Cisco IOS Telephony Service V2.1: New Features for Cisco IOS Release 12.2(11)YT

Cisco IOS Telephony Service (ITS) V2.1 introduces support for the ITU-T H.450 standard for consultative call transfer and call forwarding, four additional languages (French, German, Italian, and Spanish), other telephony features, and the Cisco IP Phone Expansion Module 7914.

Note This document discusses new features only. For information on ITS installation and basic configuration, refer to *Cisco IOS Telephony Service Version 2.01*.

Feature Specifications for Cisco IOS Telephony Service

Feature History		
Release	**ITS Version**	**Modification**
12.1(5)YD	Version 1.0	ITS was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco IAD2420.
12.2(2)XT	Version 2.0	Additional IP phone features were added. ITS V2.0 was implemented on the Cisco 1750 and Cisco 1751.
12.2(8)T	—	ITS was integrated into Cisco IOS Release 12.2(8)T and implemented on the Cisco 3725 and Cisco 3745.
12.2(8)T1	—	ITS was implemented on the Cisco 2600-XM and Cisco 2691.
12.2(11)T	Version 2.01	ITS was integrated into Cisco IOS Release 12.2(11)T. Voice ports for each IP phone, top-line description for the Cisco IP Phone 7960 and Cisco IP Phone 7940, and ATA-186 support were added. Support for the Cisco 1760 was added and support for the Cisco 1750 was removed.
12.2(11)YT	Version 2.1	Support was added for consultative transfer using the ITU-T H.450.2 standard, call forwarding using the ITU-T H.450.3 standard, four additional languages for phone displays and call progress tones, eXtensible Markup Language (XML) scripting for administrative customization, Cisco IP Phone Expansion Module 7914, and other telephony features.
12.2(11)YT1	Version 2.1	The **reset** command was modified and the **restart** command was introduced to provide more options when rebooting IP phones after configuration updates.

Supported Platforms
Cisco 1751, Cisco 1760, Cisco 2600-XM, Cisco 2650, Cisco 2650-XM, Cisco 2651, Cisco 2691, Cisco 3640, Cisco 3640A, Cisco 3660, Cisco 3725, Cisco 3745 **Note** Cisco 1751 platforms do not support quality of service (QoS) features on the asymmetric digital subscriber line (ADSL) link, Cisco Hoot and Holler over IP applications, and G.SHDSL WAN cards that are supported in the current Cisco 1700 image sets. Cisco 1751 and Cisco 1760 platforms do not support 1- and 2-port T1/E1 Multiflex Voice/WAN interface cards (VWICs) or 1- and 2-port analog modem WAN Interface Cards.
Supported Cisco IP Phones and Phone Devices
Cisco IP Phone 7910, Cisco IP Phone Expansion Module 7914, Cisco IP Conference Station 7935, Cisco IP Phone 7940, Cisco IP Phone 7960, Cisco ATA-186, Cisco ATA-188

Determining Platform Support Through Cisco Feature Navigator

Cisco IOS software is packaged in feature sets that are supported on specific platforms. To get updated information regarding platform support for this feature, access Cisco Feature Navigator. Cisco Feature Navigator dynamically updates the list of supported platforms as new platform support is added for the feature.

Cisco Feature Navigator is a web-based tool that enables you to determine which Cisco IOS software images support a specific set of features and which features are supported in a specific Cisco IOS image. You can search by feature or release. Under the release section, you can compare releases side by side to display both the features unique to each software release and the features in common.

To access Cisco Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

http://www.cisco.com/register

Cisco Feature Navigator is updated regularly when major Cisco IOS software releases and technology releases occur. For the most current information, go to the Cisco Feature Navigator home page at the following URL:

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

Availability of Cisco IOS Software Images

Platform support for particular Cisco IOS software releases is dependent on the availability of the software images for those platforms. Software images for some platforms may be deferred, delayed, or changed without prior notice. For updated information about platform support and availability of software images for each Cisco IOS software release, refer to the online release notes or, if supported, Cisco Feature Navigator.

Note You must purchase a feature license to use Cisco IOS Telephony Service. You also need an account on Cisco.com to access the Cisco IP phone firmware versions.

Contents

Information About New Features in Cisco IOS Telephony Service V2.1

Note This document discusses new features only. For information on ITS installation and basic configuration, refer to *Cisco IOS Telephony Service Version 2.01*.

Cisco IOS Telephony Service V2.1 introduces the new features that are described in the following sections:

Specifications for Cisco IOS Telephony Service V2.1

Table 1 lists the Cisco platforms, maximum number of Cisco IP phones, maximum number of directory numbers (DNs) or virtual voice ports, and memory requirements for ITS V2.1.

Note Cisco ITS V2.1 requires an IP Plus image and a Cisco IOS ITS/SRST feature license.

Table 1 Specifications for ITS V2.1 Release in 12.2(11)YT

Cisco Platforms	Maximum Cisco IP Phones	Maximum DNs or Virtural Ports	Minimum DRAM Memory	Recommended DRAM Memory	Minimum Flash Memory	Recommended Flash Memory
Cisco 1751	24	120	64 MB	64 MB	32 MB	32 MB
Cisco 1760	24	120	64 MB	64 MB	32 MB	32 MB
Cisco 2600-XM	24	120	96 MB	128 MB	32 MB	32 MB
Cisco 2650 and Cisco 2650-XM	48	192	96 MB	128 MB	32 MB	32 MB
Cisco 2651	48	192	96 MB	128 MB	32 MB	32 MB
Cisco 2691	48	288	96 MB	128 MB	32 MB	32 MB
Cisco 3640 and Cisco 3640A,	48	288	96 MB	128 MB	32 MB	32 MB
Cisco 3660	48	288	96 MB	128 MB	32 MB	32 MB
Cisco 3725	48	192	128 MB	128 MB	32 MB	32 MB
Cisco 3745	48	288	128 MB	128 MB	32 MB	32 MB

Consultative Call Transfer Using the H.450.2 Standard

Cisco ITS V2.0 allowed only blind call transfers, in which a transferring party did not have the ability to announce or consult with a destination party before transferring a call. V2.0 used a Cisco ITS proprietary mechanism to perform these blind transfers. Cisco ITS V2.1 adds the ability to perform call transfers blind or with consultation using the ITU-T H.450.2 standard for H.323 calls.

This feature is implemented using a special Tool Command Language (TCL) script. The script requires support for TCL interactive voice response (IVR) 2.0 on Cisco IOS Release 12.2(11)YT.

Note The TCL script must be configured on all dial peers in the voice over IP (VoIP) network. Dropped calls or incomplete transfers can result if participating endpoints do not support H.450.2.

For configuration information, refer to the "Enabling Consultative Call Transfer Using the H.450.2 Standard" section on page 18.

Analog Call Transfer Using Hookflash and the H.450.2 Standard

Call transfer from analog Foreign Exchange Station (FXS) phones using hookflash is provided by the same TCL script that supports call transfer with the H.450.2 standard.

This feature allows analog phones to transfer calls with consultation by using the hookflash to initiate the transfer. Once the transferrer uses the hookflash, the party being transferred is put on hold. The transferrer hears dial tone and can dial a third party. Once a connection is made, the transferrer and the third party can consult. When the transferrer hangs up, the party being transferred is connected to the third party. If the transferrer hangs up while the third party's phone is still ringing, the party being transferred is connected to the ringing phone.

To speed up or delay the setting up of the consultation call during a call transfer from an analog phone, you can use the **delay-time** attribute-value (AV) pair with the **call application voice** command.

For configuration information, refer to the "Enabling Analog Call Transfer Using Hookflash and the H.450.2 Standard" section on page 25.

Call Forward Using the H.450.3 Standard

Call forwarding using the H.450.3 standard provides a standards-based alternative to Cisco ITS proprietary H.323 call forwarding. It provides forwarding for busy, no-answer, and unconditional (all calls) conditions. H.450.3 always returns the call to the originator gateway, even for the case that the forwarder and forward-to number are local on the same ITS network.

Calls to the same number from different originations can be selectively assigned to H.450.3 standard call forwarding or to Cisco-proprietary call forwarding. For example, if extension 5234 has all calls forwarded to 5277, a call from extension 4003 can be forwarded to 5277 using H.450.3, while a call from extension 4552 can be forwarded using Cisco ITS 2.0.

For configuration information, refer to the "Enabling Call Forward Using the H.450.3 Standard" section on page 28.

Busy Attendant Announcement

This feature plays a prerecorded announcement to external callers who are directly routed over an Foreign Exchange Office (FXO) port to a central, or reception, number that is busy and that has been configured with the **connection plar-opx** command. Normally, incoming calls that are received over FXO ports from the PSTN hear ringback tone until the FXO port goes "off-hook" to answer the call. And when the dialed extension is busy the FXO port has no way to answer, so the caller continues to hear ringback tone. If the Busy Attendant Announcement feature is enabled, a recording is heard by callers who dial busy extensions rather than continual ringback tone.

For example, an incoming call from the PSTN for extension 1000 cannot be answered by the FXO port until the phone at extension 1000 goes off-hook. The PSTN plays ringback tones to the caller until the FXO port answers. If the extension is busy, the PSTN continues to play ringback tones until the caller disconnects. There is no way for an FXO port to signal a busy condition on behalf of extension 1000.

If extension 1000 has been configured on an FXO port with the **connection plar-opx 1000** command and the Busy Attendant Announcement feature has been enabled, the following will happen. If extension 1000 is available, the caller hears ringback and the FXO port stays in the on-hook state until the call is answered at extension 1000. If extension 1000 is busy, the FXO port answers the call and goes off-hook.

The Busy Attendant Announcement application plays a prompt to the caller that may contain a phrase like “I’m sorry, but all lines are currently busy. Please call back later.” Then the application disconnects the call. The prompt is based on the contents of a .au file.

For configuration information, refer to the “Enabling the Busy Attendant Announcement” section on page 34.

On-Hook Dialing

On-hook dialing allows you to enter dialed digits with the phone on-hook and the handset still in its cradle. Digits appear in the phone display as they are dialed, and a **Backspace** soft key (<<) allows you to erase digits that are entered incorrectly. When you have completed entering the digits and want the phone to dial the number, use one of the following methods:

- Press a line button or the **Dial** soft key if you are using the phone speaker or a headset.
- Pick up the handset if using the handset.

No configuration is required to activate this feature.

Silent Ring on Cisco IP Phone 7960 and Cisco IP Phone Expansion Module 7914

Audible ringers can be disabled on individual lines on the Cisco IP Phone 7960 and the Cisco IP Phone Expansion Module 7914. This feature is most useful on phones with monitored shared lines.

For configuration information, see the “Enabling Silent Ring on Cisco IP Phone 7960 and Cisco IP Phone Expansion Module 7914” section on page 37.

International Language Support: French, German, Italian, Spanish

On the Cisco IP Phone 7940 and Cisco IP Phone 7960, the language displayed on the phone and the locale for network dial progress tones and cadences can be set to the following ISO-3166 codes for languages and locales:

- French (FR)
- German (DE)
- Italian (IT)
- Spanish (ES)

For configuration information, see the “Designating International Language and Tone Support” section on page 38.

Music on Hold from a Live Feed

Previous releases of Cisco ITS provided music on hold (MoH) from an .au or .wav file held in router Flash memory. Cisco ITS V.2.1 introduces MoH from an external live audio feed (standard line level audio connection) that is directly connected to the router through an FXO or “ear and mouth” (E&M) analog voice port. If the external live feed source is disconnected or disabled, MoH can fall back to use the file in Flash memory. This feature is typically used to connect to a CD jukebox player. Only one live MoH feed is supported per system.

Music on hold, whether from a live source or a Flash file, is supplied only to public switched telephone network (PSTN) and VoIP G.711 calls, and is not supplied to local IP phone calls. Local IP phone callers hear a repeating tone while they are on hold for reassurance that the call is still connected.

For configuration information, see the “Configuring Music on Hold from a Live Feed” section on page 40.

System Speed Dial

A systemwide list of frequently called numbers can be programmed by an administrator for use as speed dial numbers on all phones, up to a maximum of 32 entries. The administrator creates an XML file that is entered in router Flash memory and is automatically integrated into the local directory services that are listed when the Directory button on a phone is pressed, as follows:

Local Services

1. Missed Calls
2. Received Calls
3. Placed Calls
4. Local Directory
5. Local Speed-dial

For configuration information, see the “Enabling System Speed Dial” section on page 43.

Local Directory Disable

The local directory that is displayed on an IP phone (item 4 in the Local Services menu) is served as an XML page that is accessed through HTTP without password protection. A new Cisco IOS command, **no service local-directory**, disables the directory HTTP service to suppress the availability of this directory.

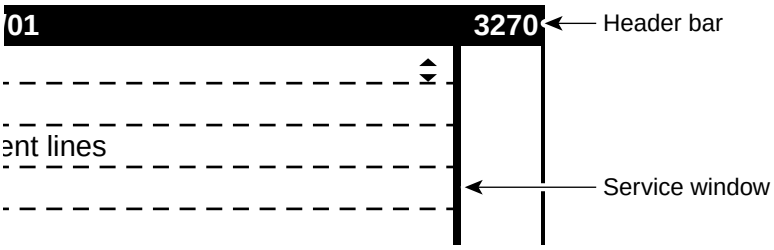
For configuration information, see the “Disabling the Local Directory Service” section on page 45.

Configurable IP Phone Header Bar

The Configurable IP Header Bar feature allows you to define a description to appear in the header bar (top line) of the phone display of a Cisco IP Phone 7940 or Cisco IP Phone 7960, as shown in Figure 1. Normally the header bar simply replicates the text appearing next to the first button. This feature allows you to specify different text for the header bar. For example, this line can be used to display the full E.164 number of the phone instead of just the extension number that appears by default. If no description is specified, the header bar replicates the line number or extension next to the first button on the phone.

For configuration information, see the "Customizing an IP Phone Header Bar" section on page 46.

Figure 1 Cisco IP Phone Display



Idle Messaging for Cisco IP Phone 7940 and Cisco IP Phone 7960

The Idle Messaging feature allows you to specify a file to display on Cisco IP Phone 7940s and Cisco IP Phone 7960s when they are not in use. You can use this feature to provide the phone display with a system message that is refreshed at configurable intervals.

For configuration information, see the "Specifying an Idle Message for Cisco IP Phone 7940 and Cisco IP Phone 7960" section on page 47.

Configurable Administrative User Classes

Previous versions of Cisco ITS allowed two levels of users: normal users and administrative users. Normal users were able to configure certain features on their own phones, and administrative users were able to configure systemwide features and provision phone systems.

Cisco ITS V2.1 divides administrative users into two classes: system administrators and customer administrators. System administrators are internal supporting phone staff that use a graphical user interface (GUI) to configure and maintain ITS systemwide. System administrators are able to access all GUI functionality. Customer administrators are external administrative staff that perform routine phone add-and-change work without having access to systemwide features. Customer administrators are limited to a configurable subset of GUI functionality.

Previous versions of Cisco ITS supported administrative user authentication on the local router only. Cisco ITS V2.1 supports authentication, authorization, and accounting (AAA) authentication through a RADIUS or TACACS+ server for system administrators. If authentication through the server fails, the local router is searched.

In addition, Cisco ITS V2.1 provides support for XML cascading style sheets (files with .css suffix) that can be used to customize the browser GUI display that is used by administrators and users to configure IP phones. For a description of the ITS GUI browser display, refer to *Cisco IOS Telephony Service Version 2.01*.

For configuration information, see the "Configuring Administrative User Classes" section on page 48.

Enhanced Dial-Plan Pattern

The Cisco IOS command **dialplan-pattern** contains a new keyword, **extension-pattern**, to allow additional manipulation of IP-phone abbreviated extension number prefix digits. When this keyword and its arguments are used, the leading digits of an extension pattern are stripped and replaced by the corresponding leading digits of the dial-plan pattern. This command can be used to avoid direct inward dial (DID) numbers like 408-555-0001 resulting in four-digit extensions such as 0001.

For configuration information, see the "Specifying an Enhanced Dial-Plan Pattern" section on page 53.

Cisco IP Phone Expansion Module 7914 Support

Call coverage is a critical capability for administrative assistants and others who must monitor, manage, and cover the various status of calls. This capability requires the ability to instantly determine the status of more lines than the six-line capacity of the Cisco IP Phone 7940 or the Cisco IP Phone 7960.

The Cisco IP Phone Expansion Module 7914 extends the capabilities of the Cisco IP Phone 7940 or the Cisco IP Phone 7960 with additional buttons and a liquid crystal display (LCD) display. With this expansion module, you add 14 buttons to the existing 6 buttons of the Cisco IP Phone 7940 or the Cisco IP Phone 7960, increasing the total number of buttons to 20 with one module or 34 when you add two Cisco IP Phone Expansion Module 7914s. Each of the 14 buttons on a Cisco IP Phone Expansion Module 7914 can be programmed as a directory number (DN), line key, or speed-dial key, much like the buttons on the Cisco IP Phone 7960. When used as a DN key, buttons are illuminated, allowing easy identification of call states.

For configuration information, see the "Adding Support for the Cisco IP Phone Expansion Module 7914" section on page 54.

Phone Reboot Commands

After you update information for a phone that is associated with a Cisco ITS router, the phone must be rebooted for the new information to take effect. In Cisco IOS Release 12.2(11)YT1, the **reset** command has been modified to add support for the sequential reset of ITS phones, which minimizes the risk of the conflict that can occur when multiple phones simultaneously attempt to access changed ITS configuration information via TFTP. In addition, the **restart** command has been introduced to support quick phone rebooting when only the line or speed-dial information for a phone changes.

The **reset** command performs a "hard" reboot similar to a power-off, power-on sequence, which includes a consultation with the local Dynamic Host Configuration Protocol (DHCP) server and TFTP server for updated information. The **restart** command performs a "soft" reboot by restarting phones without contacting the DHCP and TFTP servers. The **reset** command takes significantly longer to process than the **restart** command when more than one phone is being updated, but it must be used after updates to phone firmware, user locale, network locale, and URL parameters. The **restart** command, which is much quicker, can be used after simple button, line, or speed-dial changes.

For more information, see the "Rebooting Phones After Configuration Updates" section on page 55.

How to Configure New Features in Cisco ITS V2.1

Configuration instructions for new features in Cisco ITS V.2.1 are described in the following sections:

Assembling Prerequisites for Cisco ITS V2.1

To use Cisco ITS V2.1, you need to download Cisco IOS software and Cisco ITS V2.1 files, which are available through the Cisco Software Center. The files you need are listed below.

Note You must purchase a feature license to use Cisco IOS Telephony Service. You also need an account on Cisco.com to access the Cisco IP phone firmware files.

Cisco IOS Software

- Download and install the Cisco IOS Release 12.2(11)YT IP Plus image.

Cisco ITS V2.1 Files

Download ITS V2.1 files to a TFTP server that is accessible to your ITS router. You can download all the files at once in a bundled file, or as individual files if necessary, as explained below.

Bundled File

A bundled, compressed file that contains the individual ITS V2.1 files can be downloaded from the following URL: http://www.cisco.com/cgi-bin/tablebuild.pl/ip-key.

- its-2.1.0.1.zip

Individual Files

Individual ITS files can be downloaded from the following URL: http://www.cisco.com/cgi-bin/tablebuild.pl/ip-iostsp.

The individual ITS V2.1 files include the following types of files:

- Phone firmware files:
  - P00303020209.bin—for Cisco IP Phone 7940 and Cisco IP Phone 7960
  - P00403020209.bin—for Cisco IP Phone 7910
  - P00503010100.bin—for Cisco IP Conference Station 7935
  - S00103020002.bin—for Cisco IP Phone 7914
  - ata18x-v2-15-ms-020927a.zup—for Cisco ATA-186 and Cisco ATA-188
- GUI files (.html files)—These files create browser GUIs for users and administrators. Download these files to the Flash memory on the ITS router.
  - logohome.gif
  - ephone-admin.html
  - admin-user.html
  - telephony-service.html
  - normal-user.html
- XML files (.xml files)—The xml.template is used for new features in ITS V.2.1.
- Music on hold file—An audio file named “music-on-hold.au” provides music when the new Music on Hold From a Live Feed feature is not enabled. Download this file to router Flash memory.

- Auto-Attendant (AA) files—A TCL file, a ReadMe file, and several audio files (also called IVR prompt files) are used for the IVR AA feature and are identified on the download site.
- H.450 files—contains a TCL script for an IVR application that implements the ITU-T H.450.2 standard for call transfers and the H.450.3 standard for call forwarding. There is also a ReadMe file and an audio file associated with the script file. The following compressed files are available:
  - app-h450-transfer.2.0.0.2.zip for Cisco IOS Release 12.2(11)YT1 and later releases
  - app-h450-transfer.2.0.0.1.zip for Cisco IOS Release 12.2(11)YT
- CiscoIOSTSP.zip—Several Telephony Application Programming Interface (TAPI) TSP files are bundled in this file. They are needed to set up individual PCs for Cisco IP phone users who wish to make use of ITS-TAPI integration with TAPI-capable PC software. Download this file to a convenient location on your PC. For installation instructions, refer to *Cisco IOS Telephony Service Version 2.01*.

Installing Cisco ITS V2.1 Phone Firmware Files Smaller than 384 KB

This task explains how to upgrade the phone firmware on the ITS phones on your network when the phone firmware files are smaller than 384 KB (393216 bytes). The task involves downloading the phone firmware to the ITS router and establishing the router as a TFTP server for the IP phones.

Note The phone version is derived from the phone firmware filename. For example, [03 02 02 09] is phone version 3.2(2.9)

Prerequisites

Ensure that the appropriate phone firmware file or files have been downloaded to a TFTP server location that is accessible to the ITS router. If the file has not been downloaded, get a copy from http://www.cisco.com/cgi-bin/tablebuild.pl/ip-iostsp.

Restrictions

Phone firmware files must be smaller than 384 KB. For files larger than 384 KB, refer to the "Installing Cisco ITS V2.1 Phone Firmware Files Larger than 384 KB" section on page 14.

Note This task begins in privileged EXEC mode.

SUMMARY STEPS

1. **copy tftp flash**
2. **configure terminal**
3. **tftp-server flash:***filename*
4. **telephony-service**
5. **load** *phone-type firmware-file*
6. **exit**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**copy tftp flash**
	
	Example:
	`Router# copy tftp flash`
	
	`Address or name of remote host []? 172.24.59.11`
	`Source filename []? P00303020209.bin`
	`Destination filename [P00303020209.bin]?`
	`Accessing`
	`tftp://172.24.59.11/P00303020209.bin...`
	`Erase flash:before copying? [confirm]n`
	`Loading P00303020209.bin from 172.24.59.11 (via FastEthernet0/0):!`
	`[OK - 329 bytes]`
	
	`Verifying checksum...  OK (0xF5DB)`
	`329 bytes copied in 0.044 secs (7477 bytes/sec)`
		Copies the file from the TFTP server to the router Flash memory.
		• At the first prompt, enter the IP address or the Domain Name System (DNS) name of the remote host.
		• At both filename prompts, enter the firmware filename (for example, **P00303020209.bin)**.
		• At the prompt to erase Flash, enter **no**.

Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**tftp-server flash:***filename* **Example:** `Router(config)# tftp-server flash:P00303020209.bin`	Permits the ITS router to provide TFTP access to the specified file by the IP phones served by the router.
Step 4	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.
Step 5	**load** *phone-type firmware-file* **Example:** `Router(config-telephony-service)# load 7960-7940 P00303020209`	Identifies the Cisco IP phone firmware file to be used by phones of the specified Cisco IP phone type. **Note** When using a firmware filename in the **load** command, do not enter the file extension. For example, use X12345, not X12345.bin.
Step 6	**exit** **Example:** `Router(config-telephony-service)# exit`	Exits telephony-service configuration mode.

What to Do Next

After installing the upgraded phone firmware and establishing the router as a TFTP server for the IP phones, perform the basic configuration described in the "Configuring Cisco ITS V2.1" section on page 16. Then you can configure any of the new features described in this document.

Installing Cisco ITS V2.1 Phone Firmware Files Larger than 384 KB

This procedure explains how to upgrade the phone firmware for the ITS phones on your network when the firmware files are larger than 384 KB (393216 bytes).

The following example scenario explains this process. The phone firmware file called P0030302xxxx.bin is the one that you have decided you need to use with ITS v2.1 and you are upgrading from ITS V2.0. P0030302xxxx.bin is larger than 384 KB, so this upgrade requires what is essentially a two-stage upgrade. First, you upgrade to P00303020209.bin, a file that is smaller than 384 KB, and then you upgrade to P0030302xxxx.bin. ITS v2.1 automatically performs this two-step operation, after sensing that the desired file is larger than 384KB and detecting that P00303020209.bin is available in Flash memory.

Note The phone version is derived from the phone firmware filename. For example, [03 02 02 09] is phone version 3.2(2.9).

Prerequisites

Ensure that the appropriate phone firmware file or files have been downloaded to a TFTP server location that is accessible to the ITS router. If the file has not been downloaded, get a copy from http://www.cisco.com/cgi-bin/tablebuild.pl/ip-iostsp. The following files are needed for this task:

- A phone firmware file that is smaller than 384 KB, such as P00303020209.bin.
- The desired phone firmware file that is larger than 384 KB (P003xxxxxxxx.bin).

Restrictions

This task applies only to Cisco IP Phone 7940 and Cisco IP Phone 7960 firmware files (P00303020209.bin) and Cisco IP Phone 7910 firmware files (P00403020209.bin) that are larger than 384 KB. For files that are smaller than 384 KB, refer to the "Installing Cisco ITS V2.1 Phone Firmware Files Smaller than 384 KB" section on page 12.

Note This procedure begins in privileged EXEC mode.

SUMMARY STEPS

1. **copy tftp flash**
2. **configure terminal**
3. **tftp-server flash:***filename*
4. **telephony-service**
5. **load** *phone-type firmware-file*
6. **exit**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**copy tftp flash**
	
	Example:
	`Router# copy tftp flash`
	
	`Address or name of remote host []? 172.24.59.11`
	`Source filename []? P00303020209.bin`
	`Destination filename [P00303020209.bin]?`
	`Accessing`
	`tftp://172.24.59.11/P00303020209.bin...`
	`Erase flash:before copying? [confirm]n`
	`Loading P00303020209.bin from 172.24.59.11 (via FastEthernet0/0):!`
	`[OK - 329 bytes]`
	
	`Verifying checksum...  OK (0xF5DB)`
	`329 bytes copied in 0.044 secs (7477 bytes/sec)`
		Copies a file from the TFTP server to the router Flash memory.
		• At the first prompt, enter the IP address or the DNS name of the remote host.
		• At the filename prompts, enter the phone firmware filename of the file that is smaller than 384 KB (for example, **P00303020209.bin)**.
		• At the prompt to erase Flash, enter **no**.
		• Repeat this step for the desired file (the file that is larger than 384 KB, for example, **P003xxxxxxx.bin**).

Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**tftp-server flash:***filename* **Example:** `Router(config)# tftp-server flash:P00303020209.bin`	Permits the ITS router to provide TFTP access to the specified file by the IP phones served by the router. Use this command for each of the following files: • The first file, which is smaller than 384 KB (for example, **P00303020209.bin**) • The desired file, which is larger than 384 KB (for example, **P003xxxxxxx.bin**)
Step 4	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.
Step 5	**load** *phone-type firmware-file* **Example:** `Router(config-telephony-service)# load 7960-7940 P00303020209`	Identifies the phone firmware file to be used by phones of the specified Cisco IP phone type. **Note** When using a firmware filename in the **load** command, do not enter the file extension. For example, use X12345, not X12345.bin.
Step 6	**exit** **Example:** `Router(config-telephony-service)# exit`	Exits telephony-service configuration mode.

What to Do Next

After installing the upgraded phone firmware and establishing the router as a TFTP server for the IP phones, perform the basic configuration described in the "Configuring Cisco ITS V2.1" section on page 16. Then you can configure any of the new features described in this document.

Downgrading ITS Phone Firmware to an Earlier Version

If it becomes necessary to downgrade the Cisco IOS image back to ITS V2.0, you must use the following order so that the phones will boot correctly:

1. Downgrade the ITS phone firmware files first.
2. Then, downgrade the ITS image from V2.1 to V2.0.

Configuring Cisco ITS V2.1

Cisco ITS V2.1 introduces the use of XML configuration files for IP phones. There is one shared default XML configuration file for each type of IP phone. When an IP phone comes online or is rebooted, it automatically gets information about itself from the appropriate default. The phone coming online uses a filename alias based on the phone type specified in the **type** command in Ethernet phone (ephone) configuration mode. The **type** command is mandatory only for IP phones that have added one or two Cisco IP Phone Expansion Module 7914s.

In ITS V2.1, the configuration files have been moved to system:/its/. The file named Flash:SEPDEFAULT.cnf that was used with previous ITS versions is now obsolete, but is retained as system:/its/SEPDEFAULT.cnf to support upgrades from older phone firmware.

The commands in this task identify and modify the XML phone configuration files so that the IP phones can automatically find the defaults to configure themselves when they come online or are rebooted. The last step in this task is to reset all phones, which causes them to request the new firmware files

Prerequisites

Phone firmware files must be downloaded and installed on a TFTP server on the ITS router using one of the following procedures:

- Installing Cisco ITS V2.1 Phone Firmware Files Smaller than 384 KB, page 12
- Installing Cisco ITS V2.1 Phone Firmware Files Larger than 384 KB, page 14

SUMMARY STEPS

1. **tftp-server flash:***filename*
2. **telephony-service**
3. **max-ephones** *max-phones*
4. **max-dn** *max-directory-numbers*
5. **load** *phone-type firmware-file*
6. **ip source-address** *ip-address* [**port** *port*] [**any-match** | **strict-match**]
7. **create cnf-files**

8. **reset all** [*time-interval*]
9. **exit**
10. Verify that all phones have been upgraded.

DETAILED STEPS

	Command or Action	Purpose
Step 1	**tftp-server flash:***filename* **Example:** `Router(config)# tftp-server flash:P00303020209.bin`	Permits the ITS router to provide TFTP access to the specified file by the IP phones served by the router. **Note** The phone version is derived from the phone firmware filename. For example, [03 02 02 09] is phone version 3.2(2.9)
Step 2	**telephony-service** **Example:** `Router(config)# telephony-service`	Enables Cisco ITS and enters telephony-service configuration mode.
Step 3	**max-ephones** *max-phones* **Example:** `Router(config-telephony-service)# max-ephones 24`	Sets the maximum number of Cisco IP phones that are supported by this router.
Step 4	**max-dn** *max-directory-numbers* **Example:** `Router(config-telephony-service)# max-dn 48`	Sets the maximum number of directory numbers that are supported by this router.
Step 5	**load** *phone-type firmware-file* **Example:** `Router(config-telephony-service)# load 7960-7940 P00303020209`	Identifies the Cisco IP phone firmware file to be used by phones of the specified Cisco IP phone type. • *phone-type*—Type of IP phone. The following choices are valid: – **7910**—Cisco IP Phone 7910 – **7914**—Cisco IP Expansion Module 7914 – **7935—**Cisco IP Conference Station 7935 – **7960-7940**—Cisco IP Phone 7940 or Cisco IP Phone 7960 – **ATA**—Cisco ATA-186 or Cisco ATA-188 • *firmware-file*—Filename of the phone firmware, without the filename suffix.
Step 6	**ip source-address** *ip-address* [**port** *port*] [**any-match** | **strict-match**] **Example:** `Router(config-telephony-service)# ip source-address 10.10.1.1 port 2000`	Enables a router to receive messages from Cisco IP phones through specified IP addresses and ports.

	Command or Action	Purpose
Step 7	**create cnf-files** **Example:** `Router(config-telephony-service)# create cnf-files`	Builds the XML configuration files that are required for Cisco IOS V2.1 features.
Step 8	**reset all** [*time-interval*] **Example:** `Router(config-telephony-service)# reset all`	Resets all IP phones associated with the ITS router, which causes them to ask for the new phone firmware file. • *time-interval*—Interval between each phone reset, in seconds. This argument allows you to provide an interval between resets so that all phones do not attempt to access the TFTP resource at the same time. A 15-second interval is recommended for an 8- to 10-phone office, but you can adjust this value accordingly for your network. Range is from 0 to 60. Default is 15.
Step 9	**exit** **Example:** `Router(config-telephony-service)# exit`	Exits telephony-service configuration mode.
Step 10	Verify that all phones have been upgraded.	Check the version number displayed on the phone when you press the Settings key. To check the firmware version loaded on a specific phone, enable the **debug ephone register** command, reset the phone and look at the Load parameter that is displayed as part of the informational StationAlarm message generated when the phone registers. If a phone fails to upgrade, reset the individual phone again by using the **reset** *mac-address* command.

Troubleshooting Tips

- Check the download web page to determine the currently recommended phone firmware version (http://www.cisco.com/cgi-bin/tablebuild.pl/ip-iostsp).
- Use the **debug ephone register** command to show status (alarm) messages at registration time.The messages include the current IP phone firmware version.

Enabling Consultative Call Transfer Using the H.450.2 Standard

The Consultative Call Transfer Using the H.450.2 Standard feature adds support for initiating call transfer on a call leg using the ITU-T H.450.2 protocol. Call transfers using H.450.2 can be blind or consultative. A blind transfer is one in which the transferring phone connects the caller to a destination line before ringback begins. A consultative transfer is one in which the transferring party either connects the caller to a ringing phone (ringback heard) or speaks with the third party before connecting the caller to the third party.

You can specify blind or consultative transfer on a systemwide basis. The systemwide setting can then be overridden for individual phone lines. For example, in an ITS network that is set up for consultative transfer, a specific line with an auto-attendant that automatically transfers incoming calls to specific extension numbers can be set to use blind transfer, because auto-attendants cannot use consultative transfer.

Note that this feature and call forwarding using the H.450.3 standard can be enabled independently.

This feature requires the H.450 TCL script file that is described in the "Assembling Prerequisites for Cisco ITS V2.1" section on page 11. If you have already downloaded that file from the Cisco Software Center and loaded it onto your ITS router, you do not have to repeat those steps.

In addition to the TCL script, a ReadMe file that describes the script is available. Be sure to read this file whenever you download a new version of the script, because it may contain additional script-specific information, such as configuration parameters and user interface descriptions.

Note The TCL script must be configured on all dial peers in the VoIP network. Dropped calls or incomplete transfers can result if participating endpoints do not support H.450.2.

Prerequisites

- Ensure that the H.450 call transfer TCL script has been downloaded and copied to the Flash memory on the ITS router. If the file has not been downloaded, get a copy from http://www.cisco.com/cgi-bin/tablebuild.pl/ip-iostsp and copy it to the ITS router Flash memory. The following versions of the script are available:
  - app-h450-transfer.2.0.0.2.tcl for Cisco IOS Release 12.2(11)YT1 and later releases
  - app-h450-transfer.2.0.0.1.tcl for Cisco IOS Release 12.2(11)YT
- All voice gateway routers in the VoIP network must support the H.450 standard and be running the following software:
  - Cisco IOS Release 12.2(11)YT or a later release
  - Cisco ITS V2.1 or a later release
  - TCL IVR 2.0
  - H.450 call transfer TCL script

Note You can continue to use the app-h450-transfer.2.0.0.1.tcl script if you install Cisco IOS Release 12.2(11)YT1, but you cannot use the app-h450-transfer.2.0.0.2.tcl script with a release of Cisco IOS software that is earlier than Cisco IOS Release 12.2(11)YT1.

Restrictions

- Call transfer with consultation is not supported for the Cisco ATA-186, Cisco ATA-188, and Cisco IP Conference Station 7935. Call transfer attempts from these devices are executed as blind transfers.
- H.450.12 Supplementary Services Capabilities exchange between routers is not implemented in this release.

- This feature does not run on Cisco 2610, Cisco 2620, or Cisco 3620 routers using an earlier version of Cisco ITS. This feature requires at a minimum a Cisco 2650 or Cisco 2600-XM and Cisco IOS Release 12.2(11)YT.
- This feature does not run on platforms that do not support TCL IVR 2.0. The feature requires the enhanced TCL IVR infrastructure in Cisco IOS Release 12.2(11)YT.
- Voice over Frame Relay (VoFR) does not support transfer with consultation. Use the **local-consult** keyword with the **transfer-system** command. VoFR transfer requires Cisco IOS Release 12.2(8)T or a later release on *all* VoFR routers, or transferred calls may get dropped. Note that many older VoFR platforms, such as legacy Cisco MC3810 routers that are running Cisco IOS Release 12.0(5)XK1, cannot be upgraded because of memory limitations.

SUMMARY STEPS

1. **call application voice** *application-name location*
2. **call application voice** *application-name* **language** *number language*
3. **call application voice** *application-name* **set-location** *language category location*
4. **telephony-service**
5. **transfer-system** {**blind** | **full-blind** | **full-consult** | **local-consult**}
6. **transfer-pattern** *transfer-pattern*
7. **application** *application-name*
8. **exit**
9. **ephone-dn** *dn-tag* (single-line configuration only)
10. **transfer-mode** {**blind** | **consult**} (single-line configuration only)
11. **exit** (single-line configuration only)
12. **voice service voip**
13. **h323**
14. **h450 h450-2 timeout** {**T1** | **T2** | **T3** | **T4**} *milliseconds*
15. **exit**
16. **exit**
17. **dial-peer voice** *tag* **pots**
18. **application** *application-name*
19. **exit**
20. **dial-peer voice** *tag* **voip**
21. **application** *application-name*
22. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**call application voice** *application-name location* **Example:** `Router(config)# call application voice transfer_app flash:app-h450-transfer.tcl`	Loads the TCL script and specifies its application name. • *application-name*—User-defined name for the IVR application. This name does not have to match the script filename. • *location*—Script directory and filename in URL format. For example, Flash memory (flash:*filename*), a TFTP (tftp://../*filename*) or an HTTP server (http://../*filename*) are valid locations.
Step 2	**call application voice** *application-name* **language** *number language* **Example:** `Router(config)# call application voice transfer_app language 1 en`	(Optional) Sets the language for dynamic prompts used by the application. • *application-name*—IVR application name that was assigned in Step 1. • *number*—Number that identifies the language used by the audio files for the IVR application. • *language*—Two-character code that specifies the language of the prompts. Valid entries are **en** (English—default), **sp** (Spanish), **ch** (Chinese), or **aa** (all).
Step 3	**call application voice** *application-name* **set-location** *language category location* **Example:** `Router(config)# call application voice transfer_app set-location en 0 flash:/prompts`	(Optional) Defines the location and category of the audio files that are used by the application for dynamic prompts. • *application-name*—Name of the TCL IVR application. • *language*—Two-character code to specify the language of the prompts. Valid entries are **en** (English—default), **sp** (Spanish), **ch** (Chinese), or **aa** (all). • *category*—Category group (0 to 4) for the audio files from this location. The value 0 means all categories. • *location*—URL of the directory that contains the language audio files used by the application, without filenames. Flash memory (flash) or a directory on a server (TFTP, HTTP, or RTSP) are all valid. **Note** Prompts are only required for call transfer from analog FXS phones. No prompts are needed for call transfer from IP phones

	Command or Action	Purpose
Step 4	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.
Step 5	**transfer-system** {**blind** | **full-blind** | **full-consult** | **local-consult**} **Example:** `Router(config-telephony-service)# transfer-system full-consult`	Defines the call transfer method for all lines served by the Cisco ITS router. • **blind**—Calls are transferred without consultation with a single phone line using the Cisco proprietary method. • **full-blind**—Calls are transferred without consultation using H.450.2 standard methods. • **full-consult**—Calls are transferred with consultation using a second phone line if available. The calls fall back to **full-blind** if the second line is unavailable. • **local-consult**—Calls are transferred with local consultation using a second phone line if available. The calls fall back to **blind** for nonlocal consultation or non-local transfer target.
Step 6	**transfer-pattern** *transfer-pattern* **Example:** `Router(config-telephony-service)# transfer-pattern 52540..`	Allows transfer of telephone calls by Cisco IP phones to specified phone number patterns. • *transfer-pattern*—String of digits for permitted call transfers. Wildcards are allowed.
Step 7	**application** *application-name* **Example:** `Router(config-telephony-service)# application transfer_app`	Specifies the session-level application for all IP phones serviced by the ITS router. • *application-name*—The H.450 application that was loaded in Step 1.
Step 8	**exit** **Example:** `Router(config-telephony-service)# exit`	Exits telephony-service configuration mode. **Timesaver** Before exiting telephony-service configuration mode, configure any other parameters you need to set for the entire ITS phone network.
Step 9	**ephone-dn** *dn-tag* **Example:** `Router(config)# ephone-dn 2134`	(Optional) Enters ephone-dn configuration mode for the specified directory number.
Step 10	**transfer-mode** {**blind** | **consult**} **Example:** `Router(config-ephone-dn)# transfer-mode consult`	(Optional) Defines the type of call transfer for a specific Cisco IP phone line. Allows you to override the system default **transfer-system** setting (full-consult or full-blind) for an individual ephone-dn. • **blind**—Calls are transferred without consultation using a single phone line. • **consult**—Calls are transferred with consultation using a second phone line, if available.

	Command or Action	Purpose
Step 11	**exit** **Example:** `Router(config-ephone-dn)# exit`	(Optional) Exits ephone-dn configuration mode. **Timesaver** Before exiting ephone-dn configuration mode, configure any other parameters you need to set for this directory number.
Step 12	**voice service voip** **Example:** `Router(config)# voice service voip`	(Optional) Enters voice service configuration mode.
Step 13	**h323** **Example:** `Router(conf-voi-serv)# h323`	(Optional) Enters H.323 voice service configuration mode.
Step 14	**h450 h450-2 timeout** {**T1** | **T2** | **T3** | **T4**} *milliseconds* **Example:** `Router(conf-serv-h323)# h450 timeout T1 750`	(Optional) Sets timeouts for supplementary service timers, in milliseconds, and is primarily used when the default settings for these timers do not match your network delay parameters. Refer to the ITU-T H.450.2 specification for more information on these timers. • **T1**—Timeout value to wait to identify a response. Default is 2000. • **T2**—Timeout value to wait for call setup. Default is 5000. • **T3**—Timeout value to wait to initiate a response. Default is 5000. • **T4**—Timeout value to wait for setup of a response. Default is 5000. • *milliseconds*—Number of milliseconds. Range is from 500 to 60000.
Step 15	**exit** **Example:** `Router(conf-serv-h323)# exit`	(Optional) Exits H.323 voice service configuration mode.
Step 16	**exit** **Example:** `Router(conf-voi-serv)# exit`	(Optional) Exits voice service configuration mode.
Step 17	**dial-peer voice** *tag* **pots** **Example:** `Router(config)# dial-peer voice 25 pots`	Enters dial-peer configuration mode to configure a POTS dial peer.
Step 18	**application** *application-name* **Example:** `Router(config-dial-peer)# application transfer_app`	Loads the application named in Step 1 onto the dial peer.

	Command or Action	Purpose
Step 19	**exit** **Example:** `Router(config-dial-peer)# exit`	Exits dial-peer configuration mode. **Timesaver** Before exiting dial-peer mode, configure any other dial-peer parameters you need to set for this dial peer.
Step 20	**dial-peer voice** *tag* **voip** **Example:** `Router(config)# dial-peer voice 29 voip`	Enters dial-peer configuration mode to configure a VoIP dial peer.
Step 21	**application** *application-name* **Example:** `Router(config-dial-peer)# application transfer_app`	Loads the application that you named in Step 1.
Step 22	**exit** **Example:** `Router(config-dial-peer)# exit`	Exits dial-peer configuration mode. **Timesaver** Before exiting dial-peer mode, configure any other dial-peer parameters you need to set on this dial peer.

EXAMPLE

The following example specifies transfer with consultation using the H.450.2 standard for all IP phones serviced by the ITS router:

```
call application voice app_h450_transfer flash:app-h450-transfer.tcl
call application voice app_h450_transfer language 1 en
call application voice app_h450_transfer set-location en 0 flash:/prompts
!
dial-peer voice 100 pots
 destination-pattern 9.T
 port 1/0/0
 application app_h450_transfer
!
dial-peer voice 4000 voip
 destination-pattern 4…
 session-target ipv4:1.1.1.1
 application app_h450_transfer
!
telephony-service
 transfer-pattern 4…
 transfer-system full-consult
 application app_h450_transfer
```

Enabling Analog Call Transfer Using Hookflash and the H.450.2 Standard

The Analog Call Transfer Using Hookflash and the H.450.2 Standard feature allows analog phones to transfer calls with consultation by using the hookflash to initiate the transfer.

This feature requires the same TCL script as the one described in the "Enabling Consultative Call Transfer Using the H.450.2 Standard" section on page 18. If you have already downloaded that file from the Cisco Software Center and loaded it on your ITS router, you do not have to repeat those steps. The TCL script has parameters to which you can pass values using attribute-value (AV) pairs in the **call application voice** command. The parameter that applies to this feature is as follows:

- **delay-time**—Speeds up or delays the setting up of the consultation call during a call transfer from an analog phone using a delay timer. When all digits have been collected, the delay timer is started. The call setup to the receiving party does not begin until the delay timer expires. If the transferring party goes on-hook before the delay timer expires, then the transfer is considered a blind transfer rather than a consultative transfer. If the transferring party goes on-hook after the delay timer expires, either while the destination phone is ringing or after the destination party answers, the transfer is considered a consultative transfer.

In addition to the TCL script, a ReadMe describes the script and the configurable AV pairs. Read this file whenever you download a new version of the script, because it may contain additional script-specific information, such as configuration parameters and user interface descriptions.

Note The TCL script file for this feature is the same file that is used for the Call Transfer Using H.450.2 feature. If you have already loaded the TCL file for that feature on your ITS router, you do not need to perform Steps 1-3 in the following procedure.

Prerequisites

Note that these prerequisites are the same as those for the Enabling Consultative Call Transfer Using the H.450.2 Standard feature.

- The H.450 TCL script named app-h450-transfer.tcl must be downloaded from the Cisco Software Center at http://www.cisco.com/cgi-bin/tablebuild.pl/ip-iostsp and copied to a TFTP server that is available to the ITS router or copied to the Flash memory on the ITS router. The following versions of the script are available:
  - app-h450-transfer.2.0.0.2.tcl for Cisco IOS Release 12.2(11)YT1 and later releases
  - app-h450-transfer.2.0.0.1.tcl for Cisco IOS Release 12.2(11)YT
- All voice gateway routers in the VoIP network must support H.450 and be running the following software:
  - Cisco IOS 12.2(11)YT or a later release
  - Cisco ITS V2.1 or a later release
  - TCL IVR 2.0
  - H.450 TCL script (app-h450-transfer.tcl)

Note You can continue to use the app-h450-transfer.2.0.0.1.tcl script if you install Cisco IOS Release 12.2(11)YT1, but you cannot use the app-h450-transfer.2.0.0.2.tcl script with a release of Cisco IOS software that is earlier than Cisco IOS Release 12.2(11)YT1.

Restrictions

- When a consultative transfer is made by an analog FXS phone using hookflash, the consultation call itself can not be further transferred (that is, cannot become a recursive or chained transfer) until after the initial transfer operation has been completed and the transferee and transfer-to parties are connected. Once the initial call transfer operation has completed and the transferee and transfer-to parties are now the only parties in the call, the transfer-to party may further transfer the call.
- Call transfer with consultation is not supported for Cisco ATA-186, Cisco ATA-188, and Cisco IP Conference Station 7935. Transfer attempts from these devices are executed as blind transfers.

SUMMARY STEPS

1. **call application voice** *application-name location*
2. **call application voice** *application-name* **language** *number language*
3. **call application voice** *application-name* **set-location** *language category location*
4. **call application voice** *application-name* **delay-time** *seconds*
5. **dial-peer voice** *tag* **pots**
6. **application** *application-name*
7. **exit**
8. **dial-peer voice** *tag* **voip**
9. **application** *application-name*
10. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**call application voice** *application-name location* **Example:** `Router(config)# call application voice transfer_app flash:app-h450-transfer.tcl`	Loads the TCL script and specifies its application name. • *application-name*—User-defined name for the IVR application. This name does not have to match the script filename. • *location*—Script directory and filename in URL format. For example, Flash memory (flash:*filename*), a TFTP (tftp://../*filename*) or an HTTP server (http://../*filename*) are valid locations.
Step 2	**call application voice** *application-name* **language** *number language* **Example:** `Router(config)# call application voice transfer_app language 1 en`	(Optional) Sets the language for dynamic prompts used by the application. • *application-name*—IVR application name that was assigned in Step 1. • *number*—Number that identifies the language used by the audio files for the IVR application. • *language*—Two-character code that specifies the language of the prompts. Valid entries are **en** (English—default), **sp** (Spanish), **ch** (Chinese), or **aa** (all).

	Command or Action	Purpose
Step 3	**call application voice** *application-name* **set-location** *language category location* **Example:** `Router(config)# call application voice transfer_app set-location en 0 flash:/prompts`	Defines the location and category of the audio files that are used by the application for dynamic prompts. • *application-name*—Name of the TCL IVR application. • *language*—Two-character code to specify the language of the prompts. Valid entries are **en** (English—default), **sp** (Spanish), **ch** (Chinese), or **aa** (all). • *category*—Category group (0 to 4) for the audio files from this location. The value 0 means all categories. • *location*—URL of the directory that contains the language audio files used by the application, without filenames. Flash memory (flash) or a directory on a server (TFTP, HTTP, or RTSP) are all valid. **Note** Prompts are required for call transfer from analog FXS phones. No prompts are needed for call transfer from IP phones.
Step 4	**call application voice** *application-name* **delay-time** *seconds* **Example:** `Router(config)# call application voice transfer_app delay-time 1`	(Optional) Sets the delay time for consultation call setup for an analog phone that is making a call transfer using the H.450 application. This command passes a value to the TCL script by using an attribute-value (AV) pair. • *seconds*—Number of seconds to delay call setup. Range is from 1 to 10. Default is 2. **Note** A delay of more than 2 seconds is generally noticeable to users. **Note** For more information about AV pairs and the TCL script for H.450 call transfer and forwarding, refer to the ReadMe file that accompanies the script.
Step 5	**dial-peer voice** *number* **pots** **Example:** `Router(config)# dial-peer voice 25 pots`	Enters dial-peer configuration mode to configure a POTS dial peer.
Step 6	**application** *application-name* **Example:** `Router(config-dial-peer)# application transfer_app`	Loads the application named in Step 1 onto the dial peer.
Step 7	**exit** **Example:** `Router(config-dial-peer)# exit`	Exits dial-peer configuration mode. **Timesaver** Before exiting dial-peer mode, configure any other dial-peer parameters you need to set for this dial peer.
Step 8	**dial-peer voice** *number* **voip** **Example:** `Router(config)# dial-peer voice 29 voip`	Enters dial-peer configuration mode to configure a VoIP dial peer.

	Command or Action	Purpose
Step 9	**application** *application-name* **Example:** `Router(config-dial-peer)# application transfer_app`	Loads the application named in Step 1 onto the dial peer.
Step 10	**exit** **Example:** `Router(config-dial-peer)# exit`	Exits dial-peer configuration mode. **Timesaver** Before exiting dial-peer mode, configure any other dial-peer parameters you need to set for this dial peer.

EXAMPLE

The following example enables the H.450 TCL script for analog transfer using hookflash and sets a delay time of 1 second:

```
call application voice transfer_app flash:app-h450-transfer.tcl
call application voice transfer_app language 1 en
call application voice transfer_app set-location en 0 flash:/prompts
call application voice transfer_app delay-time 1
!
dial-peer voice 100 pots
 destination-pattern 9.T
 port 1/0/0
 application app_h450_transfer
!
dial-peer voice 4000 voip
 destination-pattern 4…
 session-target ipv4:10.1.10.1
 application app_h450_transfer
```

Enabling Call Forward Using the H.450.3 Standard

The Call Forward Using the H.450.3 Standard feature provides a standards-based alternative to the Cisco-proprietary call forwarding feature present in previous versions of ITS, and offers call forwarding on busy, no-answer, and all conditions.

To use this feature, parties calling in to an ITS directory number that has been forwarded must support the H.450.3 standard. A new Cisco IOS command, **call-forward pattern**, allows you to specify the patterns of calling-party numbers that support the H.450.3 standard. When an ITS directory number has forwarded its calls and an incoming call is received for that directory number, the ITS router sends an H.450.3 response back to the original calling party to request that the call be placed again using the forward-to destination. Calling numbers that do not match the patterns defined with this command are forwarded using Cisco-proprietary call forwarding for backward compatibility.

This feature requires the same TCL script as Enabling Consultative Call Transfer Using the H.450.2 Standard. If you have already downloaded that file from the Cisco Software Center and loaded it on your ITS router, you do not have to repeat those steps. The TCL script has parameters to which you can pass values using attribute-value (AV) pairs in the **call application voice** command. The parameter that applies to this feature is as follows:

- **max-fwd-cnt**—Allows you to specify the maximum number of times that an individual call can be forwarded by the TCL script. The purpose of this is to reduce the risk of accidentally creating infinite forwarding loops, where A forwards to B and B forwards back to A.

In addition to the TCL script, a ReadMe file describes the script and the configurable AV pairs. Read this file whenever you download a new version of the script, because it may contain additional script-specific information, such as configuration parameters and user interface descriptions.

Note The TCL script must be configured on all dial peers in the VoIP network. Dropped calls or incomplete transfers can result if participating endpoints do not support H.450.

Note The TCL script file for this feature is the same file that is used for the Call Transfer Using H.450.2 feature. If you have already loaded the TCL file for that feature on your ITS router, you do not need to perform Steps 1-5 in the following procedure.

Prerequisites

Note that these prerequisites are the same as those for the Enabling Consultative Call Transfer Using the H.450.2 Standard feature.

- The H.450 TCL script named app-h450-transfer.tcl must be downloaded from the Cisco Software Center at http://www.cisco.com/cgi-bin/tablebuild.pl/ip-iostsp and copied to a TFTP server that is available to the ITS router or copied to the Flash memory on the ITS router. The following versions of the script are available:
  - app-h450-transfer.2.0.0.2.tcl for Cisco IOS Release 12.2(11)YT1 and later releases
  - app-h450-transfer.2.0.0.1.tcl for Cisco IOS Release 12.2(11)YT
- All voice gateway routers in the VoIP network must support H.450 and run the following software:
  - Cisco IOS 12.2(11)YT or a later release
  - Cisco ITS V2.1 or a later release
  - TCL IVR 2.0
  - H.450 TCL script (app-h450-transfer.tcl)

Note You can continue to use the app-h450-transfer.2.0.0.1.tcl script if you install Cisco IOS Release 12.2(11)YT1, but you cannot use the app-h450-transfer.2.0.0.2.tcl script with a release of Cisco IOS software that is earlier than Cisco IOS Release 12.2(11)YT1.

Restrictions

You can perform a staged upgrade to H.450.3 call forwarding, but routers need to be configured to explicitly identify which calling party numbers support H.450.3 and which do not by using the **call-forward pattern** command.

SUMMARY STEPS

1. **call application voice** *application-name location*
2. **call application voice** *application-name* **language** *number language*
3. **call application voice** *application-name* **set-location** *language category location*
4. **call application voice** *application-name* **max-fwd-cnt** *number*

5. **telephony-service**
6. **call forward pattern** *pattern*
7. **application** *application-name*
8. **exit**
9. **voice service voip**
10. **h323**
11. **h450 h450-3 timeout T1** *milliseconds*
12. **exit**
13. **exit**
14. **dial-peer voice** *tag* **pots**
15. **application** *application-name*
16. **exit**
17. **dial-peer voice** *tag* **voip**
18. **application** *application-name*
19. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**call application voice** *application-name location* **Example:** `Router(config)# call application voice transfer_app flash:app-h450-transfer.tcl`	Loads the TCL script and specifies its application name. • *application-name*—User-defined name for the IVR application. This name does not have to match the script filename. • *location*—Script directory and filename in URL format. For example, Flash memory (flash:*filename*), a TFTP (tftp://../*filename*) or an HTTP server (http://../*filename*) are valid locations.
Step 2	**call application voice** *application-name* **language** *number language* **Example:** `Router(config)# call application voice transfer_app language 1 en`	(Optional) Sets the language for dynamic prompts used by the application. • *application-name*—IVR application name that was assigned in Step 1. • *number*—Number that identifies the language used by the audio files for the IVR application. • *language*—Two-character code that specifies the language of the prompts. Valid entries are **en** (English—default), **sp** (Spanish), **ch** (Chinese), or **aa** (all).

	Command or Action	Purpose
Step 3	**call application voice** *application-name* **set-location** *language category location* **Example:** `Router(config)# call application voice transfer_app set-location en 0 flash:/prompts`	(Optional) Defines the location and category of the audio files that are used by the application for dynamic prompts. • *application-name*—Name of the TCL IVR application for H.450 call transfer and forwarding. • *language*—Two-character code to specify the language of the prompts. Valid entries are **en** (English—default), **sp** (Spanish), **ch** (Chinese), or **aa** (all). • *category*—Category group (0 to 4) for the audio files from this location. The value 0 means all categories. • *location*—URL of the directory that contains the language audio files used by the application, without filenames. Flash memory (flash) or a directory on a server (TFTP, HTTP, or RTSP) are all valid. **Note** Prompts are required for call transfer only from analog FXS phones. No prompts are needed for call transfer from IP phones
Step 4	**call application voice** *application-name* **max-fwd-cnt** *number* **Example:** `Router(config)# call application voice transfer_app max-fwd-cnt 2`	(Optional) Sets a limit for the number of times that an individual call can be forwarded by the TCL script. This command passes a value to the TCL script by using an attribute-value (AV) pair. • *application-name*—Name of the TCL IVR application for H.450 call transfer and forwarding. • *number*—Number of times that a single call can be forwarded by the TCL script. Range is 1 to 7. Default is 5. **Note** For more information about AV pairs and the TCL script for H.450 call transfer and forwarding, refer to the ReadMe file that accompanies the script.

	Command or Action	Purpose
Step 5	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.
Step 6	**call-forward pattern** *pattern* **Example:** `Router(config-telephony-service)# call-forward pattern 4...`	Specifies the H.450.3 standard for call forwarding. Calling-party numbers that do not match the patterns defined with this command are forwarded using Cisco-proprietary call forwarding for backward compatibility (as described in ITS 2.0). • *pattern*—Digits to match for call forwarding using the H.450.3 standard. If an incoming calling-party number matches the pattern, it can be forwarded using the H.450.3 standard. A pattern of .T forwards all calling parties using the H.450.3 standard.
Step 7	**application** *application-name* **Example:** `Router(config-telephony-service)# application transfer_app`	Specifies the session-level application for all IP phones serviced by the ITS router. • *application-name*—The H.450 application that was loaded in Step 1.
Step 8	**exit** **Example:** `Router(config-telephony-service)# exit`	Exits telephony-service configuration mode. **Timesaver** Before exiting telephony-service mode, configure any other parameters you need to set for the entire ITS phone network.
Step 9	**voice service voip** **Example:** `Router(config)# voice service voip`	(Optional) Enters voice service configuration mode.
Step 10	**h323** **Example:** `Router(conf-voi-serv)# h323`	(Optional) Enters H.323 voice service configuration mode.
Step 11	**h450 h450-3 timeout T1** *milliseconds* **Example:** `Router(conf-serv-h323)# h450 h450-3 timeout T1 750`	(Optional) Sets timeout for supplementary service timer, in milliseconds, and is primarily used when the default setting for this timer does not match your network delay parameters. Refer to the ITU-T H.450.3 specification for more information on this timer. • **T1**—Timeout value to wait for a rerouting response. Default is 5000. • *milliseconds*—Number of milliseconds. Range is from 500 to 60000.
Step 12	**exit** **Example:** `Router(conf-serv-h323)# exit`	(Optional) Exits H.323 voice service configuration mode.

	Command or Action	Purpose
Step 13	**exit** **Example:** `Router(conf-voi-serv)# exit`	(Optional) Exits voice service configuration mode.
Step 14	**dial-peer voice** *number* **pots** **Example:** `Router(config)# dial-peer voice 25 pots`	Enters dial-peer configuration mode to configure a POTS dial peer.
Step 15	**application** *application-name* **Example:** `Router(config-dial-peer)# application transfer_app`	Loads the application named in Step 1 onto the dial peer.
Step 16	**exit** **Example:** `Router(config-dial-peer)# exit`	Exits dial-peer configuration mode. **Timesaver** Before exiting dial-peer mode, configure any other dial-peer parameters you need to set for this dial peer.
Step 17	**dial-peer voice** *number* **voip** **Example:** `Router(config)# dial-peer voice 29 voip`	Enters dial-peer configuration mode to configure a VoIP dial peer.
Step 18	**application** *application-name* **Example:** `Router(config-dial-peer)# application transfer_app`	Loads the TCL IVR script that you named in Step 1.
Step 19	**exit** **Example:** `Router(config-dial-peer)# exit`	Exits dial-peer configuration mode. **Timesaver** Before exiting dial-peer mode, configure any other dial-peer parameters you need to set on this dial peer.

EXAMPLE

The following example enables call forwarding using the H.450.3 standard and sets a maximum forward count of 2:

```
call application voice app_h450_transfer flash:app-h450-transfer.tcl
call application voice app_h450_transfer language 1 en
call application voice app_h450_transfer set-location en 0 flash:/prompts
call application voice transfer_app max-fwd-cnt 2
!
dial-peer voice 100 pots
 destination-pattern 9.T
 port 1/0/0
 application app_h450_transfer
!
dial-peer voice 4000 voip
 destination-pattern 4…
 session-target ipv4:1.1.1.1
 application app_h450_transfer
```

```
!
telephony-service
 call-forward pattern 4…
 application app_h450_transfer
```

Enabling the Busy Attendant Announcement

This feature requires the H.450 TCL script file that is described in the "Assembling Prerequisites for Cisco ITS V2.1" section on page 11. If you have already downloaded that file from the Cisco Software Center and loaded it onto your ITS router, you do not have to repeat those steps.

The H.450 TCL script has parameters to which you can pass values using attribute-value (AV) pairs in the **call application voice** command. The parameter that applies to this feature is as follows:

- **announce-for-busy**—If the value 1 is configured for this AV pair and an incoming call is transferred to a busy extension, then a recorded announcement is played. The announcement is derived from an audio file, operator-is-busy.au, which is downloaded with the TCL file and must be loaded onto the ITS router Flash memory. If a value for **announce-for-busy** is not configured and an incoming call is transferred to a busy extension, the call is terminated.

In addition to the TCL script, a ReadMe file describes the script and the configurable AV pairs. Be sure to read this file whenever you download a new version of the script, because it may contain additional script-specific information, such as configuration parameters and user interface descriptions.

Note The TCL script file for this feature is the same file that is used for the Call Transfer Using H.450.2 feature. If you have already loaded the TCL file for that feature on your ITS router, you do not need to perform Steps 1-3 in the following procedure.

SUMMARY STEPS

1. **call application voice** *application-name location*
2. **call application voice** *application-name* **language** *number language*
3. **call application voice** *application-name* **set-location** *language category location*
4. **call application voice** *application-name* **announce-for-busy 1**
5. **dial-peer voice** *tag* **pots**
6. **application** *application-name*
7. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**call application voice** *application-name location* **Example:** `Router(config)# call application voice transfer_app flash:app-h450-transfer.tcl`	Loads the TCL script on the ITS router and specifies its application name. • *application-name*—Name used to reference the call application in later commands. This is a user-defined name and does not have to match the script filename. • *location*—The directory and filename containing in URL format that contains the file. Valid URLs include Flash memory (flash:*filename*), TFTP server (tftp://../*filename*), or HTTP server (http://../*filename*).
Step 2	**call application voice** *application-name* **language** *number language* **Example:** `Router(config)# call application voice transfer_app language 1 en`	(Optional) Sets the language for dynamic prompts used by the application. • *application-name*—Name of the TCL application. • *number*—Number that identifies the language used by the audio files for the IVR application. • *language*—Two-character code to specify the language of the prompts. Valid entries are **en** (English—default), **sp** (Spanish), **ch** (Chinese), or **aa** (all).
Step 3	**call application voice** *application-name* **set-location** *language category location* **Example:** `Router(config)# call application voice transfer_app set-location en 0 flash:/prompts`	(Optional) Defines the location and category of the audio files that are used by the application for dynamic prompts. • *application-name*—Name of the TCL IVR application for H.450 call transfer and forwarding. • *language*—Two-character code to specify the language of the prompts. Valid entries are **en** (English—default), **sp** (Spanish), **ch** (Chinese), or **aa** (all). • *category*—Category group (0-4) for the audio files from this location. For example, audio files for the days and months could be category 1, audio files for units of currency category 2, audio files for units of time: seconds, minutes, and hours category 3. The value 0 means all categories. • *location*—URL of the directory that contains the language audio files used by the application, without filenames. Flash memory (flash) or a directory on a server (TFTP, HTTP, or RTSP) are all valid. **Note** Prompts are only required for call transfer from analog FXS phones. No prompts are needed for call transfer from IP phones

	Command or Action	Purpose
Step 4	**call application voice** *application-name* **announce-for-busy 1** **Example:** `Router(config)# call application voice transfer_app announce-for-busy 1`	(Optional) Specifies that the transfer application should play a prerecorded announcement, operator-is-busy.au, if the phone to which a call is to be transferred is busy. This command passes a value to the TCL script by using an attribute-value (AV) pair. If this command is not used, the caller is disconnected and hears no announcement. To disable • *application-name*—Name of the TCL IVR application for H.450 call transfer and forwarding. • **announce-for-busy 1**—AV pair that specifies that an announcement should be played if the phone to which a call is to be transferred is busy. **Note** For more information about AV pairs and the TCL script for H.450 call transfer and forwarding, refer to the ReadMe file that accompanies the script.
Step 5	**dial-peer voice** *number* **pots** **Example:** `Router(config)# dial-peer voice 25 pots`	Enters dial-peer configuration mode to configure a POTS dial peer.
Step 6	**application** *application-name* **Example:** `Router(config-dial-peer)# application transfer_app`	Loads the application named in Step 1 onto the dial peer.
Step 7	**exit** **Example:** `Router(config-dial-peer)# exit`	Exits dial-peer configuration mode. **Timesaver** Before exiting dial-peer mode, configure any other dial-peer parameters you need to set on this dial peer.

EXAMPLE

The following example enables the busy attendant announcement:

```
call application voice transfer_app flash:app-h450-transfer.tcl
call application voice transfer_app language 1 en
call application voice transfer_app set-location en 0 flash:/prompts
call application voice transfer_app announce-for-busy 1
!
dial-peer voice 100 pots
 destination-pattern 9.T
 port 1/0/0
 application app_h450_transfer
!
dial-peer voice 4000 voip
 destination-pattern 4…
 session-target ipv4:1.1.1.1
 application app_h450_transfer
```

Enabling Silent Ring on Cisco IP Phone 7960 and Cisco IP Phone Expansion Module 7914

The silent ring feature allows you to designate lines that do not produce an audible ring when they receive incoming calls. The silent ring feature is supported on multi-line IP phones, including the Cisco IP Phone 7940, Cisco IP Phone 7960, and Cisco IP Phone Expansion Module 7914.

The silent ring is enabled when the line button is configured with ringer option **s** or **b**.

Restrictions

Silent ring is limited to the Cisco IP Phone 7960 and the Cisco IP Phone Expansion Module 7914.

SUMMARY STEPS

1. **ephone** *tag*
2. **mac-address** *mac-address*
3. **button** *button-number*{**:** | **b** | **s**}*dn-tag* [[*button-number*{**:** | **b** | **s**}*dn-tag*] ...]
4. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**ephone** *tag* **Example:** `Router(config)# ephone 4`	Enters ephone (Ethernet phone) configuration mode to register Cisco IP phones.
Step 2	**mac-address** *mac-address* **Example:** `Router(config-ephone)# mac-address 1234.5678.abcd`	Specifies the MAC address of the registering phone.

	Command or Action	Purpose
Step 3	**button** *button-number*{**:** | **b** | **s**}*dn-tag* [*button-number*{**:** | **b** | **s**}*dn-tag*] ...] **Example:** `Router(config-ephone)# button 1:10 2:11 3b12 4s13`	Assigns a button number to a Cisco IP phone directory number (DN) and indicates ring treatment. The maximum number of button-DN pairs is determined by phone type, as follows: • Cisco IP Phone 7960—up to 6 button-DN pairs. • Cisco IP Phone 7940, Cisco IP Phone 7910, and Cisco IP Conference Station 7935—up to 2 button-DN pairs. **Note** The Cisco IP Phone 7910 has only one physical line button, but you can assign it up to two DNs. • *button-number*—Number of a line button on an IP phone. • **:** (colon)—Normal ring. For incoming calls, you hear audible ringing. You also see a flashing ((< icon in the phone display and a flashing red light on the handset. On the Cisco IP Phone Expansion Module 7914, a flashing yellow light also accompanies incoming calls. • **b**—Beep is allowed. Audible ring is suppressed for incoming calls, but call-waiting beeps are allowed. Visible cues are the same as described for normal ring. • **s**—Silent ring. The audible ring and call-waiting beep are suppressed for incoming calls. Visible cues are the same as described for normal ring. • *dn-tag*—Directory number tag.
Step 4	**exit** **Example:** `Router(config-ephone)# exit`	Exits ephone configuration mode.

EXAMPLE

The following example sets button 3 for silent ring:

```
ephone 4
 mac-address 1234.5678.abcd
 button 1:10 2:11 3s12
```

Designating International Language and Tone Support

This task allows you to designate an ISO-3166 code for the language used in IP phone displays and for locale-specific call progress tones and cadences.

SUMMARY STEPS

1. **telephony-service**
2. **user-locale** *language-code*

3. **network-locale** *locale-code*
4. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.
Step 2	**user-locale** *language-code* **Example:** `Router(config-telephony-service)# user-locale FR`	Specifies a language for display on the Cisco IP Phone 7940 and Cisco IP Phone 7960. • *language-code*—ISO-3166 codes that are supported in ITS V2.1 are as follows: – **FR**—French – **DE**—German – **IT**—Italian – **ES**—Spanish – **US**—United States (default)
Step 3	**network-locale** *locale-code* **Example:** `Router(config-telephony-service)# network-locale FR`	Specifies a set of call progress tones and cadences on the Cisco IP Phone7940 and Cisco IP Phone 7960. • *locale-code*—ISO-3166 codes that are supported in ITS V2.1 are as follows: – **FR**—France – **DE**—Germany – **IT**—Italy – **ES**—Spain – **US**—United States (default)
Step 4	**exit** **Example:** `Router(config-telephony-service)# exit`	Exits telephony-service mode.

EXAMPLE

The following example sets the locale for display language and call progress tones to France:

```
telephony-service
 user-locale FR
 network-locale FR
```

Troubleshooting Tips

To display the current locale codes that are associated with dictionary, language, and call progress tone files, use the **show telephony-service tftp-bind** command.

Configuring Music on Hold from a Live Feed

The live feed MoH connection is established as an automatically connected voice call either by the Cisco ITS MoH system itself or by an external source directly calling into the live feed MoH port, including calls via VoIP with voice activity detection (VAD) disabled.

The recommended interface for live feed MoH is an analog E&M port because it requires the minimum number of external components. You directly connect a line level audio feed (standard audio jack) to pins 3 and 6 of an E&M RJ-45 connector. The E&M WAN interface card (WIC) has a built-in audio transformer that provides appropriate electrical isolation for the external audio source. (The audio connection on the E&M port does not require loop-current). The **signal immediate** and **auto-cut-through** commands disable E&M signaling on this voice port. A G.711 audio packet stream is generated by the digital signal processor (DSP) on the E&M port.

If you are using an FXO voice port for live-feed MoH instead of an E&M port, connect the MoH source to the FXO voice port. This connection requires an external adapter device to supply normal telephone company (telco) battery voltage with the correct polarity to the tip and ring leads of the FXO port. The adapter device must also provide transformer-based isolation between the external audio source and the tip and ring leads of the FXO port.

Music from a live feed is continuously fed into the MoH playout buffer instead of being read from in-flash file. There is typically a 2-second delay. The outbound call to the MoH live-feed source is attempted (or reattempted) every 30 seconds until connected by the directory number that has been configured for MoH.

Restrictions

- The FXO port can be used if supplied with an external third-party adapter to provide a battery feed.
- The FXS port cannot be used.
- MoH is supplied only to PSTN and VoIP G.711 calls. Local IP phone callers hear a repeating tone on hold for reassurance that they are still connected.

SUMMARY STEPS

1. **voice-port** *port*
2. **input gain** *decibels*
3. **auto-cut-through** (E&M only)
4. **operation 4-wire** (E&M only)
5. **signal immediate** (E&M only)
6. **exit**
7. **dial peer voice** *tag* **pots**
8. **destination-pattern** *string*
9. **port** *port*
10. **exit**
11. **ephone-dn** *dn-tag*
12. **number** *number*
13. **moh out-call** *number*
14. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**voice-port** *port* **Example:** `Router(config)# voice-port 1/1/0`	Enters voice-port configuration mode. To find the correct definition of the *port* argument for your router, refer to the *Cisco IOS Voice, Video, and Fax Command Reference,* Release 12.2 T.
Step 2	**input gain** *decibels* **Example:** `Router(config-voice-port)# input gain 0`	Specifies, in decibels, the amount of gain to be inserted at the receiver side of the interface. Acceptable values are integers from -6 to 14.
Step 3	**auto-cut-through** **Example:** `Router(config-voice-port)# auto-cut-through`	(E&M ports only) Enables call completion when a PBX does not provide an M-lead response. MoH requires that you use this command with E&M ports.
Step 4	**operation 4-wire** **Example:** `Router(config-voice-port)# operation 4-wire`	(E&M ports only) Selects 4-wire cabling scheme. MoH requires that you specify 4-wire operation with this command for E&M ports.
Step 5	**signal immediate** **Example:** `Router(config-voice-port)# signal immediate`	(E&M ports only) For E&M tie trunk interfaces, directs the calling side to seize a line by going off-hook on its E-lead and to send address information as DTMF digits.
Step 6	**exit** **Example:** `Router(config-voice-port)# exit`	Exits voice-port configuration mode.
Step 7	**dial peer voice** *tag* **pots** **Example:** `Router(config)# dial peer voice 7777 pots`	Enters dial-peer configuration mode.
Step 8	**destination-pattern** *string* **Example:** `Router(config-dial-peer)# destination-pattern 7777`	Specifies either the prefix or the full E.164 telephone number to be used for a dial peer.
Step 9	**port** *port* **Example:** `Router(config-dial-peer)# port 1/1/0`	Associate a dial peer with a specific voice port. To find the correct definition of the *port* argument for your router, refer to the *Cisco IOS Voice, Video, and Fax Command Reference,* Release 12.2T.
Step 10	**exit** **Example:** `Router(config-dial-peer)# exit`	Exits dial-peer configuration mode.

	Command or Action	Purpose
Step 11	**ephone-dn** *dn-tag* **Example:** `Router(config)# ephone-dn 55`	Enters ephone-dn configuration mode.
Step 12	**number** *number* **Example:** `Router(config-ephone-dn)# number 5555`	Defines a valid directory number for a Cisco IP phone.
Step 13	**moh out-call** *outcall-number* **Example:** `Router(config-ephone-dn)# moh out-call 7777`	Specifies the number to be called for a live feed to be used for MoH.
Step 14	**exit** **Example:** `Router(config-ephone-dn)# exit`	Exits ephone-dn configuration mode.

EXAMPLE

The following example enables MoH on voice port 1/1/0 and dial peer 7777:

```
voice-port 1/1/0
 auto-cut-through
 operation 4-wire
 signal immediate
!
dial-peer voice 7777 pots
 destination-pattern 7777
 port 1/1/0
!
ephone-dn 55
 number 5555
 moh out-call 7777
```

Troubleshooting Tips

The following commands can help troubleshoot live-feed MoH:

- **debug ephone moh**.
- **show ephone summary**. Note that this command provides an extended output if the **debug ephone moh** command is enabled.

Enabling System Speed Dial

The system speed dial feature creates a list of frequently used numbers that is accessible to all IP phones. System speed dial is optional, and it is enabled only if a file called speeddial.xml is present in the Flash memory of the ITS router. Figure 2 shows a sample speeddial.xml file.

When an administrative user places the speeddial.xml file in router Flash memory, the speed-dial list that it contains is automatically integrated into the local directory services XML page that is provided to a phone when its Directory button is pressed.

Prerequisites

- In any text editor, create a file called speeddial.xml in the Cisco-specified directory DTD format. Use the keywords and format shown in Figure 2 to specify names and directory numbers for a speed dial list. For more information about Cisco DTD formats, refer to *Cisco IP Phone Services Application Development Notes.*
- Copy the file to a TFTP server on the ITS router. On UNIX workstations, use the **cp** command to copy the file. On Windows PCs, use the **copy** command.

Figure 2 Sample speeddial.xml file

System Speed Dial File

```
<CiscoIPPhoneDirectory>
<Title>Local Speed-dial</Title>
<Prompt>Record 1 to 1 of 1 </Prompt>

<DirectoryEntry>
  <Name>Security</Name>
  <Telephone>71111</Telephone>
</DirectoryEntry>

<DirectoryEntry>
  <Name>Marketing</Name>
  <Telephone>71234</Telephone>
</DirectoryEntry>

<DirectoryEntry>
  <Name>Tech Support</Name>
  <Telephone>71432</Telephone>
</DirectoryEntry>

</CiscoIPPhoneDirectory>
```

SUMMARY STEPS

1. **copy tftp flash**
2. **configure terminal**
3. **ip http server**
4. **ip http path flash**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**copy tftp flash**
	
	Example:
	`Router# copy tftp flash`
	
	`Address or name of remote host []? 172.24.59.11`
	`Source filename []? speeddial.xml`
	`Destination filename [speeddial.xml]?`
	`Accessing tftp://172.24.59.11/speeddial.xml...`
	`Erase flash:before copying? [confirm]n`
	`Loading speeddial.xml from 172.24.59.11 (via FastEthernet0/0):!`
	`[OK - 329 bytes]`
	
	`Verifying checksum...  OK (0xF5DB)`
	`329 bytes copied in 0.044 secs (7477 bytes/sec)`
		Copies the file from the TFTP server to the router Flash memory.
		• At the first prompt, enter the IP address or the DNS name of the remote host.
		• At both filename prompts, enter **speeddial.xml**.
		• At the prompt to erase Flash, enter **no**.

Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**ip http server** **Example:** `Router(config)# ip http server`	Enables the Cisco Web browser user interface on the ITS router.
Step 4	**ip http path flash** **Example:** `Router(config)# ip http path flash`	Sets the base HTTP path to Flash memory.

EXAMPLE

The following example enables the Cisco Web browser and sets the HTTP path to Flash memory so that the speeddial.xml file in Flash memory is accessible to IP phones:

```
ip http server
ip http path flash
```

Troubleshooting Tips

- **debug ephone detail**

Disabling the Local Directory Service

This Local Directory Service Disable feature allows you to disable the HTTP access mechanism that normally allows IP phones to access the local directory information provided by the ITS router. HTTP access to the local directory information is provided without validating that the accessing HTTP client is actually an authorized IP phone.

SUMMARY STEPS

1. **telephony-service**
2. **no service local-directory**
3. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.
Step 2	**no service local-directory** **Example:** `Router(config-telephony-service)# no service local-directory`	Disables local directory service on IP phones.
Step 3	**exit** **Example:** `Router(config-telephony-service)# exit`	Exits telephony-service configuration mode.

EXAMPLE

The following example disables the local directory on IP phones served by this router:

```
telephony-service
 no service local-directory
```

Customizing an IP Phone Header Bar

For Cisco IP Phone 7940s and Cisco IP Phone 7960s with black header bars as shown in Figure 1 on page 8, the Customizing an IP Phone Header Bar feature allows you to define the description that appears on the top line (black bar or header bar) of the display for the primary dialed number of a Cisco IP phone. Normally the header bar simply replicates the text appearing next to the first button. This feature allows you to specify different text for the header bar. For example, you can use this feature to display the complete E.164 telephone number at the top of the display instead of the extension number that appears next to the line button.

SUMMARY STEPS

1. **ephone-dn** *dn-tag*
2. **description** *display-text*
3. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**ephone-dn** *dn-tag* **Example:** `Router(config)# ephone dn 55`	Enters ephone-dn configuration mode.
Step 2	**description** *display-text* **Example:** `Router(config-ephone-dn)# description 408-555-5555`	Defines a description for the header bar of a Cisco IP phone.
Step 3	**exit** **Example:** `Router(config-ephone-dn)# exit`	Exits ephone-dn configuration mode.

EXAMPLE

The following example provides the department and full E.164 number for a phone line in the phone header bar:

```
ephone-dn 55
 description “Marketing 408-555-5555”
```

Specifying an Idle Message for Cisco IP Phone 7940 and Cisco IP Phone 7960

The Idle Message feature allows you to define a URL that contains an XML file to be displayed on Cisco IP Phone 7940s and Cisco IP Phone 7960s that are not in use, and to specify a refresh interval for the display, in seconds. The file can contain text, icons, or images, and must conform to the Cisco XML DTD that is described in *Cisco IP Phone Services Application Development Notes*.

SUMMARY STEPS

1. **telephony-service**
2. **url idle** *url* **idle-timeout** *seconds*
3. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.
Step 2	**url idle** *url* **idle-timeout** *seconds* **Example:** `Router(config-telephony-service)# url idle http://www.abcwrecking.com/public/logo idle-timeout 35`	Defines a URL containing a file to display in the phone display when the phone is not in use, and specifies the interval between refreshes of the display, in seconds. • *url*—Any URL that conforms to RFC 2396. • *seconds*—Range is from 0 to 300.
Step 3	**exit** **Example:** `Router(config-telephony-service)# exit`	Exits telephony-service configuration mode.

EXAMPLE

The following example specifies that a file called logo.htm should be displayed on IP phones when they are not being used:

```
telephony-service
 url idle http://www.abcwrecking.com/public/logo.htm idle-timeout 35
```

Configuring Administrative User Classes

Previous versions of Cisco ITS allowed two levels of users: administrative users and normal users. Cisco ITS V2.1 divides administrative users into two classes: system administrators and customer administrators. System administrators can configure all ITS features systemwide. Customer administrators are limited to a configurable subset of GUI functionality that is defined in an XML file. The file follows a template that conforms to the Cisco XML DTD. A sample file is shown in Figure 4, and the template is shown in Figure 3. The template is one of the files downloaded in the ITS V2.1 file set.

Cisco ITS V2.1 also provides support for XML cascading style sheets (files with .css suffix) that can be used to customize the browser GUI display.

Previous versions of Cisco ITS supported administrative user authentication on the local router only. Cisco ITS V2.1 supports AAA authentication for system administrators through a RADIUS or TACACS+ server. If authentication through the server fails, the local router is searched.

Prerequisites

- In any text editor, create a file in the Cisco-specified directory DTD format that follows the template shown in Figure 3. This file specifies the subset of the IP phone graphical user interface (GUI) that the system administrator or the customer administrator can access. A sample file is shown in Figure 4. For more information about Cisco DTD formats, refer to *Cisco IP Phone Services Application Development Notes*.
- Copy the file to a TFTP server on the ITS router. On UNIX workstations, use the **cp** command to copy the file. On Windows PCs, use the **copy** command.

Figure 3 Configurable Administrative User Class XML File Template

Configurable Administrative User Class XML File Template

```
<Presentation>
  <MainMenu>
     <!-- Take Higher Precedence over CLI "dn-wed-edit" -->
     <AddExtension> [Hide | Show] </AddExtension>
     <DeleteExtension> [Hide | Show] </DeleteExtension>
     <AddPhone> [Hide | Show] </AddPhone>
     <DeletePhone> [Hide | Show] </DeletePhone>
  </MainMenu>

  <Extension>
      <!-- Control both view and change, and possible add or delete -->
      <SequenceNumber> [Hide | Show] </SequenceNumber>
      <Type> [Hide | Show] </Type>
      <Huntstop> [Hide | Show] </Huntstop>
      <Preference> [Hide | Show] </Preference>
      <HoldAlert> [Hide | Show] </HoldAlert>
      <TranslationRule> [Hide | Show] </TranslationRule>
      <Paging> [Hide | Show] </Paging>
      <Intercom> [Hide | Show] </Intercom>
  </Extension>

  <Phone>
      <!-- control both view and change, and possible add and delete --->
      <SequenceNumber> [Hide | Show] </SequenceNumber>
  </Phone>

  <System>
     <!-- Control View Only -->
     <PhoneURL> [Hide | Show] </PhoneURL>
     <PhoneLoads> [Hide | Show]</PhoneLoad>
     <CallHistory> [Hide | Show] </CallHistory>
     <MWIServer> [Hide | Show] </MWIServer>

     <!-- Control both View and Change or Change Only -->
     <TransferPattern attr=[Both | Change]> [Hide | Show] </TransferPattern>
     <VoiceMailNumber attr=[Both | Change]> [Hide | Show] </VoiceMailNumber>
     <MaxNumberPhone attr=[Both | Change]> [Hide | Show] </MaxNumberPhone>
     <DialplanPattern attr=[Both | Change]> [Hide | Show] </DialplanPattern>

     <!-- Control Change Only -->
     <!-- Take Higher Precedence over CLI "time-web-edit" -->
     <Time> [Hide | Show] </Time>
   </System>

   <Function>
     <AddLineToPhone> [No | Yes] </AddLineToPhone>
     <DeleteLineFromPhone> [No | Yes] </DeleteLineFromPhone>
     <MaxLinePerPhone> [1-6] </MaxLinePerPhone>
   </Function>
</Presentation>
```

Figure 4 Sample XML file to Configure Administrative User Classes

Configurable Administrative User Class XML File

```
sample.xml
<Presentation>
  <MainMenu>
     <AddExtension> Hide </AddExtension>
     <DeleteExtension> Hide </DeleteExtension>
     <AddPhone> Hide </AddPhone>
     <DeletePhone> Hide </DeletePhone>
  </MainMenu>

  <Extension>
      <!-- Control both view and change, and possible add or delete -->
      <SequenceNumber> Hide </SequenceNumber>
      <Type> Hide </Type>
      <Huntstop> Hide </Huntstop>
      <Preference> Hide </Preference>
      <HoldAlert> Hide </HoldAlert>
      <TranslationRule> Hide </TranslationRule>
  </Extension>

  <Phone>
      <!-- control both view and change, and possible add and delete --->
      <SequenceNumber> Hide </SequenceNumber>
  </Phone>

  <System>
     <!-- Control View Only -->
     <PhoneURL> Hide  </PhoneURL>
     <PhoneLoads> Hide </PhoneLoad>
     <CallHistory> Hide </CallHistory>
     <MWIServer> Hide </MWIServer>

     <!-- Control Either View and Change or Change Only -->
     <TransferPattern attr=Both> Hide </TransferPattern>
     <VoiceMailNumber attr=Both> Hide </VoiceMailNumber>
     <MaxNumberPhone attr=Both>  Hide </MaxNumberPhone>
     <DialplanPattern attr=Change> Hide </DialplanPattern>

     <!-- Control Change Only -->
     <Time> Hide </Time>
   </System>

   <Function>
     <AddLineToPhone> No </AddLineToPhone>
     <DeleteLineFromPhone> No </DeleteLineFromPhone>
     <MaxLinePerPhone> 4 </MaxLinePerPhone>
   </Function>
</Presentation>
```

Restrictions

- The size of the XML file to be loaded must be 2000 bytes or smaller.
- Dynamic HTML (DHTML) is used for display and the feature requires Microsoft Internet Explorer Version 5.5 or a later release.
- Only the password of the customer administrator can be changed through the web interface, not that of the system administrator.

Note This task begins in privileged EXEC mode.

SUMMARY STEPS

1. **copy tftp flash**
2. **configure terminal**
3. **ip http server**
4. **ip http path** *path*
5. **telephony-service**
6. **web admin system name** *username* {**password** *string* | **secret** {**0** | **5**} *string*}
7. **web admin customer name** *username* **password** *string*
8. **web customize load** *filename*
9. **exit**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**copy tftp flash**
	
	Example:
	`Router# copy tftp flash`
	
	`Address or name of remote host []? 172.24.59.11`
	`Source filename []? adminuser.xml`
	`Destination filename [adminuser.xml]?`
	`Accessing tftp://172.24.59.11/adminuser.xml...`
	`Erase flash:before copying? [confirm]n`
	`Loading adminuser.xml from 172.24.59.11 (via FastEthernet0/0):!`
	`[OK - 794 bytes]`
	
	`Verifying checksum...  OK (0xF5DB)`
	`794 bytes copied in 0.084 secs (7477 bytes/sec)`
		Copies the file from the TFTP server to the router Flash memory.
		• At the first prompt, enter the IP address or the DNS name of the remote host.
		• At both filename prompts, enter **speeddial.xml**.
		• At the prompt to erase Flash, enter **no**.

Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**ip http server** **Example:** `Router(config)# ip http server`	Enables the Cisco Web browser user interface on the ITS router.
Step 4	**ip http path** *path* **Example:** `Router(config)# ip http path Flash`	Specifies the location of the XML file.
Step 5	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.
Step 6	**web admin system name** *username* {**password** *string* | **secret** {**0** | **5**} *string*} **Example:** `Router(config-telephony-service)# web admin system name user83 password pw39485638`	Defines a username or password for a system administrator or both. The default username is Admin. There is no default password. • **name** *username*—Username of system administrator. • **password** *string*—A string to verify system administrator identity. Default is empty string. • **secret** {**0** | **5**} *string*—Secret password. The digit specifies encryption, as follows: – **0**—Password that follows is not encrypted. – **5**—Password that follows is encrypted. **Note** This command replaces the **admin-username** and **admin-password** commands.
Step 7	**web admin customer name** *username* **password** *string* **Example:** `Router(config-telephony-service)# web admin customer name user44 password pw10293847`	Defines a username or password for a customer administrator or both. The default username is Customer. There is no default password. • **name** *username*—Username of customer administrator. • **password** *string*—A string to verify customer administrator identity. Default is empty string.
Step 8	**web customize load** *filename* **Example:** `Router(config-telephony-service)# web customize load adminuser.xml`	Loads and parses the specified XML file from router Flash memory. In the XML file, the tags with the value Hide are used to prevent items from being displayed in the customer administrator GUI. • *filename*—Name of the XML file in which you created the custom administrative user classes.
Step 9	**exit** **Example:** `Router(config-telephony-service)# exit`	Exits telephony-service configuration mode.

EXAMPLE

The following example establishes a system administrator named admin with full privileges and a password of admin, and a customer administrator named custadmin with limited privileges. The file called sample.xml contains the customization instructions to limit the GUI that custadmin sees.

```
telephony-service
 web admin system name admin password admin
 web admin customer name custadmin password zebra
 web customize load sample.xml
```

Specifying an Enhanced Dial-Plan Pattern

The keyword **extension-pattern** has been added to the **dialplan-pattern** command to allow additional manipulation of IP phone abbreviated extension number prefix digits.

The leading digits of the pattern specified by the **extension-pattern** keyword are stripped and replaced by the corresponding leading digits of the dial-plan pattern, which avoids DID numbers like 408-550-0001 resulting in 4-digit extension numbers like 0001.

SUMMARY STEPS

1. **telephony-service**
2. **dialplan-pattern** *tag pattern* **extension-length** *length* [**extension-pattern** *epattern*] [**no-reg**]
3. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.
Step 2	**dialplan-pattern** *tag pattern* **extension-length** *length* [**extension-pattern** *epattern*] [**no-reg**] **Example:** `Router(config-telephony-service)# dialplan-pattern 1 4085556000 extension-length 3 extension-pattern 4..`	Maps an abbreviated extension number prefix digit pattern to the full E.164 telephone number pattern. • *tag*—Dial-plan string tag used before a ten-digit telephone number. Range is from 1 to 5. • *pattern*—Dial-plan pattern for full E.164 number. • **extension-length** *length*—Number of digits in the **extension-pattern** keyword. • **extension-pattern** *epattern*—Internal extension pattern to use. • **no-reg**—No registration with gatekeeper.
Step 3	**exit** **Example:** `Router(config-telephony-service)# exit`	Exits telephony-service configuration mode.

EXAMPLE

The following example maps the extension pattern 4.. to the last three digits of the dial-plan pattern 4085556000:

```
telephony-service
 dialplan-pattern 1 4085556000 extension-length 3 extension-pattern 4..
```

Adding Support for the Cisco IP Phone Expansion Module 7914

Up to two Cisco IP Phone Expansion Module 7914s can be added to a Cisco IP Phone 7960 or Cisco IP Phone 7940. Once an expansion module is attached to a phone, the ITS router must be configured to recognize the presence of the module and must be loaded with firmware for the module. Note that the IP phone does not automatically detect the presence of the expansion module.

SUMMARY STEPS

1. **ephone** *tag*
2. **type** *phone-type* [**addon 1** *module-type* [**2** *module-type*]]
3. **exit**
4. **telephony-service**
5. **load** *phone-type firmware-file*
6. **exit**
7. **tftp-server flash:***firmware-file*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**ephone** *tag* **Example:** `Router(config)# ephone 10`	Enters Ethernet phone (ephone) configuration mode for an IP phone.
Step 2	**type** *phone-type* [**addon 1** *module-type* [**2** *module-type*]] **Example:** `Router(config-ephone)# type 7960 addon 1 7914 2 7914`	Defines one or two add-on phone modules for this phone.
Step 3	**exit** **Example:** `Router(config-ephone)# exit`	Exits ephone configuration mode.
Step 4	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.

	Command or Action	Purpose
Step 5	**load** *phone-type firmware-file* **Example:** `Router(config-telephony-service)# load 7914 S00103020002`	Identifies the Cisco IP phone firmware file that is used by the specified Cisco IP phone type. **Note** When using a firmware filename in the **load** command, do not enter the file extension. For example, use X12345, not X12345.bin.
Step 6	**exit** **Example:** `Router(config-telephony-service)# exit`	Exits telephony-service configuration mode.
Step 7	**tftp-server flash:***firmware-file* **Example:** `Router(config)# tftp-server flash:S00103020002.bin`	Permits the ITS router to provide TFTP access to the specified file by the IP phones served by the router. • *firmware-file*—Name of the firmware file in router Flash memory that the TFTP server uses in answering TFTP Read Requests from IP phones.

EXAMPLE

The following example enables two Cisco IP Phone Expansion Module 7914s on the phone with tag 4:

```
ephone 4
 type 7960 addon 1 7914 2 7914
telephony-service
 load 7914 S00103020002
 tftp-server flash:S00103020002.bin
```

Rebooting Phones After Configuration Updates

After you update information for a phone associated with an ITS router, the phone must be rebooted using one of the following commands:

- The **reset** command performs a “hard” reboot similar to a power-off, power-on sequence, which restarts the phone and contacts the DHCP server and TFTP server to update the phone from their information as well. The **sequence-all** keyword specifies a sequential reset of the ITS phones, which minimizes the risk of the conflict that can occur when multiple phones simultaneously attempt to access changed ITS configuration information via TFTP.
- The **restart** command performs a “soft” reboot by simply restarting the phone without contacting the DHCP and TFTP servers.

The **reset** command takes significantly longer to process than the **restart** command when you are updating multiple phones, but it must be used when you update phone firmware, user locale, network locale, or URL parameters. For simple button, line, or speed-dial changes, use the **restart** command.

Note The **reset sequence-all** command and the **restart** command are new in Cisco IOS Release 12.2(11)YT1.

This section describes the following tasks:

- Rebooting Phones with the reset Command
- Rebooting One Phone with the restart Command
- Rebooting All Phones with the restart Command

Rebooting Phones with the reset Command

The **reset** command is used to reboot IP phones after you update phone firmware, user locale, network locale, or URL parameters.

SUMMARY STEPS

1. **telephony-service**
2. **reset** {**all** [*time-interval*] | **cancel** | **mac-address** *mac-address* | **sequence-all**}
3. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.
Step 2	**reset** {**all** [*time-interval*] | **cancel** | **mac-address** *mac-address* | **sequence-all**} **Example:** `Router(config-telephony-service)# reset all`	Performs a complete reboot of all phones or the phone with the specified MAC address, including contacting the DHCP and TFTP servers for the latest configuration information. • **all**—Resets all phones associated with an ITS router. This keyword causes the router to pause 15 seconds between the reset start for each successive phone. • *time-interval*—Time interval, in seconds, between the start of each phone reset. Range is 0 to 60. Default is 15. • **cancel**—Interrupts a sequential reset cycle. • **mac-address** *mac-address*—Resets the phone that has the specified MAC address. • **sequence-all**—Resets all phones associated with this ITS router. This keyword causes the router to wait until one reset is complete before starting to reset the next phone. There is a reset timeout of 4 minutes, after which the router stops waiting for the currently registering phone to complete registration and starts to reset the next phone.
Step 3	**exit** **Example:** `Router(config-telephony-service)# exit`	Exits telephony-service configuration mode.

EXAMPLE

The following example performs a complete sequential reboot of all phones associated with the ITS router:

```
telephony-service
 reset sequence-all
```

Rebooting One Phone with the restart Command

The **restart** command is used to reboot IP phones after you make simple button, line, or speed-dial changes.

SUMMARY STEPS

1. **ephone** *tag*
2. **restart**
3. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**ephone** *tag* **Example:** `Router(config)# ephone 1`	Enters ephone configuration mode.
Step 2	**restart** **Example:** `Router(config-ephone)# restart`	Performs fast reboot of this ephone. Does not contact DHCP or TFTP server for updated information.
Step 3	**exit** **Example:** `Router(config-ephone)# exit`	Exits ephone configuration mode.

EXAMPLE

The following example performs a fast reboot of ephone 1:

```
!
ephone 1
 restart
!
```

Rebooting All Phones with the restart Command

The **restart** command is used to reboot IP phones after you make simple button, line, or speed-dial changes.

SUMMARY STEPS

1. **telephony-service**
2. **restart all**
3. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**telephony-service** **Example:** `Router(config)# telephony-service`	Enters telephony-service configuration mode.
Step 2	**restart all** **Example:** `Router(config-telephony-service)# restart all`	Performs fast reboot of all phones associated with this ITS router. Does not contact DHCP or TFTP server for updated information.
Step 3	**exit** **Example:** `Router(config-telephony-service)# exit`	Exits telephony-service mode.

EXAMPLE

The following example performs a fast reboot of all phones associated with the ITS router:

```
!
telephony-service
 restart all
!
```

Additional References

Additional information related to Cisco IOS Telephony Service V2.1 is available in the following references:

Related Documents

Related Topic	Document Title
Previous versions of Cisco IOS Telephony Service	Cisco IOS Telephony Service
Cisco XML DTDs for IP phone applications	*Cisco IP Phone Services Application Development Notes*
Cisco IP Phones	• Cisco IP Phone 7910 • Cisco IP Phone 7940 and Cisco IP Phone 7960 • Cisco IP Phone Expansion Module 7914
TCL scripts and programming	• *TCL IVR API Version 2.0 Programming Guide* • "Configuring TCL IVR Applications" chapter in *Cisco IOS Voice, Video, and Fax Configuration Guide*, Release 12.2
Voice and telephony command reference	*Cisco IOS Voice, Video, and Fax Command Reference*, Release 12.2 T

Standards

Standards[1]	Title
ITU-T H.450.2	*H.450.2 Call Transfer Supplementary Service for H.323*
ITU-T H.450.3	*H.450.3 Call Diversion Supplementary Service for H.323*

1. Not all supported standards are listed.

MIBs

MIBs[1]	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB website on Cisco.com at the following URL: http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

1. Not all supported MIBs are listed.

To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:

http://tools.cisco.com/ITDIT/MIBS/servlet/index

If Cisco MIB Locator does not support the MIB information that you need, you can also obtain a list of supported MIBs and download MIBs from the Cisco MIBs page at the following URL:

http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

To access Cisco MIB Locator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

http://www.cisco.com/register

RFCs

RFCs[1]	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

1. Not all supported RFCs are listed.

Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, tools, and lots more. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/public/support/tac/home.shtml

Command Reference

This section documents new and modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2 command reference publications.

New Commands

- **application (telephony-service)**
- **call-forward pattern**
- **create cnf-files**
- **description (ephone-dn)**
- **h450 h450-2 timeout**
- **h450 h450-3 timeout**
- **moh (ephone-dn)**
- **network-locale**
- **restart (ephone)**
- **restart all (telephony-service)**
- **service local-directory**
- **show telephony-service tftp-bind**
- **transfer-mode**
- **transfer-system**
- **type (ephone)**
- **user-locale**
- **web admin customer**
- **web admin system**
- **web customize load**

Modified Commands

- **button**
- **dialplan-pattern (telephony-service)**
- **load (telephony-service)**
- **reset (telephony-service)**
- **url idle**

application (telephony-service)

To select the session-level application for all Cisco IP phone lines served by the Cisco IOS Telephony Service (ITS) router, use the **application** command in telephony-service configuration mode. To disable this application, use the **no** form of this command.

application *application-name*

no application *application-name*

Syntax Description

application-name	Selected interactive voice response (IVR) application name.

Defaults

DEFAULT session application

Command Modes

Telephony-service configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command to assign a tool command language (TCL) IVR application to all IP phones served by the ITS router.

Examples

The following example selects a TCL IVR application named app-xfer for all IP phones served by the ITS router:

```
Router(config)# telephony-service
Router(config-telephony-service) application app-xfer
```

Related Commands

Command	Description
telephony-service	Enables Cisco ITS and enters telephony-service configuration mode.

button

To associate directory numbers (DNs) with individual buttons on a Cisco IP phone and specify ring behavior, use the **button** command in ephone configuration mode. To delete DNs from buttons on a Cisco IP phone, use the **no** form of this command.

button *button-number*{**:** | **b** | **s**}*dn-tag* [[*button-number*{**:** | **b** | **s**}*dn-tag*] ...]

no button *button-number*{**:** | **b** | **s**}*dn-tag* [[*button-number*{**:** | **b** | **s**}*dn-tag*] ...]

Syntax Description

button-number	Number of a line button on a Cisco IP phone. The maximum number of button-DN pairs is determined by phone type, as follows: – Cisco IP Phone 7960—up to 6 button-DN pairs. – Cisco IP Phone 7940, Cisco IP Phone 7910, and Cisco IP Conference Station 7935—up to 2 button-DN pairs. **Note** The Cisco IP Phone 7910 has only one physical line button, but you can assign it up to two DNs.
:	(colon) Normal ring. For incoming calls, the phone produces audible ringing, a flashing ((< icon in the phone display, and a flashing red light on the handset. On the Cisco IP Phone Expansion Module 7914, a flashing yellow light also accompanies incoming calls.
b	Beep is allowed. Audible ring is suppressed for incoming calls, but call-waiting beeps are allowed. Visible cues are the same as described for normal ring.
s	Silent ring. The audible ring and call-waiting beep are suppressed for incoming calls. Visible cues are the same as described for normal ring.
dn-tag	DN tag previously defined using the **ephone-dn** command.

Defaults

No default behavior or values

Command Modes

Ephone configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco IAD2420 series.
12.2(2)XT	This command was implemented on the Cisco 1750 and Cisco 1751.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T and implemented on the Cisco 3725 and Cisco 3745.
12.2(8)T1	This command was implemented on the Cisco 2600-XM and Cisco 2691.
12.2(11)T	This command was implemented on the Cisco 1760.
12.2(11)YT	The **s** and **b** keywords were added.

Usage Guidelines

The **button** command assigns telephone lines to the Cisco IP phones by assigning a button number to a Cisco IP phone directory number.

Telephone services such as call waiting and three-party conferences require a minimum of two phone lines (directory numbers defined with the **ephone-dn** command) to be available and configured on a Cisco IP phone. The Cisco IP Phone 7910 has only one physical line button. To support call waiting and three-party conferences on a Cisco IP Phone 7910, a second (hidden) line is required. This line cannot be selected directly using a line button. You can access the second line when you press the Conference button.

Silent ring can be configured with the **s** or **b** keyword in Cisco IOS Telephony Service (ITS) V2.1 or a later version. Silent ring can be configured on any type of phone, but typically you would only configure silent ring on a phone with multiple lines, such as a Cisco IP Phone 7940, a Cisco IP Phone 7960, or a Cisco IP Phone Expansion Module 7914.

Examples

The following example assigns four button numbers on the phone to directory number tags, and button 4 has a silent ring:

```
Router(config)# ephone 1
Router(config-ephone)# button 1:1 2:4 3:16 4s19
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode to register Cisco IP phones.
ephone-dn	Enters ephone-dn configuration mode to set directory numbers and parameters for individual Cisco IP phone lines.
show ephone	Displays Cisco IP phone output.

call-forward pattern

To specify a pattern for calling-party numbers that are able to support the ITU-T H.450.3 standard for call forwarding, use the **call-forward pattern** command in telephony-service configuration mode. To remove the pattern, use the **no** form of this command.

call-forward pattern *pattern*

no call-forward pattern *pattern*

Syntax Description

pattern	String that consists of one or more digits and wildcard markers or dots (.) to define a specific pattern. Calling parties that match a defined pattern use the H.450.3 standard if they are forwarded. A pattern of .T specifies the H.450.3 forwarding standard for all incoming calls.

Defaults

No default behavior or values

Command Modes

Telephony-service configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco IOS Telephony Service (ITS) V2.1 or a later version.

When H.450.3 call forwarding is selected, the router must be configured with a Tool Command Language (TCL) script that supports the H.450.3 protocol. The TCL script is loaded on the ITS router with the **call application voice** command.

The pattern match in this command is against the phone number of the calling party. When an ITS directory number has forwarded its calls and an incoming call is received for that number, the ITS router sends an H.450.3 response back to the original calling party to request that the call be placed again using the forward-to destination.

Calling numbers that do not match the patterns defined with this command are forwarded using Cisco-proprietary call forwarding for backward compatibility.

Examples

The following example specifies that all 4-digit directory numbers beginning with 4 should use the H.450.3 standard whenever they are forwarded:

```
Router(config)# telephony-service
Router(config-telephony-service)# call-forward pattern 4...
```

The following example forwards all calls using the H.450.3 standard:

```
Router(config)# telephony-service
Router(config-telephony-service)# call-forward pattern .T
```

Related Commands

Command	Description
call application voice	Defines an application, indicates the location of the corresponding TCL files that implement the application, and loads the selected TCL script.
telephony-service	Enables Cisco ITS and enters telephony-service configuration mode.

create cnf-files

To build the XML configuration files that are required for Cisco IOS Telephony Service (ITS) V2.1 or a later version, use the **create cnf-files** command in telephony-service configuration mode.

create cnf-files

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values

Command Modes

Telephony-service configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command to build XML configuration files for Cisco ITS V2.1 or later versions during initial system setup.The XML files created by this command are located in an in-RAM file system at system:/its.

Examples

The following example builds the necessary XML configuration files on the ITS router:

```
Router(config)# telephony-service
Router(config-telephony-service)# create cnf-files
```

Related Commands

Command	Description
telephony-service	Enables Cisco IOS Telephony Service and enters telephony-service configuration mode.

description (ephone-dn)

To specify the directory number description to appear in the header bar of Cisco IP phones using Cisco IOS Telephony Service (ITS), use the **description** command in ephone-dn configuration mode. To return to the default, use the **no** form of this command.

description *string*

no description

Syntax Description

string	Text to appear in the header bar of an IP phone. This is a quoted string with spaces allowed.

Defaults

The directory number of the first line on the phone appears in the header bar.

Command Modes

Ephone-dn configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco ITS V2.1 or a later version.

Examples

The following example defines a header bar display for the phone with directory number 71355:

```
Router(config)# ephone-dn 71355
Router(config-ephone-dn)# description "Marketing 888-737-1355"
```

Related Commands

Command	Description
ephone-dn	Enters ephone-dn configuration mode and configures directory numbers for Cisco IP phone lines.

dialplan-pattern (telephony-service)

To map an abbreviated extension number prefix digit pattern to a full E.164 telephone number pattern, use the **dialplan-pattern** command in telephony-service configuration mode. To disable the **dialplan-pattern** command settings, use the **no** form of this command.

dialplan-pattern *tag pattern* **extension-length** *length* [**extension-pattern** *extension-pattern*] [**no-reg**]

no dialplan-pattern *tag* [*pattern* **extension-length** *length* **extension-pattern** *extension-pattern*]

Syntax Description

tag	Dial-plan string tag used before a ten-digit telephone number. The tag number is from 1 to 5.
pattern	Dial-plan pattern, such as the area code, the prefix, and the first one or two digits of the extension number, plus wild card markers or dots (.) for the remainder of the extension number digits.
extension-length *length*	The number of extension digits. The range is from 1 to 32.
extension-pattern *extension-pattern*	(Optional) Sets the extension number leading digit pattern when the leading digits of the extension number are different than the E.164 telephone number leading digits defined by the *pattern* argument. Legal characters for this argument are one or more digits and wildcard markers or dots (.). For example, 5.. would include extensions 500 to 599 and 5... would include extensions 5000 to 5999.
no-reg	(Optional) Prevents E.164 numbers in the dial peer from registering with the gatekeeper.

Defaults

No default behavior or values

Command Modes

Telephony-service configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco IAD2420.
12.2(2)XT	This command was implemented on the Cisco 1750 and Cisco 1751.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T and implemented on the Cisco 3725 and Cisco 3745.
12.2(8)T1	This command was implemented on the Cisco 2600-XM and Cisco 2691.
12.2(11)T	This command was integrated into Cisco IOS Release 12.2(11)T and implemented on the Cisco 1760.
12.2(11)YT	The **extension-pattern** keyword was added.

Usage Guidelines

Directory numbers for the Cisco IP phones are expected to be entered in extension number format. The extension number should be greater or equal to the extension length. Otherwise, the extension number cannot be converted to a qualified E.164 number. The **dialplan-pattern** command creates a global prefix that can be used to expand the abbreviated extension numbers to fully qualified E.164 numbers. The dial-plan pattern is also required to register the Cisco IP phone lines with a gatekeeper. The **dialplan-pattern** command can resolve an incoming call with a full E.164 number to a Cisco IP phone extension number.

The **extension-length** keyword enables the system to convert a full E.164 telephone number back to an extension number for the purposes of caller-ID display and for received-call and missed-call lists. For example, a company uses extension number range 5000 to 5099 across several sites, with only the extensions 5000 to 5009 present on the local router. An incoming call from 5044 arrives from the company's internal VoIP H.323 network and this call includes the calling number as 4085555044 in its full E.164 format.

The **no-reg** keyword provides dialing flexibility. You have the option not to register some specific numbers with the gatekeeper so that those numbers can be used for other telephony services.

When a called number matches a dial-plan pattern, the call is considered a local call and has a distinctive ring identifying the call as internal. Any call that does not match a dial-plan pattern is considered an external call and has a distinctive ring that is different from the internal ring. The valid dial-plan pattern with the lowest tag is used as a prefix to all local Cisco IP phone numbers.

The number of *extension-pattern* characters must match the extension length that is specified in this command. For example, if the extension *length* is three, then the *extension-pattern* can be 8.., 1.., 5.., and so forth.

Examples

The following example shows how to create dial-plan pattern 1 for extension numbers 5001 to 5099 with the telephone prefix starting with 408555. If the following example is set, the routers recognize that the 4085555044 matches dial-plan pattern 1, and uses the **extension-length** keyword to extract the last four digits of the number 5044 and present this as the caller ID for the incoming call.

```
Router(config)# telephony-service
Router(config-telephony-service)# dialplan-pattern 1 40855550.. extension-length 4 no-reg
```

In the following example the **dialplan-pattern** command creates dial-plan pattern 1 for extensions 801 to 899 with the telephone prefix starting with 4085559. As each number in the extension pattern is declared with the **number** command, two POTs dial peers are created. In the following example, they are 801 (an internal office number) and 408-555-9001 (an external number).

```
Router(config)# telephony-service
Router(config-telephony-service)# dialplan-pattern 1 4085559... extension-length 3
extension-pattern 8..
Router(config-telephony-service)# ephone-dn 1
Router(config-ephone-dn)# number 801
```

Related Commands

Command	Description
telephony-service	Enables Cisco IOS Telephony Service (ITS) and enters telephony-service configuration mode.

h450 h450-2 timeout

To specify timeout values for call transfers using the ITU-T H.450.2 standard, use the **h450 h450-2 timeout** command in H.323 voice service configuration mode. To return to the default, use the **no** form of this command.

h450 h450-2 timeout {**T1** | **T2** | **T3** | **T4**} *milliseconds*

no h450 h450-2 timeout {**T1** | **T2** | **T3** | **T4**}

Syntax Description

T1	Timeout value to wait to identify a response.
T2	Timeout value to wait for call setup.
T3	Timeout value to wait to initiate a response.
T4	Timeout value to wait for setup of a response.
milliseconds	Number of milliseconds. Range is from 500 to 60000.

Defaults

T1 timer is 2000 milliseconds.
T2 timer is 5000 milliseconds.
T3 timer is 5000 milliseconds.
T4 timer is 5000 milliseconds.

Command Modes

H323 voice service configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco IOS Telephony Service (ITS) V2.1 or a later version.

This command is primarily used when the default settings for these timers do not match your network delay parameters. Refer to the ITU-T H.450.2 specification for more information on these timers.

Examples

The following example defines a T1 timeout of 3000 milliseconds:

```
Router(config)# voice service voip
Router(conf-voi-serv)# h323
Router(conf-serv-h323)# h450 h450-2 timeout T1 3000
```

Related Commands

Command	Description
h323	Enables H.323 voice service configuration commands.
voice service	Enters voice-service configuration mode.

h450 h450-3 timeout

To specify timeout values for call forwarding using the ITU-T H.450.3 standard, use the **h450 h450-3 timeout** command in H.323 voice service configuration mode. To return to the default, use the **no** form of this command.

h450 h450-3 timeout T1 *milliseconds*

no h450 h450-3 timeout T1

Syntax Description

T1	Timeout value to wait for a rerouting response.
milliseconds	Number of milliseconds. Range is from 500 to 60000. Default is 5000.

Defaults

T1 timer is 5000 milliseconds.

Command Modes

H323 voice service configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco IOS Telephony Service (ITS) V2.1 or a later version.

This command is primarily used when the default setting for this timer does not match your network delay parameters. Refer to the ITU-T H.450.3 specification for more information on these timers.

Examples

The following example defines a T1 timeout of 3000 milliseconds:

```
Router(config)# voice service voip
Router(conf-voi-serv)# h323
Router(conf-serv-h323)# h450 h450-3 timeout T1 3000
```

Related Commands

Command	Description
h323	Enables H.323 voice service configuration commands.
voice service	Enters voice-service configuration mode.

load (telephony-service)

To associate a phone firmware file with a type of Cisco IP phone, use the **load** command in telephony-service configuration mode. To disassociate a phone firmware file with a type of Cisco IP phones, use the **no** form of this command.

load *phone-type firmware-file*

no load *phone-type firmware-file*

Syntax Description

phone-type	Type of IP phone. The following choices are valid: • **7910**—Cisco IP Phone 7910 • **7914**—Cisco IP Expansion Module 7914 • **7935—**Cisco IP Conference Station 7935 • **7960-7940**—Cisco IP Phone 7940 and Cisco IP Phone 7960 • **ATA**—Cisco ATA-186 and Cisco ATA-188
firmware-file	Filename for the IP phone firmware to be associated with the IP phone type. For every phone-type except ATA, do not use a file extension. Filenames are case-sensitive.

Defaults

No default behavior or values

Command Modes

Telephony-service configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco IAD2420 series.
12.2(2)XT	This command was implemented on the Cisco 1750 and Cisco 1751.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T and implemented on the Cisco 3725 and Cisco 3745.
12.2(8)T1	This command was implemented on the Cisco 2600-XM and Cisco 2691.
12.2(11)T	This command was implemented on the Cisco 1760.
12.2(11)YT	Support was added for the Cisco IP Phone Expansion Module 7914.

Usage Guidelines

This command updates the Cisco IOS Telephony Service (ITS) configuration file for the specified type of IP phone to add the name of the correct firmware file that it should load. This filename also provides the version number for the phone firmware that is in the file. Later, whenever a phone is started or rebooted the phone reads the configuration file to determine the name of the firmware file that it should load and then looks for that firmware file on the TFTP server.

Cisco IP phones update themselves with new phone firmware whenever they are initially started up or reloaded.

A separate **load** command is needed for each type of phone. The Cisco IP Phone 7960 and Cisco IP Phone 7940 have the same phone firmware and share the **7960-7940** keyword.

When specifying the phone firmware filename in this command, do not use any file extension. For example, if the firmware file for Cisco IP Phone Expansion Module 7914s is named W05473955.bin, you enter **load 7914 W05473955**.

Following the **load** command, you use the **tftp-server** command to enable TFTP access to the file by Cisco IP phones. Note that the **tftp-server** command requires that you use the file extension as part of the filename.

Examples

The following example identifies the Cisco IP phone firmware file that is used by Cisco IP Phone 7960 and Cisco IP Phone 7910, and then defines the ITS router Flash memory as the location of the phone firmware file:

```
Router(config)# telephony-service
Router(config-telephony-service)# load 7960-7940 P00303020209
Router(config-telephony-service)# load 7910 P00403020209
Router(config-telephony-service)# exit
Router(config)# tftp-server flash:P00303020209.bin
Router(config)# tftp-server flash:P00403020209.bin
```

Related Commands

Command	Description
telephony-service	Enables ITS and enters telephony-service configuration mode.
tftp-server	Defines the ITS router Flash memory as the TFTP server from which the IP phones will download the firmware files.

moh (ephone-dn)

To enable music on hold from a external live audio feed (standard line level audio connection) connected directly to the router by an FXO or an E&M analog voice port for Cisco IP phones using Cisco IOS Telephony Service (ITS), use the **moh** command in ephone-dn configuration mode. To disable music on hold from a live feed, use the **no** form of this command

moh out-call *outcall-number*

no moh out-call *outcall-number*

Syntax Description

out-call *outcall-number*	Sets up a call to the outcall-number in order to connect to the MoH feed.

Defaults

No default behavior or values

Command Modes

Ephone-dn configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

An MoH connection is established as an automatically connected voice call. The MoH call can be established either by the ITS MoH system itself, or by any external source directly calling into the MoH directory number (including calls over voice over IP (VoIP) if voice activity detection (VAD) is disabled). The typical operation is for the ITS MoH directory number to establish an MoH call to a local router E&M voice port.

Connection via E&M is the recommended mechanism because it requires minimal external components. The E&M port must be placed in 4-wire operation, using E&M immediate signaling and with the auto-cut-through option enabled.

The recommended interface for live feed MoH is an analog E&M port because it requires the minimum number of external components. You directly connect a line level audio feed (standard audio jack) to pins 3 and 6 of an E&M RJ-45 connector. The E&M WAN interface card (WIC) has a built-in audio transformer that provides appropriate electrical isolation for the external audio source. (The audio connection on the E&M port does not require loop-current). The **signal immediate** and **auto-cut-through** commands disable E&M signaling on this voice port. A G.711 audio packet stream is generated by the digital signal processor (DSP) on the E&M port.

If you are using an FXO voice port for live-feed MoH instead of an E&M port, connect the MoH source to the FXO voice port. This connection requires an external adapter device to supply normal telephone company (telco) battery voltage with the correct polarity to the tip and ring leads of the FXO port. The adapter device must also provide transformer-based isolation between the external audio source and the tip and ring leads of the FXO port.

Music from a live feed is continuously fed into the MoH playout buffer instead of being read from an audio file in Flash memory. There is typically a 2-second delay with live-feed MoH.

The outbound call to the MoH live-feed source is attempted (or re-attempted) every 30 seconds until connected by the directory number that has been configured for MoH.

If you also configure the **moh** command with the *filename* argument in telephony-service configuration mode, MoH will fall back to playing music from an audio file if the live music feed is interrupted.

Examples

The following example establishes a live music-on-hold source by setting up a call to extension 7777:

```
Router(config)# ephone-dn 55
Router(config-ephone-dn)# moh out-call 7777
```

Related Commands

Command	Description
ephone-dn	Enters ephone-dn configuration mode to set directory numbers and parameters for individual Cisco IP phone lines.
moh (telephony-service)	Enables music on hold from an audio file.

network-locale

To set the definition of the tones and cadences on the Cisco IP Phone 7940 and Cisco IP Phone 7960 for a specific geographic area, use the **network-locale** command in telephony-service configuration mode. To disable selection of a code, use the **no** form of this command.

network-locale *locale-code*

no network-locale *locale-code*

Syntax Description

locale-code	The following ISO-3166 codes are valid entries: • **FR**—France • **DE**—Germany • **IT**—Italy • **ES**—Spain • **US**—United States

Defaults

The default country code is US (United States).

Command Modes

Telephony-service configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco IOS Telephony Service (ITS) V2.1 or a later version.

The **show telephony-service tftp-bind** command displays the locale that is currently associated with call progress tone files, and which has been set using this command.

Examples

The following example sets tones and cadences for France:

```
Router(config)# telephony-service
Router(config-telephony-service)# network-locale FR
```

Related Commands

Command	Description
show telephony-service tftp-bind	Displays the current network-locale and user-locale codes that are being used for international language support for IP phones
telephony-service	Enables Cisco ITS and enters telephony-service configuration mode.

reset (telephony-service)

To perform a complete reboot of one or all phones associated with a Cisco IOS Telephony Service (ITS) router, use the **reset** command in telephony-service configuration mode. To interrupt and cancel a sequential reset cycle, use the **no** form of the command.

reset {**all** [*time-interval*] | **cancel** | **mac-address** *mac-address* | **sequence-all**}

no reset all

Syntax Description

all	All Cisco IP phones served by this ITS router. This keyword causes the router to pause 15 seconds between the reset start for each successive phone.
time-interval	Time interval, in seconds, between each phone reset. Range is 0 to 60. Default is 15.
cancel	Interrupts a sequential reset cycle.
mac-address *mac-address*	MAC address of a particular Cisco IP phone.
sequence-all	Resets all phones in strict one-at-a-time order by waiting for one phone to finish before starting the reset for the next phone. There is a reset timeout of 4 minutes, after which the router stops waiting for the currently registering phone to complete registration and starts to reset the next phone.

Defaults

time-interval is 15.

Command Modes

Telephony-service configuration

Command History

Release	Modification
12.1(5)YD	This command was introduced on the Cisco 2600, Cisco 3600, and Cisco IAD2420.
12.2(2)XT	This command was implemented on the Cisco 1750 and Cisco 1751.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T and implemented on the Cisco 3725 and Cisco 3745.
12.2(8)T1	This command was implemented on the Cisco 2600-XM and the Cisco 2691.
12.2(11)YT	The *time-interval* range maximum was increased from 15 to 60 and the default was changed from 0 to 15.
12.2(11)YT1	The **cancel** keyword and the **sequence-all** keyword were introduced.

Usage Guidelines

After you update information for one or more phones associated with an ITS router, the phone or phones must be rebooted. There are two commands to reboot the phones: **reset** and **restart**. The **reset** command performs a “hard” reboot similar to a power-off-power-on sequence. It reboots the phone and sources the

DHCP server and TFTP server to update from their information as well. The **restart** command performs a "soft" reboot by simply rebooting the phone without contacting the DHCP and TFTP servers. The **reset** command takes significantly longer to process than the **restart** command when you are updating multiple phones, but it must be used to update phone firmware, user locale, network locale, or URL parameters. For simple button, line, or speed-dial changes, you can use the **restart** command.

When using the **reset** command, the default time interval of 15 seconds is recommended for an 8- to 10-phone office so that all the phones do not attempt to access TFTP server resources simultaneously. This value should be modified accordingly for larger networks.

When you use the **reset sequence-all** command, the router waits for one phone to complete its reset before starting to reset the next phone. The delay provided by this command prevents multiple phones attempting to access the TFTP server simultaneously and therefore failing to reset properly. Each reset operation can take several minutes when you use this command. There is a reset timeout of 4 minutes, after which the router stops waiting for the currently registering phone to complete registration and starts to reset the next phone.

The **reset sequence-all** command is required when the phone firmware version, user locale, or network locale is changed, and is automatically selected over the **reset all** command when any of those three parameters are changed. However, this automatic selection of the **reset sequence-all** command can be overridden by using the **reset all** *time-interval* command when the time interval is set to some value other than the default of 15 seconds.

To interrupt and terminate an ongoing sequential reset cycle, use the **reset cancel** command.

The **restart all** command allows the system to perform quick phone resets in which only the button template, line information, and speed-dial information is updated. Refer to the command reference entry for **restart all** for more information.

Examples

The following example resets all IP phones served by this ITS router:

```
Router(config)# telephony-service
Router(config-telephony-service)# reset all
```

The following example resets the Cisco IP phone with the MAC address CFBA.321B.96FA:

```
Router(config)# telephony-service
Router(config-telephony-service)# reset mac-address CFBA.321B.96FA
```

The following example resets all IP phones in sequential, non-overlapping order:

```
Router(config)# telephony-service
Router(config-telephony-service)# reset sequence-all
```

Related Commands

Command	Description
restart (ephone)	Performs a fast reboot of a single phone associated with a Cisco IOS Telephony Service (ITS) router.
restart all (telephony-service)	Performs a fast reboot of all phones associated with a Cisco IOS Telephony Service (ITS) router.
telephony-service	Enables Cisco ITS and enters telephony-service configuration mode.

restart (ephone)

To perform a fast reboot of a single phone associated with a Cisco IOS Telephony Service (ITS) router after updating buttons, lines, or speed-dial numbers, use the **restart** command in ephone configuration mode. To cancel the reboot, use the **no** form of this command.

restart

no restart

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values

Command Modes

Ephone configuration

Command History

Release	Modification
12.2(11)YT1	This command was introduced.

Usage Guidelines

This command causes the system to perform a fast phone reset in which only the button template, lines, and speed-dial numbers are updated on the phone. For updates related to phone firmware, user locale, network locale, or URL parameters, use the **reset** command. The **restart** command is much faster than the **reset** command because the phone does not need to access the DHCP or TFTP server.

To restart all phones in an ITS system for quick changes to buttons, lines, and speed-dial numbers, use the **restart all** command in telephony-service configuration mode.

Examples

The following example restarts the phone with tag 1:

```
Router(config)# ephone 1
Router(config-ephone)# restart
```

Related Commands

Command	Description
reset	Performs a complete reboot of one or all phones associated with a Cisco IOS Telephony Service (ITS) router.
restart all (telephony-service)	Performs a fast reboot of all phones associated with a Cisco IOS Telephony Service (ITS) router.

restart all (telephony-service)

To perform a fast reboot of all phones associated with a Cisco IOS Telephony Service (ITS) router after updating buttons, lines, or speed-dial numbers, use the **restart all** command in telephony-service configuration mode. To cancel the reboot, use the **no** form of this command.

restart all

no command

Syntax Description

This command has no arguments or keywords.

Defaults

No default behavior or values

Command Modes

Telephony-service configuration

Command History

Release	Modification
12.2(11)YT1	This command was introduced.

Usage Guidelines

This command causes the system to perform a fast phone reset in which only the button template, lines, and speed-dial numbers are updated on the phone. For updates related to phone firmware, user locale, network locale, or URL parameters, use the **reset** command.

Use the **restart all** command to reboot IP phones after quick changes to buttons, lines, and speed-dial numbers. It is much faster than the **reset** command because the phone does not access the DHCP or TFTP server.

To restart a single phone, use the **restart** command in ephone configuration mode.

Examples

The following example performs a quick restart of all phones in the ITS system:

```
Router(config)# telephony-service
Router(config-telephony-service)# restart all
```

Related Commands

Command	Description
reset	Performs a complete reboot of one or all phones associated with a Cisco IOS Telephony Service (ITS) router.
restart (ephone)	Performs a fast reboot of a single phone associated with a Cisco IOS Telephony Service (ITS) router.

service local-directory

To enable the availability of the local directory service on IP phones served by Cisco IOS Telephony Service (ITS), use the **service local-directory** command in telephony service configuration mode. To disable the display, use the **no** form of this command.

service local-directory

no service local-directory

Syntax Description

This command has no arguments or keywords.

Defaults

Local directory service is available on IP phones.

Command Modes

Telephony-service configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco ITS V2.1 or a later version.

The local directory service is available on IP phones by default.

Examples

The following example specifies that the directory service should not be available on the IP phones served by this ITS router:

```
Router(config)# telephony-service
Router(config-telephony-service)# no service local-directory
```

Related Commands

Command	Description
telephony-service	Enables Cisco ITS and enters telephony-service configuration mode.

show telephony-service tftp-bind

To display the current network-locale and user-locale codes that are being used for international language support for IP phones, use the **show telephony-service tftp-bind** command in privileged EXEC mode.

show telephony-service tftp-bind

Syntax Description

This command has no arguments or keywords.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco IOS Telephony Service (ITS) V2.1 or a later version.

This command provides a list of dictionary, language, and tone configuration files that are associated with the ISO-3166 codes that have been selected using the **user-locale** and **network-locale** commands.

Examples

The following is sample output from the **show telephony-service tftp-bind** command when the ISO-3166 code for Germany has been selected for both language and tones:

```
Router(config)# show telephony-service tftp-bind

tftp-server system:/its/SEPDEFAULT.cnf
tftp-server system:/its/SEPDEFAULT.cnf alias SEPDefault.cnf
tftp-server system:/its/XMLDefault.cnf.xml alias XMLDefault.cnf.xml
tftp-server system:/its/ATADefault.cnf.xml
tftp-server system:/its/XMLDefault7960.cnf.xml alias SEP00036B54BB15.cnf.xml
tftp-server system:/its/germany/7960-font.xml alias German_Germany/7960-font.xml
tftp-server system:/its/germany/7960-dictionary.xml alias
German_Germany/7960-dictionary.xml
tftp-server system:/its/germany/7960-kate.xml alias German_Germany/7960-kate.xml
tftp-server system:/its/germany/SCCP-dictionary.xml alias
German_Germany/SCCP-dictionary.xml
tftp-server system:/its/germany/7960-tones.xml alias Germany/7960-tones.xml
```

Related Commands

Command	Description
network-locale	Sets the definition of the tones and cadences on the Cisco IP Phone 7940 and Cisco IP Phone 7960 for a specific geographic area.
user-locale	Sets language for displays on the Cisco IP Phone 7940 and Cisco IP Phone 7960 by country.

transfer-mode

To specify the type of call transfer for an individual IP phone directory number using the ITU-T H.450.2 standard, use the **transfer-mode** command in ephone-dn configuration mode. To remove this specification, use the **no** form of this command.

transfer-mode {**blind** | **consult**}

no transfer-mode

Syntax Description

blind	Transfers calls without consultation using a single phone line.
consult	Transfers calls with consultation using a second phone line, if available.

Defaults

No default behavior or values

Command Modes

Ephone-dn configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

This command specifies the type of call transfer for an individual Cisco IP phone line that is using the ITU-T H.450.2 protocol. It allows you to override the system default **transfer-system** setting (full-consult or full-blind) for that line.

Call transfers using H.450.2 can be blind or consultative. A blind transfer is one in which the transferring phone connects the caller to a destination line before ringback begins. A consultative transfer is one in which the transferring party either connects the caller to a ringing phone (ringback heard) or speaks with the third party before connecting the caller to the third party.

You can specify blind or consultative transfer on a systemwide basis with the **transfer-system** command. The systemwide setting can then be overridden for individual phone lines with the **transfer-mode** command. For example, in an ITS network that is set up for consultative transfer, a specific line with an auto-attendant that automatically transfers incoming calls to specific extension numbers can be set to use blind transfer, because auto-attendants do not use consultative transfer.

Use this command with Cisco IOS Telephony Service (ITS) V2.1 or a later version.

Examples

The following example sets blind mode for call transfers from this directory number:

```
Router(config)# ephone-dn 21354
Router(config-ephone-dn)# transfer-mode blind
```

Related Commands

Command	Description
ephone-dn	Enters ephone-dn configuration mode to set directory numbers and parameters for individual Cisco IP phone lines.
transfer-system	Specifies the call transfer method for all IP phones on a Cisco ITS router using the ITU-T H.450.2 standard.

transfer-system

To specify the call transfer method for all IP phones on a Cisco IOS Telephony Service (ITS) router using the ITU-T H.450.2 standard, use the **transfer-system** command in telephony-service configuration mode. To disable the call transfer method, use the **no** form of this command.

transfer-system {**blind** | **full-blind** | **full-consult** | **local-consult**}

no transfer-system

Syntax Description

blind	Transfers calls without consultation using a single phone line and the Cisco proprietary method.
full-blind	Transfers calls without consultation using H.450.2 standard methods.
full-consult	Transfers calls using H.450.2 with consultation using the second phone line if available, or the calls fall back to **full-blind** if the second line is unavailable.
local-consult	Transfers calls with local consultation using the second phone line if available, or the calls fall back to **blind** for nonlocal consultation or transfer target. This mode is intended for use primarily in Voice over Frame Relay (VoFR) networks, because the Cisco VoFR call transfer protocol does not support an end-to-end transfer with consultation mechanism.

Defaults

blind

Command Modes

Telephony-service configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco ITS V2.1 or a later version.

Call transfers using the H.450.2 standard can be blind or consultative. A blind transfer is one in which the transferring phone connects the caller to a destination line before ringback begins. A consultative transfer is one in which the transferring party either connects the caller to a ringing phone (ringback heard) or speaks with the third party before connecting the caller to the third party. When H.450.2 call transfer is selected using the **full-blind** or **full-consult** keyword, the router must be configured with a Tool Command Language (TCL) script that supports the H.450.3 protocol. The TCL script is loaded on the ITS router with the **call application voice** command.

You can specify blind or consultative transfer on a systemwide basis with the **transfer-system** command. The systemwide setting can then be overridden for individual phone lines with the **transfer-mode** command. For example, in an ITS network that is set up for consultative transfer, a specific line with an auto-attendant that automatically transfers incoming calls to specific extension numbers can be set to use blind transfer, because auto-attendants cannot use consultative transfer.

Examples

The following example sets full consultation as the call transfer method for this ITS phone network:

```
Router(config)# telephony-service
Router(config-telephony-service)# transfer-system full-consult
```

Related Commands

Command	Description
call application voice	Defines an application, indicates the location of the corresponding TCL files that implement the application, and loads the selected TCL script.
telephony-service	Enables ITS and enters telephony-service configuration mode.
transfer-mode	Specifies the type of call transfer for an individual IP phone directory number using the H.450.2 standard.

type (ephone)

To define a phone type or to define one or two add-on phone modules for a Cisco IP phone, use the **type** command in ephone configuration mode. To remove a definition, use the **no** form of this command.

type *phone-type* [**addon 1** *module-type* [**2** *module-type*]]

no type *phone-type* [**addon 1** *module-type* [**2** *module-type*]]

Syntax Description

phone-type	Type of IP phone that is being defined or the type of IP phone to which a module is being added. Valid entries are: • **7910**—Cisco IP Phone 7910 • **7935**—Cisco IP Conference Station 7935 • **7940**—Cisco IP Phone 7940 • **7960**—Cisco IP Phone 7960 • **ata**—Cisco ATA-186 or Cisco ATA-188 **Note** The only phones that accept an add-on module are the Cisco IP Phone 7940 and the Cisco IP Phone 7960.
addon 1 *module-type*	(Optional) Tells the router that a module is being added to this IP phone, and the type of module. The valid entry for *module-type* is: • **7914**—Cisco IP Phone Expansion Module 7914
2 *module-type*	(Optional) Tells the router that a second module is being added to this IP phone, and the type of module. The valid entry for *module-type* is: • **7914**—Cisco IP Phone Expansion Module 7914

Defaults

No default behavior or values

Command Modes

Ephone configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco IOS Telephony Service (ITS) V2.1 or a later version.

In ITS V2.1, the only phones you are required to identify with the **type** command are the Cisco ATA-186 or the Cisco ATA-188. Cisco IOS software is able to identify all other phone types, but will take the configured value if found.

In ITS V2.1, the only phones that can accept an add-on module are the Cisco IP Phone 7940 and the Cisco IP Phone 7960.

Examples

The following example defines an IP phone with tag 10 as a Cisco IP Phone 7960 with two attached Cisco IP Phone Expansion Module 7914s:

```
Router(config)# ephone 10
Router(config-ephone)# type 7960 addon 1 7914 2 7914
```

The following example defines the IP phone with tag 4 as a Cisco ATA device:

```
Router(config)# ephone 4
Router(config-ephone)# mac 1234.87655.234
Router(config-ephone)# type ata
```

Related Commands

Command	Description
ephone	Enters ephone configuration mode to register Cisco IP phones.

url idle

To specify a file to display on an IP phone that is not in use, use the **url idle** command in telephony-service configuration mode. To disable display of the file, use the **no** form of this command.

url idle *url* **idle-timeout** *seconds*

no url idle

Syntax Description

url	Uniform resource location as defined in RFC 2396.
idle-timeout *seconds*	Time interval between display refreshes, in seconds. Range is from 0 to 300.

Defaults

No default behavior or values

Command Modes

Telephony-service configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco IOS Telephony Service (ITS) V2.1 or a later version.

The file that is displayed must be encoded in XML using the Cisco XML DTD. For more information about Cisco DTD formats, refer to *Cisco IP Phone Services Application Development Notes.*

Examples

The following example specifies that the file logo.htm should be displayed on IP phones when they are not being used, and that the display should be refreshed every 12 seconds:

```
Router(config)# telephony-service
Router(config-telephony-service)# url idle http://mycompany.com/files/logo.xml
idle-timeout 12
```

Related Commands

Command	Description
telephony-service	Enables Cisco ITS and enters telephony-service configuration mode.

user-locale

To set the language for displays on the Cisco IP Phone 7940 and Cisco IP Phone 7960, use the **user-locale** command in telephony-service configuration mode. To disable selection of a language, use the **no** form of this command.

user-locale *language-code*

no user-locale *language-code*

Syntax Description

language-code	The following ISO-3166 codes are valid entries: • **FR**—French • **DE**—German • **IT**—Italian • **ES**—Spanish • **US**—United States

Defaults

The default code is US (United States).

Command Modes

Telephony-service configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco IOS Telephony Service (ITS) V2.1 or a later version.

The **show telephony-service tftp-bind** command displays the locale that is currently associated with dictionary and language files, and which has been set using this command.

Examples

The following example sets the IP phone display language to French:

```
Router(config)# telephony-service
Router(config-telephony-service)# user-locale FR
```

Related Commands

Command	Description
show telephony-service tftp-bind	Displays the current network-locale and user-locale codes that are being used for international language support for IP phones
telephony-service	Enables Cisco IOS Telephony Service and enters telephony-service configuration mode.

web admin customer

To define a username and password for a Cisco IOS Telephony System (ITS) customer administrator, use the **web admin customer** command in telephony-service configuration mode. To disable a customer administrator login, use the **no** form of this command.

web admin customer name *username* {**password** *string* | **secret** {**0** | **5**} *string*}

no web admin customer

Syntax Description

name *username*	Defines the username for the customer administrator. The default is Customer.
password *string*	Defines a password for the customer administrator. The default is no password.
secret {**0** | **5**} *string*	Defines a secret password. The digit specifies encryption, as follows: • **0**—Password that follows is not encrypted. • **5**—Password that follows is encrypted.

Defaults

A customer administrator named Customer with no password is defined.

Command Modes

Telephony-service

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco IOS Telephony Service (ITS) V2.1 or a later version.

Examples

The following example defines a customer administrator named user22 whose password is pw567890:

```
Router(config)# telephony-service
Router(config-telephony-service)# web admin customer name user22 password pw567890
```

Related Commands

Command	Description
telephony-service	Enables Cisco ITS and enters telephony-service configuration mode.

web admin system

To define a username and password for a Cisco IOS Telephony Service (ITS) system administrator, use the **web admin system** command in telephony-service configuration mode. To disable a customer administrator login, use the **no** form of this command.

web admin system name *username* {**password** *string* | **secret** {**0** | **5**} *string*}

no web admin system

Syntax Description

name *username*	Defines a username for the system administrator. The default name is Admin.
password *string*	Defines a password for the system administrator. The default is no password.
secret {**0** | **5**} *string*	Defines a secret password. The digit specifies encryption, as follows: • **0**—Password that follows is not encrypted. • **5**—Password that follows is encrypted.

Defaults

A system administrator named Admin with no password is defined.

Command Modes

Telephony-service

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco ITS V2.1 or a later version.

Examples

The following example establishes a system administrator named user1 whose password is pw234567:

```
Router(config)# telephony-service
Router(config-telephony-service)# web admin system name user1 password pw234567
```

Related Commands

Command	Description
telephony-service	Enables Cisco ITS and enters telephony-service configuration mode.

web customize load

To load and parse an eXtensible Markup Language (XML) file in router Flash memory to customize a graphical user interface (GUI) for a customer administrator using Cisco IOS Telephony Service (ITS), use the **web customize load** command in telephony-service configuration mode. To disable the customized GUI and fall back to the system administrator GUI, use the **no** form of this command.

web customize load *filename*

no web customize load

Syntax Description

filename	Loads and parses the specified file. • *filename*—Name of the XML file in router Flash memory that defines the customer administrator GUI.

Defaults

The standard system administrator GUI is used.

Command Modes

Telephony-service configuration

Command History

Release	Modification
12.2(11)YT	This command was introduced.

Usage Guidelines

Use this command with Cisco ITS V2.1 or a later version.

Examples

The following example specifies a file named cust_admin_gui.xml as the file that defines the GUI for ITS customer administrators:

```
Router(config)# telephony-service
Router(config-telephony-service)# web customize load cust_admin_gui.xml
```

Related Commands

Command	Description
telephony-service	Enables Cisco ITS and enters telephony-service configuration mode.

Glossary

ITU—International Telecommunication Union.

ITU-T—ITU Telecommunication Standardization Sector.

Note Refer to the *Internetworking Terms and Acronyms* for terms not included in this glossary.