



Release Notes for Cisco IOS Release 12.3(2)XA on the Cisco ICS 7750

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These release notes describe features and functionality of Cisco IOS Release 12.3(2)XA 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 Release 12.3](#) located on Cisco.com and the Documentation CD-ROM.

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

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System Requirements

This section describes the system requirements for Release 12.3(2)XA on the Cisco ICS 7750. It includes the following sections:

- [Memory Requirements, page 2](#)
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Memory Requirements

[Table 1](#) describes the memory requirements for the Cisco IOS feature sets supported by Cisco IOS Release 12.3(2)XA on analog station interface cards (ASIs) and multiservice route processor cards (MRPs) in a Cisco ICS 7750.


Note

If you intend to use Survivable Remote Site Telephony (SRST) and if you expect the amount of voice traffic to reach two full T1s (48 channels) on an MRP300, the amount of DRAM that is required on the MRP300 increases to 96 MB. Refer to [Installing Memory, PVD, and VPN Modules in ASI Cards, MRP Cards, and SPE Cards in the Cisco ICS 7750](#) for memory upgrade instructions.

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

Platform	Image Name	Image	Software Bundles	Required Flash Memory for the MRP300, MRP3-8FXS ¹ , 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

Table 1 Available Software Images and Memory Requirements for ASIs and MRPs (continued)

Platform	Image Name	Image	Software Bundles	Required Flash Memory for the MRP300, MRP3-8FXS ¹ , MRP3-16FXS	Required Flash Memory for the MRP200, ASI81, ASI160 ²	Required DRAM Memory ³	Runs From
	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. FXS = Foreign Exchange Station.
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, PVD, 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 12.3(2)XA 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.	<ul style="list-style-type: none"> • SPE200¹: No front-panel ports. • SPE310: Front-panel ports for video, keyboard, and universal serial bus (USB).

Table 2 Cisco ICS 7750 Processor Cards (continued)

Card	Card Description	Port Description
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.	<ul style="list-style-type: none"> • 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 connections to analog trunks between a Central Office (CO) and an IP telephony system. It also has two PVDM slots and onboard flash memory.	<ul style="list-style-type: none"> • Eight FXO² 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
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.	<ul style="list-style-type: none"> • 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.

2. FXO = Foreign Exchange Office.

[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

Refer to *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=
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 ¹ Mode
2-port FXS voice/fax interface card	VIC-2FXS	Yes
2-port FXO voice/fax interface card	VIC-2FXO	Yes
4-port FXO voice/fax interface card with battery reversal detection and caller ID support (for the United States, Europe, and Australia) [Replaces the VIC-4FXO-M1, VIC-2FXO-M1, VIC-2FXO-M2, and VIC-2FXO-M3]	VIC2-4FXO	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

Table 5 Supported WICs, VICs and VWICs (continued)

Card Description	Abbreviated Name	Support in MGCP ¹ Mode
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
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 ² voice/fax interface card	VIC2-2E/M	No
2-port E&M voice/fax interface card	VIC-2E/M	No
2-port analog DID ³ 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) [Replaces the VIC-2BRI-NT/TE]	VIC2-2BRI-NT/TE	Yes
2-port ISDN BRI voice/fax interface card (network and terminal side)	VIC-2BRI-NT/TE	Yes
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 ⁴ BRI ⁵ (S/T interface)	WIC-1B-ST	Not applicable
1-port ISDN BRI with integrated NT1 (U interface)	WIC-1B-U	Not applicable
1-port, four-wire 56-kbps CSU/DSU ⁶	WIC-1DSU-56K4	Not applicable
1-port, T1/fractional T1 CSU/DSU	WIC-1DSU-T1	Not applicable

1. MGCP = Media Gateway Control Protocol
2. E&M = Ear and Mouth
3. DID = Direct Inward Dial
4. ISDN = Integrated Services Digital Network
5. BRI = Basic Rate Interface
6. 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, VIC2-2BRI-NT/TE, VIC-2DID, VIC2-2E/M, VIC-2E/M, VIC-2FXO, VIC-2FXO-M1, VIC-2FXO-M2, VIC-2FXO-M3, VIC-4FXO-M1, VIC2-4FXO, 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, VIC2-2BRI-NT/TE, VIC-2DID, VIC2-2E/M, VIC-2E/M, VIC-2FXO, VIC-2FXO-M1, VIC-2FXO-M2, VIC-2FXO-M3, VIC-4FXO-M1, VIC2-4FXO, 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
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

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

	MRP300 (Voice Only) ¹	MRP300 (Data Only)	MRP300 (Voice and Data)	MRP3-8FXOM1	MRP3-8FXS
Slot 0	Slot 1				
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, VIC2-2E/M, VIC-2E/M, VIC-2-2E/M, VIC-2FXO, VIC-2FXO-M1, VIC-2FXO-M2, VIC-2FXO-M3, VIC-4FXO-M1, VIC2-4FXO, 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
8-port FXS module	Not applicable	Not applicable	Not applicable	Not applicable	VIC-2DID, VIC2-2E/M, VIC-2E/M, VIC-2FXO, VIC-2FXO-M1, VIC-2FXO-M2, VIC-2FXO-M3, VIC-4FXO-M1, VIC2-4FXO, 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.

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 12.3(2)XA, 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. Cisco IOS Release 12.3(2)XA supports the same feature sets as Releases 12.2 and 12.2T, but Release 12.3(2)XA 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 17 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 12.3(2)XA.

New Hardware Features in Release 12.3(2)XA

There are no new hardware features supported in Cisco IOS Release 12.3(2)XA on the Cisco ICS 7750.

For a description of new hardware features supported by previous versions, refer to the Cisco IOS Release information for the Cisco Integrated Communications System 7750 at

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios122/122relnt/ics7750/>.

New Software Features in Release 12.3(2)XA

Cisco IOS Release 12.3(2)XA on the Cisco ICS 7750 supports the following new software features:

- [ISDN BRI Backhaul \(Cisco CallManager/MGCP Mode with Fallback, Failover, and Multiple Frequency Tone Support\)](#), page 11
- [Data and Voice Quality of Service Features](#), page 12

ISDN BRI Backhaul (Cisco CallManager/MGCP Mode with Fallback, Failover, and Multiple Frequency Tone Support)

Cisco IOS Release 12.3(2)XA on the Cisco ICS 7750 builds on the support for E1 PRI QSIG Backhaul (MGCP), as detailed in [Release Notes for Cisco IOS Release 12.2\(13\)ZH on the Cisco ICS 7750](#). ISDN BRI backhaul provides the capability to terminate the ISDN D-channel in the Cisco IOS software running on the MRP300, and enables MGCP-controlled backhaul of BRI signaling to Cisco CallManager over a reliable transport session.

BRI Layer 3 (Q.931) signaling backhaul is the transport of signaling information between a media gateway (such as a Cisco ICS 7750 MRP, Cisco access server, router, or concentrator) and a media gateway controller (such as Cisco CallManager). Communication between the media gateway and the media gateway controller is managed by the Media Gateway Control Protocol (MGCP).

The media gateway provides an interface between the Public Switched Telephone Network (PSTN) and the packet network (IP or ATM). The media gateway controller provides call processing and gateway control.

The signaling backhaul occurs at the boundary between Layer 2 (Q.921) and Layer 3 (Q.931). The Cisco CallManager MGCP backhaul support enables communication with the gateway via two logical channels: a user datagram protocol (UDP) logical connection to exchange MGCP messages and a transmission control protocol (TCP) connection to backhaul, or transport, the Q.931 messages. The lower layers of the protocol are terminated and processed on the media gateway. The upper layers of the protocol are backhauled using TCP directly from the media gateway to the media gateway controller. The media gateway controller processes these Q.931 messages and sends call setup instructions to the media gateway.



Note

The only BRI protocol that is supported on the Cisco CallManager MGCP gateway is NET3 (user side protocol).

Data and Voice Quality of Service Features

Cisco IOS Release 12.3(2)XA on the Cisco ICS 7750 adds support for the following data and voice-specific IOS software Quality of Service (QoS) features, as categorized below.

Classification

Packet classification features provide the capability to partition network traffic into multiple priority levels, or classes of service. The following classification feature is supported:

- **Policy-Based Routing (PBR)**—PBR provides a flexible method to route packets by allowing you to configure a defined policy for traffic flows. PBR enhances routing by extending and complementing the existing mechanisms provided by routing protocols, while reducing reliance on routes derived from routing protocols. PBR allows you to specify a path for certain traffic, such as priority traffic over a high-cost link; it can also be set to route packets based on configured policies. For example, you can implement routing policies to allow or deny paths based on the identity of a particular end system, an application protocol, or the size of packets. All packets received on a PBR-enabled interface are passed through enhanced packet filters known as route maps. These route maps are then used by PBR to dictate the policy and determine where the packets are forwarded.

Policing and Shaping

Traffic regulation mechanisms ensure that a packet, or data source, adheres to a stipulated contract. Traffic policing allows you to control the maximum rate of traffic sent or received on an interface, and to partition a network into multiple priority levels or class of service (CoS). The following policing and shaping features are supported:

- **Single-Rate Policer**—This traffic policing feature manages the maximum rate of traffic through a token bucket algorithm. The token bucket algorithm can use the user-configured values to determine the maximum rate of traffic allowed on an interface at a specific time. The token bucket algorithm is affected by all traffic entering or leaving the interface (depending on the location of the interface on which the feature is configured) and is useful in managing network bandwidth in cases where several large packets are sent in the same traffic stream. The token bucket algorithm enables the use of three actions for each packet: a conform action, an exceed action, and an optional violate action. Traffic entering the interface with Traffic Policing configured is placed into one of these categories. Within these three categories, you can make decisions about packet treatments. For example, packets that conform can be configured to be transmitted, packets that exceed can be configured to be sent with a decreased priority, and packets that violate can be configured to be dropped.
- **Two-Rate Policer**—With the Two-Rate Policer, you can enforce traffic policing according to two separate rates: committed information rate (CIR) and peak information rate (PIR). The Two-Rate Policer manages the maximum rate of traffic through a token bucket algorithm. The token bucket algorithm can use the user-configured values to determine the maximum rate of traffic allowed on an interface at a specific time. The token bucket algorithm is affected by all traffic entering or leaving the interface (depending on the location of the interface on which the Two-Rate Policer is configured) and is useful in managing network bandwidth in cases where several large packets are sent in the same traffic stream. The token bucket algorithm enables the use of three actions for each packet: a conform action, an exceed action, and an optional violate action. Traffic entering the interface with Two-Rate Policer configured is placed into one of these categories. Within these three categories, you can make a decision about packet treatments. For example, packets that conform can be configured to be sent, packets that exceed can be configured to be sent with a decreased priority, and packets that violate can be configured to be dropped. The Two-Rate Policer is often configured on interfaces at the edge of a network to limit the rate of traffic entering or leaving the network. In the most common configurations, traffic that conforms is sent and traffic that exceeds is sent with a decreased priority or is dropped. You can change these configuration options to suit your specific network needs.

Call Admission Control

Call Admission Control (CAC) applies to voice traffic only. If an influx of data traffic oversubscribes a particular link in the network, queueing, buffering, and packet drop decisions resolve the congestion. The extra traffic is delayed until the interface becomes available to send the traffic, or, if traffic is dropped, the protocol or the end user initiates a timeout and requests a retransmission of the information. CAC is a deterministic and informed decision that is made before a voice call is established; it is based on whether the required network resources are available to provide the appropriate QoS for the new call. CAC mechanisms extend the capabilities of the QoS tool suite to protect voice traffic from being negatively affected by other voice traffic, and to keep excess voice traffic off the network. For additional information about CAC, refer to the “VoIP Call Admission Control” section in [Cisco Voice over IP Solutions](#).

The following CAC features are supported:

- **Local Voice Busyout (LVBO)**—LVBO allows you to take a PBX trunk connection to the attached gateway completely out of service when WAN conditions are considered unsuitable to carry voice traffic. This provides a method to reject all calls without a post dial delay. It also prevents the need for hairpinning rejected calls back to the originating PBX, using up multiple DS0 slots for a single call.
- **Advanced Voice Busyout (AVBO)**—AVBO is an enhancement to LVBO. Although LVBO provides for busyout based on local conditions of the outgoing gateway, AVBO adds the capability to trigger a Security Assurance Agent (SAA) probe to one or more configured IP destinations. The information returned by the probe, either the explicit loss or delay values, or the Calculated Planning Impairment Factor (ICPIF) congestion threshold can be used to trigger a busyout of the connection to the PBX.
- **Alarm Trigger on T1/E1**—The alarm-conditioning feature provides status monitoring on T1/E1 PBX voice interfaces for permanent trunk connections created using the Cisco **connection trunk** command (private lines and tie-lines) and for switched calls. The feature supports operation with channel associated signaling (CAS) only; it does not support common channel signaling (CCS). A T1/E1 alarm can be triggered by events detected through the monitoring of a specified set of voice ports within a T1/E1 trunk. When all of the monitored voice ports on a T1/E1 trunk go out of service (PVCs are out of service and SVCs are busied out), a T1/E1 blue alarm (alarm indication signal, AIS) can be generated on the T1/E1 connected to the PBX or PSTN.



Note

For detailed information about data and voice QoS features, refer to [Cisco IOS Quality of Service Solutions Configuration Guide, Release 12.3](#).

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 12.3(2)XA. 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 12.3(2)XA

This section describes unexpected behavior in Release 12.3(2)XA.

CSCea28664

If you have configured SRST on an MRP300 in the Cisco ICS 7750, and if the MRP has 64 MB of memory (the factory default), there will not be enough memory to configure the maximum number of SRST directory numbers (DNs) and 2 T1 PRIs (24 channels each) at the same time.

Assuming that two full T1 PRIs (48 channels) are configured, when you attempt to add the maximum number of DN, an error message similar to the following might be displayed.

```
*Mar 1 00:00:31.743: %LINK-3-UPDOWN: Interface ephone_dsp DN 129, changed state to up
*Mar 1 00:00:31.883: %DIALPEER_DB-3-ADDPEER_MEM_THRESHOLD: Addition of dial-peers limited
by available memory
```

Workaround—Install additional memory in the MRP300 (up to a maximum of 128 MB). Refer to [Installing Memory, PVD, and VPN Modules in ASI Cards, MRP Cards, and SPE Cards in the Cisco ICS 7750](#) for instructions.

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](#)

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, page 15](#)
- [Cisco ICS 7750 Documents, page 16](#)
- [Feature Navigator, page 17](#)
- [Cisco IOS Software Documentation Set, page 17](#)

Release-Specific Documents

The following documents are specific to Release 12.3 and Release 12.2, and apply to Release 12.3(2)XA. They are located on Cisco.com and the Documentation CD-ROM:

- [Release Notes for Cisco IOS Release 12.3\(2\)XA](#)
 - To reach the *Release Notes for Cisco IOS Release 12.3(2)XA on the Cisco ICS 7750* from Cisco.com, click this path:
Products & Services: IOS Software: Cisco IOS Software Releases 12.3: Cisco IOS Software Releases 12.3XA: Technical Documentation: Release Notes: Cisco ICS 7750 - Cisco IOS Release 12.3(2)XA
 - To reach the *Release Notes for Cisco IOS Release 12.3(2)XA on the Cisco ICS 7750* on the Documentation CD-ROM, click this path:
Product Documentation: Cisco IOS Software: Release 12.3: Release Notes: Cisco Integrated Communications System 7750: Release Notes for Cisco IOS Release 12.3(2)XA on the Cisco ICS 7750
- [Release Notes for Cisco IOS Release 12.3](#)
 - To reach the *Cross-Platform Release Notes for Cisco IOS Release 12.3* from Cisco.com, click this path:
Products & Services: IOS Software: Cisco IOS Software Releases 12.3: Cisco IOS Software Releases 12.3: Technical Documentation: Release Notes: Cisco IOS Software Releases 12.3
 - To reach the *Cross-Platform Release Notes for Cisco IOS Release 12.3* on the Documentation CD-ROM, click this path:
Product Documentation: Cisco IOS Software: Cisco IOS Release 12.3: Release Notes: Cisco IOS Release 12.3

- [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: Technical Documentation: 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 12.3](#)
 The [Caveats for Cisco IOS Release 12.3](#) documents contain caveats applicable to all platforms for all maintenance releases of Release 12.3.
 - To reach the caveats document from Cisco.com, click this path:
Products & Services: IOS Software: Cisco IOS Software Releases 12.3: Cisco IOS Software Releases 12.3: Technical Documentation: Release Notes: Cisco IOS Software Releases 12.3
 - To reach the caveats document on the Documentation CD-ROM, click this path:
Product Documentation: Cisco IOS Software: Cisco IOS Release 12.3: Caveats
- [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: Technical Documentation: 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: Technical Documentation

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 Mainline: Technical Documentation: 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 8 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 8 Cisco IOS Release 12.2 Documentation Set

Books	Major Topics
<ul style="list-style-type: none"> • Cisco IOS Configuration Fundamentals Configuration Guide • Cisco IOS Configuration Fundamentals Command Reference 	Cisco IOS User Interfaces File Management System Management
<ul style="list-style-type: none"> • 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

Table 8 Cisco IOS Release 12.2 Documentation Set (continued)

Books	Major Topics
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • <i>Cisco IOS Interface Configuration Guide</i> • <i>Cisco IOS Interface Command Reference</i> 	LAN Interfaces Serial Interfaces Logical Interfaces
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Cisco IOS AppleTalk and Novell IPX Configuration Guide • Cisco IOS AppleTalk and Novell IPX Command Reference 	AppleTalk Novell IPX
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Cisco IOS Voice, Video, and Fax Configuration Guide • <i>Cisco IOS Voice, Video, and Fax Command Reference</i> 	Voice over IP Call Control Signaling Voice over Frame Relay Voice over ATM Telephony Applications Trunk Management Fax, Video, and Modem Support
<ul style="list-style-type: none"> • Cisco IOS Quality of Service Solutions Configuration Guide • <i>Cisco IOS Quality of Service Solutions Command Reference</i> 	Packet Classification Congestion Management Congestion Avoidance Policing and Shaping Signaling Link Efficiency Mechanisms

Table 8 Cisco IOS Release 12.2 Documentation Set (continued)

Books	Major Topics
<ul style="list-style-type: none"> • Cisco IOS Security Configuration Guide • <i>Cisco IOS Security Command Reference</i> 	AAA Security Services Security Server Protocols Traffic Filtering and Firewalls IP Security and Encryption Passwords and Privileges Neighbor Router Authentication IP Security Options Supported AV Pairs
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Cisco IOS Wide-Area Networking Configuration Guide • <i>Cisco IOS Wide-Area Networking Command Reference</i> 	ATM Frame Relay SMDS X.25 and LAPB
<ul style="list-style-type: none"> • Cisco IOS Mobile Wireless Configuration Guide • Cisco IOS Mobile Wireless Command Reference 	General Packet Radio Service
<ul style="list-style-type: none"> • Cisco IOS Terminal Services Configuration Guide • Cisco IOS Terminal Services Command Reference 	ARA LAT NAS1 Telnet TN3270 XRemote X.28 PAD Protocol Translation
<ul style="list-style-type: none"> • <i>Cisco IOS Configuration Guide Master Index</i> • <i>Cisco IOS Command Reference Master Index</i> • 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.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- The *Cisco Product Catalog* describes the networking products offered by Cisco Systems as well as ordering and customer support services. Access the *Cisco Product Catalog* at this URL:

http://www.cisco.com/en/US/products/products_catalog_links_launch.html

- Cisco Press publishes a wide range of networking publications. Cisco suggests these titles for new and experienced users: *Internetworking Terms and Acronyms Dictionary*, *Internetworking Technology Handbook*, *Internetworking Troubleshooting Guide*, and the *Internetworking Design Guide*. For current Cisco Press titles and other information, go to Cisco Press online at this URL:

<http://www.ciscopress.com>

- *Packet* magazine is the Cisco monthly periodical that provides industry professionals with the latest information about the field of networking. You can access *Packet* magazine at this URL:

http://www.cisco.com/en/US/about/ac123/ac114/about_cisco_packet_magazine.html

- *iQ Magazine* is the Cisco monthly periodical that provides business leaders and decision makers with the latest information about the networking industry. You can access *iQ Magazine* at this URL:

http://business.cisco.com/prod/tree.taf%3fasset_id=44699&public_view=true&kbns=1.html

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in the design, development, and operation of public and private internets and intranets. You can access the *Internet Protocol Journal* at this URL:

http://www.cisco.com/en/US/about/ac123/ac147/about_cisco_the_internet_protocol_journal.html

- Training—Cisco offers world-class networking training, with current offerings in network training listed at this URL:

http://www.cisco.com/en/US/learning/le31/learning_recommended_training_list.html

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

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