these release notes because Cisco IOS Release 12.2(2) XA5 is based on Cisco IOS Release 12.1(5) T.

The following documents are specific to Cisco IOS Release 12.1 and are located on Cisco.com and the Documentation CD-ROM:

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

  On Cisco.com at:

  Technical Documents: **Cisco IOS Software**: **Cisco IOS Release 12.1: Release Notes: Cross-Platform Release Notes**

  On the Documentation CD-ROM at:

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

- Product bulletins, field notices, and other release-specific documents on Cisco.com at:

  Technical Documents

- The "Caveats for Cisco IOS Release 12.2 XA" section on page 14

  As a supplement to the caveats listed in "Caveats for Cisco IOS Release 12.2 XA" in these release notes, see *Caveats for Cisco IOS Release 12.1* and *Caveats for Cisco IOS Release 12.1 T*, which contain caveats applicable to all platforms for all maintenance releases of Cisco IOS Release 12.1 and Cisco IOS Release 12.1 T.

  On Cisco.com at:

  Technical Documents: Cisco IOS Software: **Cisco IOS Release 12.1: Release Notes: Caveats**

  On the Documentation CD-ROM at:

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

Platform-Specific Documents

These documents are available for the Cisco AS5400 on Cisco.com and the Documentation CD-ROM:

- *Cisco AS5400 Universal Gateway Read Me First*
- Hardware Installation Documents for Cisco AS5400
- Configuration Documents for Cisco AS5400
- Regulatory Compliance and Safety Documents for Cisco AS5400

  On Cisco.com at:

  Technical Documents: Cisco Product Documentation: Access Servers and Access Routers: Access Servers: Cisco AS5400

  On the Documentation CD-ROM at:

  Cisco Product Documentation: Access Servers and Access Routers: Access Servers: Cisco AS5400

Feature Modules

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 Cisco.com at:

Technical Documents: Cisco IOS Software: Cisco IOS Release 12.1: New Feature Documentation

On the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software Configuration: **Cisco IOS Release 12.1**: **New Feature Documentation**

Cisco IOS Software Documentation Set

Note The Cisco IOS Release 12.1 documentation set is used for these release notes because Cisco IOS Release 12.2(2) XA5 is based on Cisco IOS Release 12.1(5) T.

The Cisco IOS software documentation set consists of the Cisco IOS configuration guides, Cisco IOS command references, and several other supporting documents. The Cisco IOS software documentation set is 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 one or more configuration guides and one or more corresponding command references. 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. Use each configuration guide with its corresponding command reference.

The Cisco IOS software documentation set is available on Cisco.com and on the Documentation CD-ROM.

On Cisco.com at:

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

On the Documentation CD-ROM at:

Cisco Product Documentation: Cisco IOS Software Configuration: Cisco IOS Release 12.2: Configuration Guides and Command References

Release 12.1 Documentation Set

Table 15 lists the contents of the Cisco IOS Release 12.1 software documentation set, which is available in both electronic and printed form.

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

On Cisco.com at:

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

On the Documentation CD-ROM at:

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

Books	Major Topics
• *Cisco IOS Configuration Fundamentals Configuration Guide* • *Cisco IOS Configuration Fundamentals Command Reference*	Configuration Fundamentals Overview Cisco IOS User Interfaces Cisco IOS File Management Cisco IOS System Management Cisco IOS User Interfaces Commands Cisco IOS File Management Commands Cisco IOS System Management Commands
• *Cisco IOS Bridging and IBM Networking Configuration Guide* • *Cisco IOS Bridging and IBM Networking Command Reference, Volume I* • *Cisco IOS Bridging and IBM Networking Command Reference, Volume II*	Using Cisco IOS Software Overview of SNA Internetworking Bridging IBM Networking
• *Cisco IOS Dial Services Configuration Guide: Terminal Services* • *Cisco IOS Dial Services Configuration Guide: Network Services* • *Cisco IOS Dial Services Command Reference*	Preparing for Dial Access Modem Configuration and Management ISDN and Signaling 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
• *Cisco IOS Interface Configuration Guide* • *Cisco IOS Interface Command Reference*	Interface Configuration Overview Configuring LAN Interfaces Configuring Serial Interfaces Configuring Logical Interfaces
• *Cisco IOS IP and IP Routing Configuration Guide* • *Cisco IOS IP and IP Routing Command Reference*	IP Addressing and Services IP Routing Protocols IP Multicast
• *Cisco IOS AppleTalk and Novell IPX Configuration Guide* • *Cisco IOS AppleTalk and Novell IPX Command Reference*	AppleTalk and Novell IPX Overview Configuring AppleTalk Configuring Novell IPX
• *Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Configuration Guide* • *Cisco IOS Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Command Reference*	Apollo Domain, Banyan VINES, DECnet, ISO CLNS, and XNS Overview Configuring Apollo Domain Configuring Banyan VINES Configuring DECnet Configuring ISO CLNS Configuring XNS

Books	Major Topics
• *Cisco IOS Multiservice Applications Configuration Guide* • *Cisco IOS Multiservice Applications Command Reference*	Multiservice Applications Overview Voice Video Broadband
• *Cisco IOS Quality of Service Solutions Configuration Guide* • *Cisco IOS Quality of Service Solutions Command Reference*	Quality of Service Overview Classification Congestion Management Congestion Avoidance Policing and Shaping Signaling Link Efficiency Mechanisms Quality of Service Solutions
• *Cisco IOS Security Configuration Guide* • *Cisco IOS Security Command Reference*	Security Overview Authentication, Authorization, and Accounting (AAA) Security Server Protocols Traffic Filtering and Firewalls IP Security and Encryption Other Security Features
• *Cisco IOS Switching Services Configuration Guide* • *Cisco IOS Switching Services Command Reference*	Cisco IOS Switching Services Overview Cisco IOS Switching Paths Cisco Express Forwarding NetFlow Switching Multiprotocol Label Switching Multilayer Switching Multicast Distributed Switching Virtual LANs LAN Emulation
• *Cisco IOS Wide-Area Networking Configuration Guide* • *Cisco IOS Wide-Area Networking Command Reference*	Wide-Area Networking Overview Configuring ATM Configuring Frame Relay Configuring Frame Relay-ATM Interworking Configuring SMDS Configuring X.25 and LAPB
• *Cisco IOS Configuration Guide Master Index* • *Cisco IOS Command Reference Master Index* • *Cisco IOS Debug Command Reference* • *Cisco IOS Dial Services Quick Configuration Guide* • *Cisco IOS Software System Error Messages* • *New Features in 12.1-Based Limited Lifetime Releases* • *New Features in Release 12.1 T* • *Release Notes* (Release note and caveat documentation for 12.1-based releases and various platforms)	

Obtaining Documentation

The following sections provide sources for obtaining documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following sites:

- http://www.cisco.com
- http://www-china.cisco.com
- 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 and may be more current than printed documentation. The CD-ROM package is available as a single unit or as an annual subscription.

Ordering Documentation

Cisco documentation is available in the following ways:

- Registered Cisco Direct Customers can order Cisco Product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/en/US/ordering/index.shtml

- Registered Cisco.com users can order the Documentation CD-ROM through the online Subscription Store:

  http://www.cisco.com/go/subscription

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, in North America, by calling 800 553-NETS(6387).

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, use the response card behind the front cover of your document, or write to the following address:

Attn Document Resource Connection
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

Cisco provides Cisco.com as a starting point for all technical assistance. Customers and partners can obtain documentation, troubleshooting tips, and sample configurations from online tools. For Cisco.com registered users, additional troubleshooting tools are available from the TAC website.

Cisco.com

Cisco.com 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.

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

To access Cisco.com, go to the following website:

http://www.cisco.com

Technical Assistance Center

The Cisco TAC website is available to all customers who need technical assistance with a Cisco product or technology that is under warranty or covered by a maintenance contract.

Contacting TAC by Using the Cisco TAC Website

If you have a priority level 3 (P3) or priority level 4 (P4) problem, contact TAC by going to the TAC website:

http://www.cisco.com/tac

P3 and P4 level problems are defined as follows:

- P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

To register for Cisco.com, go to the following website:

http://www.cisco.com/register/

If you cannot resolve your technical issue by using the TAC online resources, Cisco.com registered users can open a case online by using the TAC Case Open tool at the following website:

http://www.cisco.com/tac/caseopen

Contacting TAC by Telephone

If you have a priority level 1 (P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.
- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.

This document is to be used with the documents listed in the "Related Documentation" section on page 20.