



Release Notes for Cisco IOS Release 12.2(15)ZL1 on the Cisco ICS 7750

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These release notes describe features and functionality of Cisco IOS Release 12.2(15)ZL1 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 Cisco.com and the Documentation CD-ROM.

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System Requirements

This section describes the system requirements for Release 12.2(15)ZL1 on the Cisco ICS 7750. It includes the following sections:

- [Memory Requirements, page 2](#)
- [Hardware Supported, page 3](#)
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Memory Requirements

[Table 1](#) describes the memory requirements for the Cisco IOS feature sets supported by Cisco IOS Release 12.2(15)ZL1 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, PVDM, 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 12.2(15)ZL1 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 | No |
| 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 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 12.2(15)ZL, 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(15)ZL1 supports the same feature sets as Releases 12.2 and 12.2T, but Release 12.2(15)ZL1 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 18 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(15)ZL.

New Hardware Features in Release 12.2(15)ZL

Cisco IOS Release 12.2(15)ZL on the Cisco ICS 7750 supports the following new interface cards:

- [Two-Port Ear and Mouth VIC \(VIC2-2E/M\)](#)
- [Four-Port Foreign Exchange Office Voice Interface Card \(VIC2-4FXO\)](#)
- [Two-Port Integrated Services Digital Network Basic Rate Interface VIC \(VIC2-2BRI\)](#)

Two-Port Ear and Mouth VIC (VIC2-2E/M)

Cisco IOS Release 12.2(15)ZL supports the two-port E&M VIC (VIC2-2E/M). You can use the VIC2-2E/M to connect to PBX or key system trunk lines.

Four-Port Foreign Exchange Office Voice Interface Card (VIC2-4FXO)

Cisco IOS Release 12.2(15)ZL supports the four-port FXO voice interface card (VIC2-4FXO). You can use the VIC2-4FXO to connect to Private Branch Exchanges (PBXs) or key systems and to provide off-premises connections.

The VIC2-4FXO is a universal FXO card that supports the following types of FXO interfaces:

- FXO
- FXO-M1—An FXO enhancement with battery reversal and Caller ID feature support for North America
- FXO-M2—An FXO enhancement with battery reversal and Caller ID feature support for Europe
- FXO-M3—An FXO enhancement with battery reversal feature support for Australia



Note You can use H.323 with the Caller ID and battery reversal answer supervision features on the VIC2-4FXO. For interfaces that are configured to use FXO-M1, Media Gateway Control Protocol (MGCP) on the VIC2-4FXO is supported, but not with Caller ID or battery reversal detection.

Two-Port Integrated Services Digital Network Basic Rate Interface VIC (VIC2-2BRI)

Cisco IOS Release 12.2(15)ZL supports the two-port ISDN BRI VIC (VIC2-2BRI). You can use the VIC2-2BRI to connect to ISDN PBXs or key systems. The VIC2-2BRI supports the following functionality:

- S/T—Terminal Equipment (TE). Connects to an ISDN WAN through an external NT1 device.
- NT/TE—Network Termination (NT) or TE. Connects to a central office (CO) switch or PBX that provides Network Termination.

New Software Features in Release 12.2(15)ZL

Cisco IOS Release 12.2(15)ZL on the Cisco ICS 7750 supports the following new software features:

- [E1 R2 Signaling](#)
- [Locale-Based Multifrequency Tones](#)
- [T1 Channel Associated Signaling Feature Group D](#)
- [Survivable Remote Site Telephony \(SRST\)](#)
- [MGCP Gateway Fallback](#)

E1 R2 Signaling

R2 signaling is an international signaling standard that is common to channelized E1 networks, however, there is no single signaling standard for R2. The ITU-T Q.400-Q.490 recommendation defines R2, but a number of countries and geographic regions implement R2 in entirely different ways. Cisco Systems addresses this challenge by supporting many localized implementations of R2 signaling in its Cisco IOS software.

Beginning with Cisco IOS Release 12.2(15)ZL, voice gateways (MRPs) on the Cisco ICS 7750 can originate and terminate calls over E1 links (MRP-peer PBX/CO) by using R2 signaling.

Locale-Based Multifrequency Tones

Cisco IOS Release 12.2(15)ZL on the Cisco ICS 7750 supports locale-based multifrequency tones on voice gateways (MRPs).

Cisco IOS gateways typically use pre-defined static tones. The static tones for each country are stored in IOS tone tables. Beginning with Cisco CallManager 3.3(2), locale-specific tones and their associated frequency, amplitude, and cadence information can be stored on a trivial file transfer protocol (TFTP) server and downloaded to gateways in an XML-based configuration file. The country-specific information that is stored in this configuration file is referred to as a *network locale*. When Cisco CallManager and the gateway are properly configured, the tones with locale-specific frequency, amplitude, and cadence as stored on the TFTP server are used in place of the pre-defined static tones in the IOS tone table.

T1 Channel Associated Signaling Feature Group D

Cisco IOS Release 12.2(15)ZL on the Cisco ICS 7750 extends support for T1 Channel Associated Signaling (CAS) Feature Group D. Feature Group D service is a trunk-side connection that enables telephone customers to choose their long distance network and use the same number of digits no matter which carrier they use. Routers interface with interexchange carriers using Feature Group D to support voice traffic in the carrier environment.

Cisco platforms use Feature Group D to provide voice functionality in the carrier environment. Feature Group D is a trunk-side local access transport area (LATA) access that supplies the following features:

- Call supervision to an interexchange carrier (IEC)
- Trunk-side access with an associated 10XXX access code for end-user use in originating and terminating communications
- Optional calling-party identification
- Recording of access-charge billing details

- Presubscription to a customer-specified IEC
- Automatic number identification (ANI) for billing purposes

Survivable Remote Site Telephony (SRST)

Cisco IOS Release 12.2(15)ZL on the Cisco ICS 7750 supports SRST, to provide call-handling support on an MRP when Cisco CallManager is not available. SRST enables MRPs or other routers to provide call-handling support for Cisco IP phones when they lose connection to remote primary, secondary, or tertiary Cisco CallManager installations, or when the WAN connection is down. Prior to the SRST feature, if the WAN connection between a router and Cisco CallManager failed, or if connectivity with Cisco CallManager was lost for some reason, Cisco IP phones on the network became unusable for the duration of the failure.

With SRST, the system automatically detects a failure and uses Simple Network Auto Provisioning (SNAP) to autoconfigure the branch office router to provide call processing for Cisco IP phones registered with the router. When the WAN link or connection to the primary Cisco CallManager is restored, call-handling reverts back to the primary Cisco CallManager.

When Cisco IP phones lose contact with primary, secondary, and tertiary Cisco CallManagers, they must establish a connection to a local SRST router in order to ensure that call-processing can continue. The Cisco IP phone retains the IP address of the local SRST router as a default router in the Network Configuration area of the Settings menu. This list supports a maximum of five default router entries; however, Cisco CallManager accommodates a maximum of three entries. When a secondary Cisco CallManager is not available on the network, the local SRST router IP address is retained as the standby connection for Cisco CallManager during normal operation.

When the WAN link fails, calls in progress are sustained for the duration of the call. Calls in transition and calls that have not yet connected are dropped and must be reinitiated once Cisco IP phones reestablish connection to their local SRST router. Telephone service remains unavailable from the time connection to the remote Cisco CallManager is lost until the Cisco IP phone establishes connection to the SRST router.



Note

Cisco CallManager fallback mode telephone service is available only to those Cisco IP phones that are supported by an SRST router. Other Cisco IP phones on the network remain out of service until they are able to reestablish a connection with their primary, secondary, or tertiary Cisco CallManager.

MGCP Gateway Fallback

Cisco IOS Release 12.2(15)ZL on the Cisco ICS 7750 supports MGCP gateway fallback. MGCP gateway fallback improves the reliability of MGCP branch networks. A WAN link connects the MGCP gateway at a remote site to the Cisco CallManager at a central site, which is the MGCP call agent. If Cisco Callmanager or the WAN link fails, the fallback feature keeps the gateway working as an H.323 gateway.

In the event of a Cisco CallManager failure, any transient calls fail and are cleared. With the exception of ISDN Primary Rate Interface (PRI), active calls are maintained, and are cleared when a user hangs up. (For ISDN PRI interfaces, active and transient calls are both cleared upon fallback.) MGCP gateway fallback complements SRST and uses the H.323 protocol for basic call handling for FXS, FXO, T1-CAS and T1/E1 ISDN PRI interfaces during the fallback period.

**Note**

The difference between SRST and MGCP gateway fallback is that in SRST, IP phones fall back to a local gateway, which serves as the call processing engine during a Cisco CallManager failure, while for MGCP gateway fallback, the MGCP gateway does not rely on a local gateway—it uses the default H.323 session application for call processing. That is, the MGCP gateway does not fall back to another local gateway for control of its interfaces.

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(15)ZL1. 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(15)ZL

This section describes unexpected behavior in Release 12.2(15)ZL.

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.

CSCea17401

If an analog telephone is connected to an MRP FXS port, and if that port is configured for MGCP gateway fallback, the following will occur. If Cisco CallManager becomes unavailable, the analog telephone should fail over to H.323. If the analog telephone is off-hook when normal Cisco CallManager operation is restored, the MRP will communicate with Cisco CallManager in such a way that it will appear to Cisco CallManager that the analog telephone is on-hook. During this period, Cisco CallManager might attempt to set up calls to the off-hook analog telephone, and any such call setup attempts will fail.

When the analog telephone is back on-hook, the MRP will send the correct notification to Cisco CallManager and normal call processing will resume. There is no functional impact.

Workaround—Returning the analog telephone to on-hook allows normal call processing to continue.

CSCea88896

A problem has been observed when the following Cisco ICS 7750 topology is in use:

Telephone --- PSTN --- VIC-2DID --- IOS Gateway (MRP) --- VoIP--- IP phone

In this topology, if both MGCP and H.323 are configured on the gateway (MRP), after a caller places a call through the PSTN to the IP phone, the caller does not hear a ringback tone when the IP phone rings.

The same problem occurs if the IP phone is replaced with an analog phone that is connected to the gateway (MRP) through an FXS port.

The following is a sample configuration that would exhibit this problem, provided that the MGCP stack is active:

```
mgcp
mgcp call-agent a.b.c.d service-type mgcp version 0.1
!

dial-peer voice 1 pots
  application mgcpapp
!
```

That is, if you are using this configuration, the DID ports that are under H.323 control do not generate a ringback tone.

Workaround—Downgrade the MRP IOS image to Release 12.2(8)YN.

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(15)ZL. They are located on Cisco.com and the Documentation CD-ROM:

- [Release Notes for Cisco IOS Release 12.2\(15\)ZL1](#)
 - To reach the *Release Notes for Cisco IOS Release 12.2(15)ZL1 on the Cisco ICS 7750* from Cisco.com, click this path:
Products & Services: IOS Software: Cisco IOS Software Releases 12.2: Cisco IOS Software Releases 12.2 ZL: Technical Documentation: Release Notes: Cisco ICS 7750 - Cisco IOS Release 12.2(15)ZL1
 - To reach the *Release Notes for Cisco IOS Release 12.2(15)ZL1 on the Cisco ICS 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(15)ZL1 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: 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 12.2 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 |
| <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 |

Table 8 Cisco IOS Release 12.2 Documentation Set (continued)

| Books | Major Topics |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <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 |
| <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 |

Table 8 Cisco IOS Release 12.2 Documentation Set (continued)

| Books | Major Topics |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> Cisco IOS Terminal Services Configuration Guide Cisco IOS Terminal Services Command Reference | ARA LAT NASI Telnet TN3270 XRemote X.28 PAD Protocol Translation |
| <hr/> <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) <hr/> | |

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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