Release Notes for Cisco IOS Release 12.2(8)YN on the Cisco ICS 7750

May 22, 2003

These release notes describe features and functionality of Cisco IOS Release 12.2(8)YN on the Cisco Integrated Communications System (ICS) 7750.

⚠
Caution   Software upgrades for the Cisco ICS 7750 are delivered in packaged system software bundles that are distributed on Cisco.com and/or on CD-ROM. Each Cisco ICS 7750 system software bundle is certified with a specific Cisco IOS release. Appropriate consideration must be given to the other software in the bundle when installing Cisco IOS software in the Cisco ICS 7750. Contact your sales representative for ordering instructions.

These release notes are updated as needed to describe new memory requirements, new features, new hardware support, software platform deferrals, microcode changes, related document changes, and any other important changes. Use these release notes with the *Cross-Platform Release Notes for Cisco IOS 12.2T* located on CCO and the Documentation CD-ROM.

Contents

These release notes discuss the following topics:

CISCO SYSTEMS

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

System Requirements

This section describes the system requirements for Release 12.2(8)YN on the Cisco ICS 7750. It includes the following sections:

Memory Requirements

Table 1 describes the memory requirements for the Cisco IOS feature sets supported by Cisco IOS Release 12.2(8)YN on ASIs and MRPs in a Cisco ICS 7750 chassis.

Table 1 Available Software Images and Memory Requirements for ASIs and MRPs

Platform	Image Name	Image	Software Bundles[1]	Required Flash Memory for the MRP300, MRP3-8FXS, MRP3-16FXS	Required Flash Memory for the MRP200, ASI81, ASI160[2]	Required DRAM Memory[3]	Runs From
Cisco ICS 7750	IP/Voice Plus	ics7700-sv3y-mz	S77a-x.x.x	16MB	Not applicable	64 MB	RAM
	IP/FW/Voice Plus IPSec 56	ics7700-k8o3sv3y-mz	S77b-k8-x.x.x	16MB	Not applicable	64MB	RAM
	IP/FW/Voice Plus IPSec 3DES	ics7700-k9o3sv3y-mz	S77c-k9-x.x.x	16MB	Not applicable	64MB	RAM
	IP/IPX/AT/ IBM/ Voice, Plus	ics7700-bnr2sv3y-mz	S77d-x.x.x	16MB	Not applicable	64MB	RAM
	IP/IPX/AT/IBM/FW/ Voice, Plus IPSec 56	ics7700-bk8no3r2sv3y-mz	S77e-k8-x.x.x	16MB	Not applicable	64MB	RAM
	IP/IPX/AT/IBM/FW/ Voice, Plus IPSec 3DES	ics7700-bk9no3r2sv3y-mz	S77f-k9-x.x.x	16MB	Not applicable	64 MB	RAM
	Reduced-IP/ Analog Voice Plus[4]	ics7700-sv12y10-mz	ICS-7750-AV	16MB	Not applicable	64 MB	RAM
	Reduced-IP/ Voice Plus[4]	ics7700-sv3y10-mz	ICS-7750-DV	16MB	Not applicable	64 MB	RAM

1. In addition to the Cisco IOS software listed above, each software bundle contains the following software: Cisco IOS software for the system switch processor (SSP) card, ICS System Manager, ICS Core Software, and system alarm processor (SAP) software. The x.x.x in the system software bundle name represents the release number. For example, for release 2.5.0, the name of the bundle containing the IP/Voice Plus image would be S77a-2.5.0.

2. Flash memory is not used for the Cisco IOS image on ASIs and MRP200s. Since onboard flash is not available on ASIs and MRP200s, a Cisco IOS compressed image resides on the system processing engine (SPE) and is downloaded to the RAM of each ASI or MRP200 before image decompression.

3. You can upgrade ASI or MRP card memory to 80 MB, 96 MB, or 128MB by installing a dual in-line memory module (DIMM) in the card DIMM slot. For memory upgrade instructions, refer to *Installing Memory, PVDM, and VPN Modules in ASI Cards, MRP Cards, and SPE Cards in the Cisco ICS 7750*.

4. This image comprises one of the voice-only packages, and does not include data networking support.

Hardware Supported

Cisco IOS Release 12.2(8)YN supports ASIs and MRPs in a Cisco ICS 7750. See Table 2 for a description of the processor cards which are supported in the Cisco ICS 7750.

Processor Cards

Table 2 lists the processor cards that can be used in the Cisco ICS 7750.

Table 2   Cisco ICS 7750 Processor Cards

Card	Card Description	Port Description
SPE	A single-board computer that runs system software applications such as ICS System Manager and Cisco CallManager.	• SPE200[1]: No front-panel ports. • SPE310: Front-panel ports for video, keyboard, and universal serial bus (USB).
MRP200 MRP300	A voice-and-data-capable router that can carry voice traffic over an IP network and can link remote Ethernet LANs to central offices over WAN links. The multiservice route processor has two slots that support combinations of WAN interface cards (WICs), voice WAN interface cards (VWICs), and Voice interface cards (VICs). It also has two slots to support Packet Voice Data modules (PVDMs). Five versions of PVDMs are available. The MRP 300 has onboard flash memory.	Supports the data and voice interface port types listed in Table 5.
ASI 81 MRP3-8FXS	A voice-and-data-capable router that can carry voice traffic over an IP network and can link small-to- medium-size remote Ethernet LANs to central offices over WAN links (depending on the type of card installed in its WIC/VIC/VWIC slot) and can support connections to analog telephones, fax machines, and polycoms. It also has two PVDM slots. The MRP3-8FXS has onboard flash memory.	• Eight FXS ports • One slot that supports the data and voice interface port types listed in Table 5
MRP3-8FXOM1	A voice-and-data-capable router that can carry voice traffic over an IP network and can link small-to- medium-size remote Ethernet LANs to central offices over WAN links (depending on the type of card installed in its WIC/VIC/VWIC slot) and can support the connection of eight analog trunks between a Central Office (CO) and an IP telephony system. It also has two PVDM slots and onboard flash memory.	• Eight FXO ports • One slot that supports the data and voice interface port types listed in Table 5
ASI 160 MRP3-16FXS	An analog gateway that supports connections to telephones, fax machines, and polycoms. It also has two PVDM slots. The MRP3-16FXS has onboard flash memory.	Sixteen FXS ports

Table 2 Cisco ICS 7750 Processor Cards (continued)

Card	Card Description	Port Description
System alarm processor (SAP)	A module that monitors the status of the chassis, power supply modules, and fans, and feeds real-time data to the system processing engines. The SAP card delivers its data to the SPE running System Manager.	• Two COM ports • One console port
System switch processor (SSP)	An Ethernet switch that passes data between all system cards and to any other Ethernet switches connected to the system.	Two Ethernet 10/100 ports

1. System software release 2.1.0 or later is supported only on SPE 310s.

Table 3 lists the number of processor cards supported by a Cisco ICS 7750.

Table 3 Number of Cards Supported in a Cisco ICS 7750 Chassis

Card	Minimum Required	Maximum Allowed
SAP	1	1
SSP	1	1
MRP	0	5
ASI	0	5
SPE310	1	5
200W power supply module	1	2

MRP and ASI Card Upgrades

You can upgrade MRP and ASI cards as follows:

*   Memory. MRP and ASI cards ship with 64 MB of dynamic RAM (DRAM). You can upgrade MRP and ASI card memory to 80 MB, 96, or 128 MB by installing a dual in-line memory module (DIMM) in the card DIMM slot.

*   Voice and data processing power. VICs, VWICs, and FXS modules installed in MRP or ASI cards might require additional digital signal processors (DSPs) for processing heavier volumes of voice traffic. You can install Packet Voice/Data Modules (PVDMs) in one or both of the card PVDM slots to give MRP and ASI cards more processing power.

Note   See *Installing Memory, PVDM, and VPN Modules in ASI Cards, MRP Cards, and SPE Cards in the Cisco ICS 7750* for instructions on how to upgrade ASI and MRP cards.

Table 4 provides information about the modules that you can install in ASI and MRP cards

Table 4 Cisco ASI and MRP Card Replacement DIMMs and PVDMs

Description	Cisco Part Number
16-MB SDRAM DIMM	MEM-MRP-16D=
32-MB SDRAM DIMM	MEM-MRP-32D=
64-MB SDRAM DIMM	MEM-MRP-64D=
4-channel packet voice/fax data DSP module	PVDM-256K-4=

Table 4   Cisco ASI and MRP Card Replacement DIMMs and PVDMs (continued)

Description	Cisco Part Number
8-channel packet voice/fax data DSP module	PVDM-256K-8=
12-channel packet voice/fax data DSP module	PVDM-256K-12=
16-channel packet voice/fax data DSP module	PVDM-256K-16=
20-channel packet voice/fax data DSP module	PVDM-256K-20=

Wide Area Network Interface Cards, Voice Interface Cards, and Voice WAN Interface Cards

Table 5 lists the WICs, VICs, and VWICs that you can order in Cisco ICS 7750 MRP and ASI 81 cards. Refer to the *Cisco ICS 7750 Installation and Configuration Guide* and the ICS System Manager online help for configuration instructions.

Table 5   Supported WICs, VICs and VWICs

Card Description	Abbreviated Name	Support in MGCP Mode
2-port FXS[1] voice/fax interface card	VIC-2FXS	Yes
2-port FXO[2] voice/fax interface card	VIC-2FXO	Yes
2-port FXO voice/fax interface card with battery reversal detection and caller ID support (for the United States)	VIC-2FXO-M1	No MGCP support if Caller ID or battery reversal detection enabled
4-port FXO voice/fax interface card with battery reversal detection and caller ID support (for the United States)	VIC-4FXO-M1	No MGCP support if Caller ID or battery reversal detection enabled
2-port FXO voice/fax interface card with battery reversal detection and caller ID support (for Europe)	VIC-2FXO-M2	No MGCP support if Caller ID or battery reversal detection enabled
2-port FXO voice/fax interface card with battery reversal detection (for Australia)	VIC-2FXO-M3	No MGCP support if Caller ID or battery reversal detection enabled
2-port E&M[3] voice/fax interface card	VIC-2E/M	No
2-port analog DID[4] voice/fax interface card	VIC-2DID	FXS mode only
4-port analog FXS/DID voice/fax interface card	VIC-4FXS/DID	FXS mode only
2-port ISDN BRI voice/fax interface card (network and terminal side)	VIC-2BRI-NT/TE	No
1-port T1/fractional T1 multiflex trunk with CSU/DSU	VWIC-1MFT-T1	Yes
2-port T1/fractional T1 multiflex trunk with CSU/DSU	VWIC-2MFT-T1	Yes
1-port E1/fractional E1 multiflex trunk with CSU/DSU	VWIC-1MFT-E1	Yes
2-port E1/fractional E1 multiflex trunk with CSU/DSU	VWIC-2MFT-E1	Yes
1-port serial, asynchronous and synchronous (T1/E1)	WIC-1T	Not applicable
2-port serial, asynchronous and synchronous (T1/E1)	WIC-2T	Not applicable
2-port serial, low speed (up to 128 kbps), asynchronous and synchronous	WIC-2A/S	Not applicable
1-port ISDN[5] BRI[6] (S/T interface)	WIC-1B-ST	Not applicable
1-port ISDN BRI with integrated NT1 (U interface)	WIC-1B-U	Not applicable

Table 5   Supported WICs, VICs and VWICs (continued)

Card Description	Abbreviated Name	Support in MGCP Mode
1-port, four-wire 56-kbps CSU/DSU[7]	WIC-1DSU-56K4	Not applicable
1-port, T1/fractional T1 CSU/DSU	WIC-1DSU-T1	Not applicable

1. FXS = Foreign Exchange Station
2. FXO = Foreign Exchange Office
3. E&M = Ear and Mouth
4. DID = Direct Inward Dial
5. ISDN = Integrated Services Digital Network
6. BRI = Basic Rate Interface
7. CSU/DSU = channel services unit/data services unit

Table 6 lists the combinations of WICs, VICs, and VWICs that are supported on MRP300s, MRP3-8FXOM1s, and MRP3-8FXSs, where the left column of the table shows that a T1, E1, 8-port FXO-M1, or 8-port FXS module is installed in Slot 0, and where the remaining columns of the table show the types of modules that could be installed in Slot 1 of a given type of MRP.

Table 6   Supported Combinations of WICS, VICs, and VWICs on MRP300s, MRP3-8FXOM1s, and MRP3-8FXSs

Slot 0	MRP300 (Voice Only)[1]	MRP300 (Data Only)	MRP300 (Voice and Data)	MRP3-8FXOM1	MRP3-8FXS
	Slot 1				
VWIC-1MFT-E1 (voice)	VIC-2BRI-NT/TE, VIC-2DID, VIC-2E/M, VIC-2FXO, VIC-2FXO-M1, VIC-2FXO-M2, VIC-2FXO-M3, VIC-4FXO-M1, VIC-2FXS, VIC-4FXS/DID	Not applicable	VWIC-1MFT-E1 (data), WIC-1T, WIC-2T, WIC-2A/S, WIC-1B-ST, WIC-1B-U, WIC-1DSU-56K4, WIC-1DSU-T1	Not applicable	Not applicable
VWIC-1MFT-T1 (voice)	VWIC-1MFT-T1 (voice), VIC-2BRI-NT/TE, VIC-2DID, VIC-2E/M, VIC-2FXO, VIC-2FXO-M1, VIC-2FXO-M2, VIC-2FXO-M3, VIC-4FXO-M1, VIC-2FXS, VIC-4FXS/DID	Not applicable	VWIC-1MFT-T1 (data), WIC-1T, WIC-2T, WIC-2A/S, WIC-1B-ST, WIC-1B-U, WIC-1DSU-56K4, WIC-1DSU-T1	Not applicable	Not applicable

Table 6   Supported Combinations of WICS, VICs, and VWICs on MRP300s, MRP3-8FXOM1s, and MRP3-8FXSs

Slot 0	MRP300 (Voice Only)[1]	MRP300 (Data Only)	MRP300 (Voice and Data)	MRP3-8FXOM1	MRP3-8FXS
	Slot 1				
VWIC-1MFT-T1 (data) or VWIC-1MFT-E1 (data)	Not applicable	WIC-1T, WIC-2T, WIC-2A/S, WIC-1B-ST, WIC-1B-U, WIC-1DSU-56K4, WIC-1DSU-T1	VWIC-1MFT-T1 (voice), VWIC-1MFT-E1 (voice)	Not applicable	Not applicable
VWIC-2MFT-T1 (data) or VWIC-2MFT-E1 (data)	Not applicable	Empty slot	Empty slot	Not applicable	Not applicable
VWIC-2MFT-T1 (voice) or VWIC-2MFT-E1 (voice)	Empty slot	Not applicable	Empty slot	Not applicable	Not applicable
8-port FXO-M1 module	Not applicable	Not applicable	Not applicable	VIC-2DID, VIC-2E/M, VIC-2FXO, VIC-2FXO-M1, VIC-2FXO-M2, VIC-2FXO-M3, VIC-4FXO-M1 , VIC-2FXS, VIC-4FXS/DID, VWIC-1MFT-T1 (voice), VWIC-1MFT-E1 (voice), VWIC-2MFT-T1 (1 voice, 1 data), VWIC-2MFT-E1 (1 voice, 1 data) WIC-1T, WIC-2T, WIC-2A/S, WIC-1B-ST, WIC-1B-U, WIC-1DSU-56K4, WIC-1DSU-T1	Not applicable

Table 6   Supported Combinations of WICS, VICs, and VWICs on MRP300s, MRP3-8FXOM1s, and MRP3-8FXSs

Slot 0	MRP300 (Voice Only)[1]	MRP300 (Data Only)	MRP300 (Voice and Data)	MRP3-8FXOM1	MRP3-8FXS
	Slot 1				
8-port FXS module	Not applicable	Not applicable	Not applicable	Not applicable	VIC-2DID, VIC-2E/M, VIC-2FXO, VIC-2FXO-M1, VIC-2FXO-M2, VIC-2FXO-M3, VIC-4FXO-M1 , VIC-2FXS, VIC-4FXS/DID, VWIC-1MFT-T1 (voice), VWIC-1MFT-E1 (voice), VWIC-2MFT-T1 (1 voice, 1 data), VWIC-2MFT-E1 (1 voice, 1 data) WIC-1T, WIC-2T, WIC-2A/S, WIC-1B-ST, WIC-1B-U, WIC-1DSU-56K4, WIC-1DSU-T1

1. Up to 48 voice channels are now supported on the same MRP300, in certain configurations. See the "New Software Features in Release 12.2(8)YN" section on page 10 for more information.

Determining Your Software Release

Complete the following steps to determine the Cisco IOS software version running on Cisco ICS 7750 ASI, MRP, or SSP cards:

Step 1   On a PC, choose **Start > Run**.

Step 2   Enter the following command to open a Telnet session, where *IP address* is the IP address of the card that you wish to verify:

```
telnet IP address
```

Step 3   Enter your login password.

Step 4   Enter the **show version** command:

```
card> show version
```

The following is some of the output that is displayed after entering the command **show version** on an ASI or MRP card:

```
router> show version
Cisco Internetwork Operating System Software
IOS (tm) ICS7700 Software (ICS7700-SV3Y-M), Version 12.2(8)YN, EARLY DEPLOYMENT RELEASE
SOFTWARE (fc1)
```

Additional output lines from the **show version** command include information such as the processor revision numbers, amount of available memory, hardware IDs, and partition information.

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. Release 12.2(8)YN supports the same feature sets as Releases 12.2 and 12.2T, but Release 12.2(8)YN can include new features supported by the Cisco ICS 7750 platform. Table 7 lists the feature sets supported by the Cisco ICS 7750.

Table 7   Feature Sets Supported by the Cisco ICS 7750

Image Name	Feature Set Matrix Terms	Software Image
Cisco ICS 7750 IOS IP, Voice, Plus	IP/Voice Plus	ics7700-sv3y-mz
Cisco ICS 7750 IOS IP, FW, Voice, Plus, IPSec 56	IP/FW/Voice Plus IPSec 56	ics7700-k8o3sv3y-mz
Cisco ICS 7750 IOS IP, FW, Voice, Plus, IPSec, 3DES	IP/FW/Voice Plus IPSec 3DES	ics7700-k9o3sv3y-mz
Cisco ICS 7750 IOS IP, IPX, AT, IBM, Voice, Plus	IP/IPX/AT/IBM/Voice Plus	ics7700-bnr2sv3y-mz
Cisco ICS 7750 IOS IP, IPX, AT, IBM, FW, Voice, Plus, IPSec 56	IP/IPX/AT/IBM/FW/ Voice Plus IPSec 56	ics7700-bk8no3r2sv3y-mz
Cisco ICS 7750 IOS IP, IPX, AT, IBM, FW, Voice, Plus, IPSec, 3DES	IP/IPX/AT/IBM/FW/ Voice Plus IPSec 3DES	ics7700-bk9no3r2sv3y-mz
Cisco ICS 7750 IOS Reduced IP, Analog Voice, Plus[1]	Reduced-IP/Analog Voice Plus	ics7700-sv12y10-mz
Cisco ICS 7750 IOS Reduced IP, Voice, Plus[1]	Reduced-IP/Voice Plus	ics7700-sv3y10-mz

1. This image comprises one of the new voice-only packages, and does not include data networking support.

Note For additional information about feature support for this Cisco IOS release, use the Feature Navigator. See the "Feature Navigator" section on page 19 for additional information.

New and Changed Information

The following section lists the new hardware and software features supported by the Cisco ICS 7750, beginning with Cisco IOS software Release 12.2(8)YN.

New Hardware Features in Release 12.2(8)YN

Cisco IOS Release 12.2(8)YN on the Cisco ICS 7750 supports an MRP with an eight-port FXO card (MRP3-8FXOM1), as described below.

Eight-Port Foreign Exchange Office MRP for the United States with Battery Reversal (MRP3-8FXOM1)

The Cisco ICS 7750 now supports an MRP with eight FXO-M1 ports (MRP3-8FXOM1), which you can use to connect to PBXs or key systems and to provide off-premise connections in the U.S., Canada and other countries. FXO-M1 is an enhancement of FXO with battery reversal and Caller ID features. Like the MRP3-8FXS, the MRP3-8FXOM1 also includes an open slot (slot 1) that accepts all VICs, WICs, and VWICs that are supported on the Cisco ICS 7750.

Note You can use H.323 with the Caller ID and battery reversal answer supervision features on the MRP3-8FXOM1. Media Gateway Control Protocol (MGCP) on the MRP3-8FXOM1 is supported, but not with Caller ID or battery reversal detection.

New Software Features in Release 12.2(8)YN

Cisco IOS Release 12.2(8)YN on the Cisco ICS 7750 supports the following new software features:

- ISDN Non-Facility Associated Signaling (NFAS) with D Channel Backup
- 48 Voice Channel Support on the Same MRP300
- DSP Grouping Enhancement
- Multichannel Support
- Echo Cancellation Enhancement

ISDN Non-Facility Associated Signaling (NFAS) with D Channel Backup

ISDN Non-Facility Associated Signaling (NFAS) enables a single D channel to control multiple Primary Rate Interfaces (PRIs). You can configure a backup D channel when the primary NFAS D channel fails. When you configure channelized T1 controllers for ISDN PRI, you need to configure only the NFAS primary D channel; its configuration is distributed to all the members of the associated NFAS group.

By using a single D channel to control multiple PRIs, one extra channel on each interface is free to carry data traffic. Any hard failure of the primary D-signaling channel results in an immediate switchover to the backup D channel without disconnecting currently connected users.

Configuring NFAS on PRI Groups

When configuring NFAS, use an extended version of the **ISDN pri-group** command to specify the following values for the associated channelized T1 controllers configured for ISDN:

- The range of PRI time slots to be under the control of the D channel (timeslot 24).

- The function to be performed by time slot 24 (primary D channel, backup, or none); the latter specifies its use as a B channel.

- The group identifier number for the interface under this D channel's control.

To configure ISDN NFAS, complete the following tasks in controller configuration mode:

	Command	Purpose
Step 1	**pri-group timeslots 1-24 nfas_d primary nfas_int** *number* **nfas_group** *number*	Configures, on one channelized T1 controller, the NFAS primary D channel.
Step 2	**pri-group timeslots 1-24 nfas_d backup nfas_int** *number* **nfas_group** *number*	Configures, on a different channelized T1 controller, the NFAS backup D channel to be used if the primary D channel fails.
Step 3	**pri-group timeslots 1-24 nfas_d none nfas_int** *number* **nfas_group** *number*	(Optional) Configures, on other channelized T1 controllers, a 24 B channel interface.

> **Note** For additional information about ISDN PRI configuration, refer to the "Configuring ISDN Interfaces for Voice" section in the "Configuring the Cisco ICS 7750" chapter of the *Cisco ICS 7750 Installation and Configuration Guide*. For detailed ISDN PRI configuration instructions, refer to the "Configuring ISDN PRI" chapter in "Part 4, Signaling Configuration" in the *Cisco IOS Dial Technologies Configuration Guide, Release 12.2*.

Restrictions

The following restrictions apply when using NFAS on MRPs in the Cisco ICS 7750:

- NFAS is not supported between two MRPs.

- MGCP is not supported when using NFAS—you must use H.323 in order to use NFAS.

- NFAS must be configured on your service provider's ISDN switch.

- Only the switch types shown in Table 8 support NFAS.

Table 8   ISDN Switch Types and Supported NFAS Types

Switch Type	NFAS Type
AGCS GTD5	NI-2 NFAS
Lucent 4ESS	Custom NFAS
Lucent 5ESS	NI-2 NFAS
Nortel DMS100	Custom NFAS
Nortel DMS250	Custom NFAS
Other switch types	NI-2 NFAS

> ✎
>
> **Note** For additional information about service provider ISDN switches, refer to the document *Capabilities of ISDN Switches*.

48 Voice Channel Support on the Same MRP300

Cisco IOS Release 12.2(8)YN on the Cisco ICS 7750 supports up to 48 channels of voice traffic on the same MRP300, in either of the following configurations:

- One VWIC-2MFT-T1 (the other MRP300 slot must be empty)
- Two VWIC-1MFT-T1s

> ✎
>
> **Note** In order to support 48 voice channels on the same MRP300, that MRP300 can serve only as a voice gateway—that is, that MRP300 cannot be configured to provide VLAN routing or any other data networking functions.

> ✎
>
> **Note** In order to support 48 voice channels, it is recommended that a PVDM-256K-16 be installed in each PVDM slot, because 4 DSPs must be available to each T1 (assuming that the G.711 codec is being used).

Voice Channel Support on ASIs and Other MRPs

The maximum number of voice channels supported on ASIs and on other MRPs is as follows:

- ASI81—38 channels (8 FXS channels + 30 E1 channels)
- ASI160—16 channels (16 FXS channels)
- MRP200—34 channels (4 FXS or FXO channels + 30 E1 channels)
- MRP3-8FXOM1—38 channels (8 FXO channels + 30 E1 channels)
- MRP3-8FXS—38 channels (8 FXS channels + 30 E1 channels)

DSP Grouping Enhancement

Cisco IOS Release 12.2(8)YN on the Cisco ICS 7750 makes it possible to control the grouping of DSPs, by adding support for the **[no] tdm connected** command. Entering this command on an MRP controls the number of DSP groups that are created when there is only one T1 or E1 voice clocking domain.

That is, if a **tdm connected** command has not been entered, the default configuration would be such that there are two DSP groups, provided that there is some combination of analog, BRI, T1, or E1 ports installed in the MRP. If a **tdm connected** command has been entered, the following DSP groups are created, regardless of the types of ports that are installed in the MRP:

- Single voice T1 or E1 clocking domain—One DSP group
- Two voice T1 or E1 clocking domains—Two DSP groups

When **tdm connected** has been configured on an MRP, if a subsequent **tdm clock** command is entered that configures a port for voice (or for voice and data), or if the MRP reboots, then a single DSP group will be created, regardless of the combination of analog, T1, or E1 ports that is installed, except when there are two T1 voice clocking domains.

Note Do not use the **tdm connected** command when both a BRI VIC (VIC-2BRI-NT/TE) and an E1/T1 VWIC (such as the VWIC-1MFT-E1) are present in the same MRP. BRI and E1/T1 ports require independent clock sources.

Tip It is recommended that the **tdm connected** command be used when there is only one T1 or E1 port configured for voice (or for voice and data) installed in the system.

Multichannel Support

Entering the **[no] tdm multichannel** command enables multi-channel support. This command provides support for up to a maximum of eight channel groups, PRI data (PRI-D) channels, or PRI dialer calls on a single T1 or E1 controller on an MRP, with supported speeds on the individual channels of 48Kbps, 56Kbps, and 64Kbps. If multi-channel support is not enabled, speeds of 48Kbps and 56Kbps are not supported.

Enter the following command to enable multi-channel support (this feature is not enabled by default):

tdm multichannel {**E1**/**T1**} *slot/port number* **timeslots** *range*

where *range* can be 1-24 or 1-31.

The default is to have all timeslots in Serial Channel Controller (SCC) non-multi-channel support mode.

If all four SCCs are engaged by multiple channel groups (multi-channel and non-multi-channel modes) on one controller, all High-Level Data Link Control (HDLC) resources will be allocated and no additional channel groups can be created on the remaining controller. This situation is caused by the fragmentation of channel groups on the controller. To work around this problem, do not interleave SCC and multi-channel modes under one controller; instead, use consecutive channels of either SCC or multi-channel modes.

For example, to set up a total of 11 channels in multi-channel mode, you could enter a command similar to the following:

tdm multichannel [**T1**/**E1**] **1/0 timeslots 1-11** (multi-channel mode)

In this example, only one SCC will be used and all remaining timeslots on 1/0 will use up the second available SCC. There will be two SCCs available for the second controller. If you fragment the groups by entering multiple **tdm multichannel** commands, all four SCCs will be used by one controller, leaving no available SCCs for the remaining controller.

Note HDLC is a protocol that provides Cisco serial encapsulation. When using non-multi-channel mode, only four HDLC resources are available. In multi-channel mode, eight HDLC resources are available.

Echo Cancellation Enhancement

Cisco IOS Release 12.2(8)YN on the Cisco ICS 7750 introduces support for a G.168-2000-compliant echo canceller, with up to 64 ms of coverage. The standard Cisco echo canceller, which supports 32 ms of coverage, is used by default. To enable 64-ms echo cancellation, enter the following command, in global configuration mode:

```
voice echo-canceller extended
```

For example:

```
MRP#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
MRP(config)#voice echo-canceller extended
MRP(config)#voice-port 0/0
MRP(config-voiceport)#echo coverage ?
  24  24 milliseconds echo canceller coverage
  32  32 milliseconds echo canceller coverage
  48  48 milliseconds echo canceller coverage
  64  64 milliseconds echo canceller coverage

MRP(config-voiceport)#echo coverage 64
```

If you choose not to enter the extended form of the command, the sequence of commands would be as follows:

```
MRP#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
MRP(config)#voice-port 0/0
MRP(config-voiceport)#echo coverage ?
  16  16 milliseconds echo canceller coverage
  24  24 milliseconds echo canceller coverage
  32  32 milliseconds echo canceller coverage
  8   8 milliseconds echo canceller coverage
```

Important Notes

The following sections contain important notes about Cisco IOS-related issues that can apply to the Cisco ICS 7750.

Software Images on MRP and ASI Cards

All of the MRPs and ASIs in a Cisco ICS 7750 must run the same Cisco IOS image.

Caveats

Caveats describe unexpected behavior or defects in Cisco IOS software releases. Severity 1 caveats are the most serious caveats, severity 2 caveats are less serious, and severity 3 caveats are the least serious of these three severity levels.

Caveats in Release 12.2 T are also in Release 12.2(8)YN. For information on caveats in Cisco IOS Release 12.2 T, refer to the *Caveats for Cisco IOS Release 12.2 T* document. For information on caveats in Cisco IOS Release 12.2, refer to the *Caveats for Cisco IOS Release 12.2* document. These documents list severity 1 and 2 caveats, and are located on CCO and the Documentation CD.

Note   If you have an account with Cisco.com, you can also use the Bug Toolkit to find select caveats of any severity. To reach the Bug Toolkit, log in to Cisco.com and click **Technical Support**: **Tools & Utilities: Software Bug Toolkit**. Another option is to go to http://www.cisco.com/cgi-bin/Support/Bugtool/launch_bugtool.pl.

Open Caveats - Release 12.2(8)YN

This section describes unexpected behavior in Release 12.2(8)YN.

CSCdz77734

If you are using ISDN PRI with MGCP on an MRP300 with two VWIC-1MFT-T1s, the PRI line that is associated with Slot 1 in the VWIC-1MFT-T1 will not work properly.

Workaround—Install a VWIC-2MFT-T1 in the MRP300 and leave the other MRP slot empty.

CSCdz32467

If both a BRI VIC (VIC-2BRI-NT/TE) and an E1/T1 VWIC (such as the VWIC-2MFT-E1) are present in the same MRP, a **tdm connected** command can be entered without generating an error message, although it is not supported in this configuration. BRI and E1/T1 ports require independent clock sources.

Workaround—Do not enter the **tdm connected** command when both a BRI VIC (VIC-2BRI-NT/TE) and an E1/T1 VWIC (such as the VWIC-2MFT-E1) are present in the same MRP.

CSCdz12520

Fax relay might fail if the call is placed through a BRI link (VIC-2BRI-NT/TE) on an MRP.

Workaround—Downgrade to Release 12.2(4)XL4.

CSCdz24792

If no VWICs are present in an MRP, DSP groups cannot be created on that MRP, even though PVDMs are installed.

There is no workaround.

CSCdz32793

If an analog VIC and a T1 VWIC are installed in the same MRP (such as a VWIC-2MFT-T1 in a MRP3-8FXS), and if both the analog and T1 CAS ports are registered with the Cisco CallManager as MGCP endpoints, when the T1 line goes down due to loss of connection, the Cisco CallManager deregisters the analog ports in that MRP.

Workaround—Ensure that the T1 link does not go down, or remove the T1 CAS MGCP configuration from Cisco CallManager if it is not being used.

CSCdz23298

If FXO channel associated signaling (CAS) is used on an MRP300, the MRP300 might reload sporadically.

Workaround—Use E&M signaling instead of FXO signaling, or downgrade to Release 12.2(4)YH.

CSCdy57942

It is possible that after entering multiple commands on an MRP that affect its PRI group and TDM clock configurations, without any pause between the commands, the MRP might reboot. Note that this problem has been observed only in an automated test environment, is not likely to occur in "real-world" situations.

Workaround—After entering a TDM clock command, wait several seconds before entering a PRI group command.

CSCdy19867

When a call to the PSTN is being made through MRP FXS and FXO interfaces on which the **forward-digits all** command has been entered, it is possible that the DTMF tones might be echoed back to the call originator, due to a suspected problem with the echo canceller.

Workaround—Tuning the echo canceller settings and disabling the forward all digits functionality on the necessary FXS and FXO interfaces should help solve this problem. Refer to the following documentation for more information:

- Cisco IOS Voice, Video, and Fax Configuration Guide
- IP Telephony Solution Guide
- Voice Parameters and Tuning Guide

CSCdy02040

If you are using an MRP or ASI with an E1 or T1 CAS trunk, if you change the TDM clocking on an E1 or T1 controller from an export clock configuration to an import clock configuration, and if the E1 or T1 controller is shut down when its clocking is changed, then configuring a DS0 group and entering a **no shut** command on that controller will cause intermittent call failures on some time slots.

For example, if interface T1 0/0 is configured as an export clock and interface T1 0/1 is also configured as an export clock, the following sequence of commands will cause intermittent call failures on T1 0/1:

```
controller T1 0/0
shutdown
no ds0-group 0 timeslots 1-24
no tdm clock T1 0/0

controller T1 0/1
shutdown
no ds0-group 1 timeslots 1-24
no tdm clock T1 0/1

tdm clock T1 0/0 voice export line
tdm clock T1 0/1 voice import T1 0/0 internal

controller T1 0/0
ds0-group 0 timeslots 1-24 type e&m-wink-start
no shutdown

controller T1 0/1
ds0-group 1 timeslots 1-24 type e&m-wink-start
no shutdown
```

Workaround—Do not shut down the E1 or T1 controller before changing its tdm clock configuration. Based on the example shown above, the following configuration will work:

```
controller T1 0/0
no ds0-group 0 timeslots 1-24
no tdm clock T1 0/0

controller T1 0/1
no ds0-group 1 timeslots 1-24
no tdm clock T1 0/1

tdm clock T1 0/0 voice export line
tdm clock T1 0/1 voice import T1 0/0 internal

controller T1 0/0
ds0-group 0 timeslots 1-24 type e&m-wink-start

controller T1 0/1
ds0-group 1 timeslots 1-24 type e&m-wink-start
```

Related Documentation

The following sections describe the documentation available for the Cisco ICS 7750. Typically, 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 the documents listed in the following sections:

- Release-Specific Documents
- Cisco ICS 7750 Documents
- Feature Navigator
- Cisco IOS Software Documentation Set

Release-Specific Documents

The following documents are specific to Release 12.2 and apply to Release 12.2(8)YN. They are located on Cisco.com and the Documentation CD-ROM:

- Release Notes for Cisco IOS Release 12.2(8)YN
  - To reach the *Release Notes for Cisco IOS Release 12.2(8)YN on the Cisco 1CS 7750* from Cisco.com, click this path:

    Products & Services: IOS Software: Cisco IOS Software Releases 12.2: Cisco IOS Software Releases 12.2 YN: Instructions & Guides: Release Notes: Cisco ICS 7750 - Cisco IOS Release 12.2(8)YN

  - To reach the *Release Notes for Cisco IOS Release 12.2(8)YN on the Cisco 1CS 7750* on the Documentation CD-ROM, click this path:

    Product Documentation: Cisco IOS Software: Release 12.2: **Release Notes**: **Cisco Integrated Communications System 7750: Release Notes for Cisco IOS Release 12.2(8)YN on the Cisco ICS 7750**

- Release Notes for Cisco IOS Release 12.2 T

  – To reach the *Cross-Platform Release Notes for Cisco IOS Release 12.2 T* from Cisco.com, click this path:

    Products & Services: IOS Software: Cisco IOS Software Releases 12.2: Cisco IOS Software Releases 12.2 T: Instructions and Guides: Release Notes: Cisco IOS Software Releases 12.2 T

  – To reach the *Cross-Platform Release Notes for Cisco IOS Release 12.2* on the Documentation CD-ROM, click this path:

    Product Documentation: Cisco IOS Software: **Cisco IOS Release 12.2**: **Release Notes**: **Cisco IOS Release 12.2 T**

- *Caveats for Cisco IOS Release 12.2 and 12.2 T*

  The *Caveats for Cisco IOS Release 12.2* and *Caveats for Cisco IOS Release 12.2 T* documents contain caveats applicable to all platforms for all maintenance releases of Release 12.2.

  – To reach the caveats document from Cisco.com, click this path:

    Products & Services: IOS Software: Cisco IOS Software Releases 12.2: Cisco IOS Software Releases 12.2 T: Instructions and Guides: Release Notes: Cisco IOS Software Releases 12.2 T

  – To reach the caveats document on the Documentation CD-ROM, click this path:

    Product Documentation: Cisco IOS Software: **Cisco IOS Release 12.2**: **Caveats**

Note If you have an account with Cisco.com, you can also use the Bug Toolkit to find select caveats of any severity. To reach the Bug Toolkit, log in to Cisco.com and click **Technical Support**: **Tools & Utilities: Software Bug Toolkit**. Another option is to go to http://www.cisco.com/cgi-bin/Support/Bugtool/launch_bugtool.pl.

Cisco ICS 7750 Documents

The documents described in this section are available on Cisco.com and on CD:

On Cisco.com:

Products & Services: Voice Application Systems: Cisco ICS 7700 Series Integrated Communications Systems: Instructions and Guides

On the Documentation CD-ROM (order number DOC-CONDOCCD=) at:

Product Documentation: Voice/Telephony: Cisco ICS 7750

Documentation Set

Printed versions of many of the platform-specific documents can be ordered as a boxed set (order number DOCS-7750=).

Feature Navigator

Feature Navigator is a web-based tool that enables you to quickly determine which Cisco IOS software images support a particular set of features and which features are supported in a particular Cisco IOS image. Feature Navigator is available 24 hours a day, 7 days a week.

To access Feature Navigator, 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 set up an account.

To use Feature Navigator, you must have a JavaScript-enabled web browser such as Netscape 3.0 or later, or Internet Explorer 4.0 or later. Internet Explorer 4.0 always has JavaScript enabled. To enable JavaScript for Netscape 3.x or Netscape 4.x, follow the instructions provided with the web browser. For JavaScript support and enabling instructions for other browsers, check with the browser vendor.

Feature Navigator is updated when major Cisco IOS software releases and technology releases occur. You can access Feature Navigator at the following URL:

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

Cisco IOS Software Documentation Set

The Cisco IOS software documentation set consists of the Cisco IOS configuration guides, Cisco IOS command references, and several other supporting documents that are shipped with your order in electronic form on the Documentation CD-ROM—unless you specifically ordered 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:

Products & Services: IOS Software: Cisco IOS Software Releases 12.2: Instructions and Guides: Master Indices

On the Documentation CD-ROM at:

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

Release 12.2 Documentation Set

Table 9 describes the contents of the Cisco IOS Release 12.2 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.

> **Note** Some aspects of the complete Cisco IOS Release 12.2 software documentation set might not apply to the Cisco ICS 7750.

Table 9   Cisco IOS Release 12.2 Documentation Set

Books	Major Topics
• Cisco IOS Configuration Fundamentals Configuration Guide • Cisco IOS Configuration Fundamentals Command Reference	Cisco IOS User Interfaces File Management System Management
• Cisco IOS Bridging and IBM Networking Configuration Guide • Cisco IOS Bridging and IBM Networking Command Reference, Volume 1 of 2 • Cisco IOS Bridging and IBM Networking Command Reference, Volume 2 of 2	Transparent Bridging SRB Token Ring Inter-Switch Link Token Ring Route Switch Module RSRB DLSW+ Serial Tunnel and Block Serial Tunnel LLC2 and SDLC IBM Network Media Translation SNA Frame Relay Access NCIA Client/Server Airline Product Set DSPU and SNA Service Point SNA Switching Services Cisco Transaction Connection Cisco Mainframe Channel Connection CLAW and TCP/IP Offload CSNA, CMPC, and CMPC+ TN3270 Server
• Cisco IOS Dial Technologies Configuration Guide: Dial Access • Cisco IOS Dial Technologies Configuration Guide: Large-Scale Dial Applications • Cisco IOS Dial Technologies Command Reference, Volume 1 of 2 • Cisco IOS Dial Technologies Command Reference, Volume 2 of 2	Dial Access Modem and Dial Shelf Configuration and Management ISDN Configuration Signaling Configuration Point-to-Point Protocols Dial-on-Demand Routing Dial Backup Dial Related Addressing Service Network Access Solutions Large-Scale Dial Solutions Cost-Control Solutions Internetworking Dial Access Scenarios
• *Cisco IOS Interface Configuration Guide* • *Cisco IOS Interface Command Reference*	LAN Interfaces Serial Interfaces Logical Interfaces

Table 9   Cisco IOS Release 12.2 Documentation Set (continued)

Books	Major Topics
• Cisco IOS IP Configuration Guide • Cisco IOS IP Command Reference, Volume 1 of 3: Addressing and Services • Cisco IOS IP Command Reference, Volume 2 of 3: Routing Protocols • Cisco IOS IP Command Reference, Volume 3 of 3: Multicast	IP Addressing IP Services IP Routing Protocols IP Multicast
• Cisco IOS AppleTalk and Novell IPX Configuration Guide • Cisco IOS AppleTalk and Novell IPX Command Reference	AppleTalk 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 XNS
• Cisco IOS Voice, Video, and Fax Configuration Guide • *Cisco IOS Voice, Video, and Fax Command Reference*	Voice over IP Call Control Signaling Voice over Frame Relay Voice over ATM Telephony Applications Trunk Management Fax, Video, and Modem Support
• Cisco IOS Quality of Service Solutions Configuration Guide • *Cisco IOS Quality of Service Solutions Command Reference*	Packet Classification Congestion Management Congestion Avoidance Policing and Shaping Signaling Link Efficiency Mechanisms
• Cisco IOS Security Configuration Guide • *Cisco IOS Security Command Reference*	AAA Security Services Security Server Protocols Traffic Filtering and Firewalls IP Security and Encryption Passwords and Privileges Neighbor Router Authentication IP Security Options Supported AV Pairs
• Cisco IOS Switching Services Configuration Guide • Cisco IOS Switching Services Command Reference	Cisco IOS Switching Paths 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*	ATM Frame Relay SMDS X.25 and LAPB

Table 9   Cisco IOS Release 12.2 Documentation Set (continued)

Books	Major Topics
• Cisco IOS Mobile Wireless Configuration Guide • Cisco IOS Mobile Wireless Command Reference	General Packet Radio Service
• Cisco IOS Terminal Services Configuration Guide • Cisco IOS Terminal Services Command Reference	ARA LAT NASI Telnet TN3270 XRemote X.28 PAD Protocol Translation
• *Cisco IOS Configuration Guide Master Index* • *Cisco IOS Command Reference Master Index* • Cisco IOS Debug Command Reference • Cisco IOS Software System Error Messages • New Features in 12.2-Based Limited Lifetime Releases • New Features in Release 12.2T • Release Notes (Release note and caveat documentation for 12.2-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 URL:

http://www.cisco.com

Translated documentation is available at the following URL:

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

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which is shipped 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 through 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/cgi-bin/order/order_root.pl

- 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, elsewhere 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, for your convenience many documents contain a response card behind the front cover. Otherwise, you can mail your comments to the following address:

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

We appreciate 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 by using the Cisco Technical Assistance Center (TAC) Web Site. Cisco.com registered users have complete access to the technical support resources on the Cisco TAC Web Site.

Cisco.com

Cisco.com is the foundation of a suite of interactive, networked services that provides immediate, open access to Cisco information, networking solutions, services, programs, and resources at any time, from anywhere in the world.

Cisco.com is a highly integrated Internet application and a powerful, easy-to-use tool that provides a broad range of features and services to help you to

- Streamline business processes and improve productivity
- Resolve technical issues with online support

- Download and test software packages

- Order Cisco learning materials and merchandise

- Register for online skill assessment, training, and certification programs

You can self-register on Cisco.com to obtain customized information and service. To access Cisco.com, go to the following URL:

http://www.cisco.com

Technical Assistance Center

The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available through the Cisco TAC: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Inquiries to Cisco TAC are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.

- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.

- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.

- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Which Cisco TAC resource you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

The Cisco TAC Web Site allows you to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to the following URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco services contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to the following URL to register:

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

If you cannot resolve your technical issues by using the Cisco TAC Web Site, and you are a Cisco.com registered user, you can open a case online by using the TAC Case Open tool at the following URL:

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

If you have Internet access, it is recommended that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses issues that are classified as priority level 1 or priority level 2; these classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer will automatically open a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to the following URL:

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

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled; for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). In addition, please have available your service agreement number and your product serial number.

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