



# Integrating Cisco CallManager Express and Cisco Unity Express

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This document describes how to configure Cisco CallManager Express (CME) versions 3.0 and higher with Cisco Unity Express to work together to provide voice mail. In this document are configuration instructions for allowing voice mail between IP phones on the same router and from different sites over WAN H.323.

This document contains integration configuration instructions only. Information about configuring Cisco CME and Cisco Unity Express is located in the system administrator guides in the [Cisco CME](http://www.cisco.com/univercd/cc/td/doc/product/access/ip_ph/ip_ks/index.htm) index at [http://www.cisco.com/univercd/cc/td/doc/product/access/ip\\_ph/ip\\_ks/index.htm](http://www.cisco.com/univercd/cc/td/doc/product/access/ip_ph/ip_ks/index.htm) and in the [Cisco Unity Express](http://www.cisco.com/univercd/cc/td/doc/product/voice/unityexp/index.htm) index at <http://www.cisco.com/univercd/cc/td/doc/product/voice/unityexp/index.htm>.

## Finding Support Information for Platforms and Cisco IOS Software Images

Cisco CME is Cisco IOS software based. Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.



Note

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Cisco Unity Express is not Cisco IOS software based. For support and download information regarding Cisco Unity Express, go to the [Software Center](http://www.cisco.com/kobayashi/sw-center/sw-voice.shtml) website at <http://www.cisco.com/kobayashi/sw-center/sw-voice.shtml>.

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- [Configuration Examples for Integrating Cisco CME with Cisco Unity Express](#), page 33
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## Prerequisites for Integrating Cisco CME with Cisco Unity Express

- You must run versions of Cisco CME and Cisco Unity Express that are compatible. For compatibility information, see [Table 1](#), where “yes” indicates versions of Cisco CME and Cisco Unity Express that are compatible.

**Table 1** Cisco CME and Cisco Unity Express Compatibility

| Cisco CME Version | Cisco Unity Express All Versions                    |  |
|-------------------|---|--|
|                   | With Advanced Integrated Module (AIM) Configuration | With Network Module (NM) Configuration |
| 3.2 and later     | Yes   | Yes                                    |
| 3.1               | Yes   | Yes                                    |
| 3.0               | No  | Yes                                    |
| 2.1               | No  | No                                     |
| 2.02              | No  | No                                     |
| 2.01              | No  | No                                     |
| 1.0               | No  | No                                     |

- Cisco Unity Express must be installed on each Cisco CME host router. Cisco Unity Express cannot provide voice-mail services across Cisco CME routers. For Cisco Unity Express installation instructions, refer to the system administrator guides in the [Cisco Unity Express](#) index.
- You must be able to place calls between phones on the same router using H.323. For more information about configuration, go to the [Cisco CallManager Express](#) index and click the desired Cisco CME version and **System Administrator Guide**.
- Cisco Unity Express must be installed and configured. For more information, go to the [Cisco Unity Express](#) index and click the desired Cisco Unity Express version and **System Administrator Guide**.
- Cisco Unity Express and Cisco CME’s user interfaces must be enabled. The Cisco Unity Express interface is enabled during installation when an administrator name and password are created. The Cisco CME interface can be enabled anytime after Cisco CME installation. For instructions on how to enable the Cisco CME interface, go to the [Cisco CallManager Express](#) index and click the desired Cisco CME version > **System Administrator Guide** > **Setting Up the Cisco CME GUI** > **Setting Up GUI Access for the System Administrator**. Perform the steps in the “Setting up the HTTP Server” and “Setting Up GUI Access for the System Administrator” sections.

The following example configuration enables the Cisco CME interface:

```
ip http server
ip http path flash:

telephony-service
 web admin system name test password test
 dn-webedit
 time-webedit
```

**Note**

Cisco CME interface files must be installed in the router's flash memory.

## Restrictions for Integrating Cisco CME with Cisco Unity Express

- Ephone-dns used for loopback cannot be dual-line ephone-dns.
- Cisco CME and Cisco Unity Express do not support central call processing.
- Cisco Unity Express cannot provide voice-mail services across Cisco CME routers. Cisco Unity Express can provide voice mail services only for phones on its host Cisco CME router.
- Cisco CME 3.2 released in Cisco IOS Software 12.3(8)T and 12.3(11)T and running on Cisco 1760 with T1 modules should not use the Cisco CME and Cisco Unity Express GUIs. For more information, see <http://www.cisco.com/univercd/cc/td/doc/product/software/ios123/123relnt/xprn123t/123newf.htm#wp1799702>.

## Information About Integrating Cisco CME with Cisco Unity Express

To configure Cisco CME and Cisco Unity Express for WAN H.323 calls, you should understand the following:

- [Features, page 3](#)
- [Configuration, page 4](#)
- [Administration, page 5](#)
- [Loopback Ephone-dns, page 5](#)

### Features

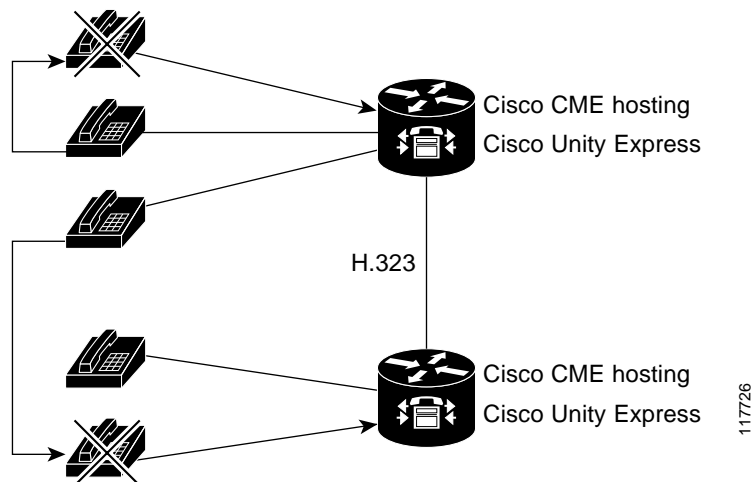
Cisco Unity Express voice mail on Cisco CME routers provides the following features:

- Call forward to personal greeting—When an incoming call is routed to an unanswered or busy extension, the call is forwarded to the voice mail of the subscriber. The caller then hears the personal greeting of the subscriber and can leave a message.
- Easy message access—A subscriber can retrieve messages without entering a user ID. Cisco Unity Express identifies a subscriber by the extension from which the call originated. A password may be required.
- Identified subscriber messaging—Using the extension from which the call originated, Cisco Unity Express automatically identifies the sending subscriber who leaves a message during a forwarded internal call.
- Message waiting indication—When a message is waiting for a subscriber, Cisco Unity Express notifies the Cisco CME system to activate the message-waiting indicator (MWI) on the subscriber extension.
- Cisco Unity Express support of up to eight voice ports.

## Configuration

Cisco CME and Cisco Unity Express voice mail can be configured for one site with a single router or for multiple sites with one router per site and WAN H.323 links between sites. Voice-mail features are available for IP phones using the same router and for remote WAN H.323 calls. Each router supports voice mail for its IP phones only, so each Cisco CME router must have Cisco Unity Express configured. As shown in [Figure 1](#), Cisco Unity Express supports local and WAN H.323 calls. If a call is busy or is not answered, the call is sent to voice mail on the called number's router.

**Figure 1** Cisco Unity Express Voice Mail Support for Local and WAN H.323 Calls



It is not necessary to make fundamental changes to your existing Cisco CME configuration. The required voice-mail configuration elements include the following:

- For voice mail between IP phones on the same router:
  - The Cisco Unity Express module must communicate with the host Cisco CME router.
  - If an internal call is busy or unanswered, the ephone-dn must forward it to a voice-mail pilot or access number.
  - Message-waiting indicator (MWI) ephone-dns must be defined.
- For voice mail between phones on different gateways (H.323):
  - The above criteria for voice mail between IP phones on the same router must be met.
  - Each router must be configured so WAN H.323 calls will route through loopback ephone-dns directly.

## Administration

Voice-mail system administration tasks may be performed by using the Cisco Unity Express interface. After voice mail has been configured, Cisco CME and Cisco Unity Express interfaces will share the same information about phones, extensions, and system parameters. Integration configuration will not change the interfaces' usage.

## Loopback Ephone-dns



Note

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Loopback ephone-dns are required for integrating Cisco Unity Express with Cisco CME versions 3.0 and 3.1. They are not necessary for Cisco CME V3.2 and higher.

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Cisco Unity Express uses Session Initiation Protocol (SIP) signals only. When calls on the same router are forwarded to Cisco Unity Express, the calls' dual tone multifrequency (DTMF) tones are automatically presented to Cisco Unity Express as SIP notify messages. For WAN H.323 calls, SIP conversion must take place using loopback ephone-dns, which are ephone-dns configured with the **loopback-dn** command. For more information about loopback ephone-dns, see the [“Configuring Cisco CME Versions 3.0 and 3.1 for WAN H.323 Calls to Cisco Unity Express Voice Mail”](#) section on page 20.

## How to Integrate Cisco with Cisco Unity Express

Integrating Cisco CME for Cisco Unity Express for WAN H.323 calls involves the following tasks:

- [Configuring Cisco CME and Cisco Unity Express for Calls Between IP Phones on the Same Router](#)
- [Configuring Cisco CME V3.2 and Higher for WAN H.323 Calls to Cisco Unity Express Voice Mail](#)
- [Configuring Cisco CME Versions 3.0 and 3.1 for WAN H.323 Calls to Cisco Unity Express Voice Mail](#)

## Configuring Cisco CME and Cisco Unity Express for Calls Between IP Phones on the Same Router



Note

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If your voice mail is working between local phones on your routers, skip this section and go to the [“Configuring Cisco CME Versions 3.0 and 3.1 for WAN H.323 Calls to Cisco Unity Express Voice Mail”](#) section on page 20.

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Configuration is performed using the Cisco CME command-line interface (CLI) and the Cisco Unity Express CLI. You can start with a new Cisco CME configuration or modify an existing one. Integration configuration does not require changes to your existing configuration structure. It involves the add-on configuration described in this section.

Configuring Cisco CME and Cisco Unity Express for voice mail on a single router involves enabling communication between the Cisco Unity Express module and the host Cisco CME router, enabling call forwarding from the ephone-dns to a voice-mail pilot number, and enabling message-waiting indicators (MWIs).

To enable communication between the Cisco Unity Express module and the host Cisco CME router, perform the following tasks:

- [Configuring Interfaces and a Static Route, page 6](#)
- [Configuring Dial Peers for Cisco CME Phones to Call Cisco Unity Express Voice Mail, page 10](#)

To enable call forwarding from ephone-dns to a voice-mail pilot number and to enable MWIs, perform the following tasks:

- [Configuring Voice-Mail Access, page 12](#)
- [Configuring MWIs, page 14](#)

## Configuring Interfaces and a Static Route

For communication to take place between Cisco Unity Express and Cisco CME, several interfaces must be created. The first is an interface to the router hosting Cisco CME. See the **interface fastethernet0/1** command in [Figure 2](#). The second is an interface that links together the Cisco Unity Express and Cisco CME ports and IP addresses. See the **interface service-engine0/0** command in [Figure 2](#).

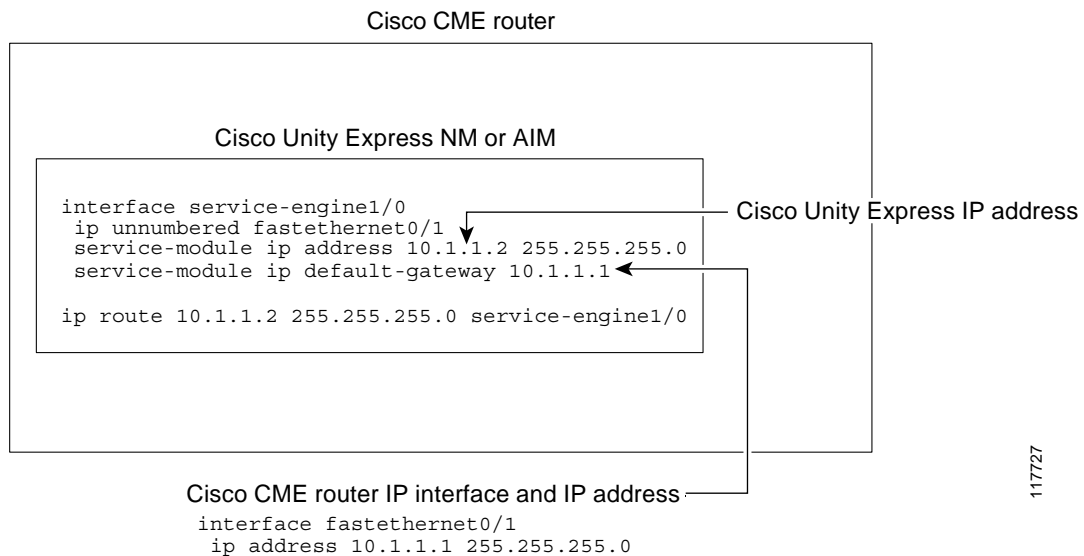


### Note

The Cisco Unity Express and Cisco CME must use IP addresses with the same subnet address.

In addition, a static route to the Cisco Unity Express NM or AIM has to be created because Cisco CME cannot build a route dynamically.

**Figure 2** Communication Between the Cisco CME Router and Cisco Unity Express



## Prerequisites

The following information is required for activating the software:

- Slot and unit numbers of the Cisco Unity Express module on the Cisco IOS router hosting Cisco Unity Express.
- IP address and subnet mask of the Cisco IOS router hosting Cisco Unity Express or the unnumbered interface type and number.
- IP address of the Cisco Unity Express module. This IP address must be on the same subnet as the Cisco IOS router hosting Cisco Unity Express.
- IP address of the default gateway of the Cisco Unity Express router. This IP address must be the same IP address as the Cisco IOS router hosting Cisco Unity Express.



### Note

Use the Cisco Unity Express CLI for configuring the **service-engine interface** command.

## SUMMARY STEPS

1. **interface fastethernet***slot/interface\_subinterface*
2. **ip address** *ip-address mask*
3. **exit**
4. **interface service-engine***slot/interface\_subinterface*
5. **ip unnumbered fastethernet***slot/interface\_subinterface*
6. **service-module ip address** *ce-side-ip-addr subnet-mask*
7. **service module ip default-gateway** *gw-ip-addr*
8. **exit**
9. **ip route** *ip-address mask service-engineslot/interface\_subinterface*

## DETAILED STEPS

|        | Command or Action  | Purpose  |
|--------|--|--|
| Step 1 | <pre><b>interface</b> <b>fastethernet</b><i>slot/interface_subinterface</i></pre> <p><b>Example:</b><br/>Router(config)# interface fastethernet0/0</p> | <p>Configures the FastEthernet interface for the Cisco CME host router and enters interface configuration mode.</p> <ul style="list-style-type: none"> <li>• <i>slot</i>—Slot number. Refer to the appropriate hardware manual for slot and port information.</li> <li>• <i>interface_subinterface</i>—Subinterface number in the range 1 to 4,294,967,293. The number that precedes the period (.) must match the number to which this subinterface belongs.</li> </ul> |
| Step 2 | <pre><b>ip address</b> <i>ip-address mask</i></pre> <p><b>Example:</b><br/>Router(config-if)# ip address 10.0.0.1<br/>255.255.255.255</p>              | <p>Sets a primary or secondary IP address for an interface.</p> <ul style="list-style-type: none"> <li>• <i>ip-address</i>—IP address.</li> <li>• <i>mask</i>—Mask for the associated IP subnet.</li> </ul> <p><b>Note</b> Enter the IP address and mask of the Cisco CME router hosting Cisco Unity Express.</p>  |

|        | Command or Action  | Purpose  |
|--------|--|--|
| Step 3 | <code>exit</code><br><br><b>Example:</b><br>Router(config-if)# <code>exit</code>   | Exits the interface configuration mode.  |
| Step 4 | <code>interface</code><br><code>service-engineslot/interface_subinterface</code><br><br><b>Example:</b><br>Router(config)# <code>interface service-engine1/0</code>                              | Configures the Cisco Unity Express interface module and enters interface configuration mode. <ul style="list-style-type: none"> <li><code>slot</code>—Slot number. Refer to the appropriate hardware manual for slot and port information.</li> <li><code>interface_subinterface</code>—Subinterface number in the range 1 to 4,294,967,293. The number that precedes the period (.) must match the number to which this subinterface belongs.</li> </ul> <b>Note</b> This command is available through Cisco Unity Express only. You must use the Cisco Unity Express CLI.                                    |
| Step 5 | <code>ip unnumbered</code><br><code>fastethernet slot/interface_subinterface</code><br><br><b>Example:</b><br>Router(config-if)# <code>ip unnumbered fastethernet0/0</code>                      | Enables IP processing on a FastEthernet interface (for the Cisco CME host router) without assigning an explicit IP address to the interface. <ul style="list-style-type: none"> <li><code>slot</code>—Slot number. Refer to the appropriate hardware manual for slot and port information.</li> <li><code>interface_subinterface</code>—Subinterface number in the range 1 to 4,294,967,293. The number that precedes the period (.) must match the number to which this subinterface belongs.</li> <li>Specify the interface type and number for the Cisco CME router hosting Cisco Unity Express.</li> </ul> |
| Step 6 | <code>service-module ip address ce-side-ip-addr</code><br><code>subnet-mask</code><br><br><b>Example:</b><br>Router(config-if)# <code>service-module ip address 10.40.0.2 255.255.255.255</code> | Defines the IP address for the internal network-module-side interface (the Cisco Unity Express module) on a content engine (CE) network module (the Cisco CME host router). <ul style="list-style-type: none"> <li><code>ce-side-ip-addr</code>—IP address of the internal network-module-side interface on a CE network module.</li> <li><code>subnet-mask</code>—Subnet mask to append to the IP address.</li> <li>Specify the IP address used by Cisco Unity Express module. The IP address must be on the same subnet as the IP address for the Cisco CME router hosting Cisco Unity Express.</li> </ul>   |
| Step 7 | <code>service-module ip default-gateway gw-ip-addr</code><br><br><b>Example:</b><br>Router(config-if)# <code>service module ip default-gateway 10.40.0.3</code>                                  | Defines a default IP address for the service engine interface. <ul style="list-style-type: none"> <li><code>gw-ip-addr</code>—IP address of the default gateway.</li> <li>Specify the IP address of the Cisco CME router hosting Cisco Unity Express.</li> </ul>   |

|        | Command or Action  | Purpose   |
|--------|--|---|
| Step 8 | <code>exit</code>  | Exits the service engine interface configuration mode.        |
|        | <b>Example:</b><br>Router(config-if)# <code>exit</code>  |   |
| Step 9 | <code>ip route ip-address mask<br/>service-engine slot/interface_subinterface</code>                     | Establishes a static route to the Cisco Unity Express module. |
|        | <b>Example:</b><br>Router(config)# <code>ip route 10.40.0.2<br/>255.255.255.255 service-engine1/0</code> |   |

## Verifying Interfaces and Static Routes

To verify that interfaces and static routes are configured correctly, perform the following steps:

### SUMMARY STEPS

1. `show interface service-engine slotinterface_subinterface`
2. `service-module service-engine slotinterface_subinterface status`
3. `show running interface interface-type slotinterface_subinterface`
4. `show ip route ip-address`

### DETAILED STEPS

#### Step 1 `show interface service-engine slotinterface_subinterface`

Use this command to make sure that the service-engine interface is in an Up/Up state as shown below. No IP traffic will pass through unless the interface is in this state.

```
Router# show interface service-engine 1/0
Service-Engine1/0 is up, line protocol is up
Hardware is I82559FE, address is 0008.e35f.6e80 (bia 0008.e35f.6e80)
```

#### Step 2 `service-module service-engine slotinterface_subinterface status`

Use this command to make sure that the service-module status is steady state. Cisco IOS software uses Router Blade Control Protocol (RBCP) for IP address communication, and RBCP messages for IP addresses take effect only when the module is in a steady state. If the module is not in a steady state, then, depending on what state the module is in, either wait for Cisco Unity Express to reach a steady state or reload or reset the module.

```
Router# service-module service-engine 1/0 status
Service Module is Cisco Service-Engine1/0
Service Module supports session via TTY line 33
Service Module is in Steady state
Getting status from the Service Module, please wait..
cisco service engine 1.0
```

**Step 3** `show running interface interface-type slotinterface_subinterface`

Use this command to make sure that the IP addresses have been configured for the service-engine interface and Cisco Unity Express. Also, check the IP default gateway for Cisco Unity Express. Use the following **show** commands to check the IP addresses assigned to Cisco Unity Express. In the example, the IP address for Cisco Unity Express is 10.10.10.2, and the default gateway is 10.10.10.1. Note that the IP address of the service-engine interface is same as that of the Fast Ethernet 0/0 interface.

```
Router# show running interface service-engine 1/0
Building configuration...

Current configuration :211 bytes
interface Service-Engine1/0
 ip unnumbered FastEthernet0/0
 service-module ip address 10.10.10.2 255.255.255.0
 service-module ip default-gateway 10.10.10.1
end
```

```
Router# show running interface FastEthernet0/0
Building configuration...

Current configuration :211 bytes

interface FastEthernet0/0
 ip address 10.10.10.1 255.255.255.0
 duplex auto
 speed auto
end
```

**Step 4** `show ip route ip-address`

If you are using an IP unnumbered scheme of addresses, use the **show ip route** command to make sure that the host route (/32 mask) has been configured for the IP address assigned to Cisco Unity Express; for example:

```
Router# show ip route 10.10.10.2
Routing entry for 10.10.10.2/32
  Known via "static", distance 1, metric 0 (connected)
  Routing Descriptor Blocks:
 * directly connected, via Service-Engine1/0
   Route metric is 0, traffic share count is 1
```

## Troubleshooting Tips

If you can ping Cisco Unity Express from the router itself, but not from outside, check the default gateway for Cisco Unity Express. It should be the IP address of the Cisco CME interface. If this is the case, you can also ping the router hosting Cisco Unity Express.

## Configuring Dial Peers for Cisco CME Phones to Call Cisco Unity Express Voice Mail

A dedicated dial peer is required for facilitating communication between Cisco CME and Cisco Unity Express. The **destination-pattern** command under dial peer 1 assigns a set of phone numbers dedicated to applications such as Cisco Unity Express. If no other applications are going to be used, you could set the destination pattern to one number only, such as 2000. Note that the voice-mail pilot number must be within the dial peer's destination-pattern range (see the [“Configuring Voice-Mail Access” section on page 12](#)), and the ephone-dns must be configured for call forwarding to the voice-mail number (see the [“Configuring Voice-Mail Access” section on page 12](#)), which triggers the use of the dial peer.

The Cisco Unity Express dial peer must use Session Initiation Protocol (SIP) for call sessions and for translating dual tone multifrequency (DTMF) tones into SIP notify messages. A codec must be designated, and voice activity detection (VAD) must be switched off.

## SUMMARY STEPS

1. **dial-peer voice** *tag voip*
2. **destination-pattern** [**+**] *string* [**T**]
3. **session protocol sipv2**
4. **session target ipv4:***destination-pattern*
5. **dtmf-relay sip-notify**
6. **no vad**
7. **exit**

## DETAILED STEPS

|        | Command or Action   | Purpose  |
|--------|---|--|
| Step 1 | <b>dial-peer voice</b> <i>tag voip</i><br><br><b>Example:</b><br>Router(config)# dial-peer voice voip   | Defines a particular dial peer, specifies the method of voice encapsulation, and enters dial-peer configuration mode.  |
| Step 2 | <b>destination-pattern</b> [ <b>+</b> ] <i>string</i> [ <b>T</b> ]<br><br><b>Example:</b><br>Router(config-dial-peer)# destination-pattern 2... | Specifies either the prefix or the full E.164 telephone number (depending on your dial plan) to be used for a dial peer. <ul style="list-style-type: none"> <li>• <b>+</b>—Character that indicates an E.164 standard number.</li> <li>• <i>string</i>—Series of digits that specify a pattern for the E.164 or private dialing plan telephone number. Consult CLI help for valid entries.</li> <li>• <b>T</b>—Control character that indicates that the destination-pattern value is a variable-length dial string. Using this control character enables the router to wait until all digits are received before routing the call.</li> </ul> |
| Step 3 | <b>session protocol sipv2</b><br><br><b>Example:</b><br>Router(config-dial-peer)# session protocol sipv2  | Specifies SIP as the session protocol for calls between the host Cisco CME router and the Cisco Unity Express module.  |
| Step 4 | <b>session target ipv4:</b> <i>destination-pattern</i><br><br><b>Example:</b><br>Router(config-dial-peer)# session target ipv4:10.10.10.10      | Designates a network-specific address to receive calls from a Voice over IP (VoIP) dial peer. <ul style="list-style-type: none"> <li>• <i>destination-pattern</i>—IP address of the dial peer that is to receive calls. Enter the IP address of the Cisco Unity Express module.</li> </ul>   |
| Step 5 | <b>dtmf-relay sip-notify</b><br><br><b>Example:</b><br>Router(config-dial-peer)# dtmf-relay sip-notify  | Forwards DTMF tones using SIP notify messages.   |

|        | Command or Action  | Purpose  |
|--------|--|--|
| Step 6 | <pre>codec codec</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# codec g711ulaw</p> | <p>Specifies the voice coder rate of speech for a dial peer.</p> <ul style="list-style-type: none"> <li><i>codec</i>—The allowable codec is dependent on the router that you are using. Consult CLI help for valid entries.</li> </ul> <p><b>Note</b> Cisco Unity Express 1.0 and 1.1 support mu-law only.</p> |
| Step 7 | <pre>no vad</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# no vad</p>              | <p>Disables VAD for the calls using a particular dial peer.</p>  |
| Step 8 | <pre>exit</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# exit</p>                  | <p>Exits dial-peer configuration mode.</p>   |

## Troubleshooting Tips

Make sure that the voice-mail number has an appropriate SIP dial peer pointing to the correct destination. In the example commands shown in the “Detailed Steps” section above, dial-peer 1’s destination pattern of 2... will allow for a voice-mail pilot number between 2000 and 2999. If you are running the auto-attendant and the greeting management system (GMS), they could each use one of dial-peer 1’s extension numbers. If they do not use one of these numbers, they must use a new dial peer or separate dial peers, depending on their pilot numbers.

## Configuring Voice-Mail Access

Cisco CME configuration must include the creation of a voice-mail pilot number that is within the range of the destination pattern for the dial peer that you just created (see the “[Configuring Dial Peers for Cisco CME Phones to Call Cisco Unity Express Voice Mail](#)” section on page 10). The voice-mail pilot number is the telephone number that is speed-dialed when the Messages button on a Cisco IP phone is pressed or when a busy or unanswered call is forwarded to voice mail. One voice-mail pilot extension number is configured for voice messaging for all Cisco IP phones connected to the router. In addition, ephone-dns must be configured to forward unanswered or busy calls to the voice-mail number.

### SUMMARY STEPS



#### Note

The commands in the Summary Steps and Detailed Steps sections do not provide all of the ephone-dn configuration elements. For information about how ephone-dns must be configured for IP telephony, go to the [Cisco CallManager Express](#) index and click the desired Cisco CME version and then **System Administrator Guide > Setting Up Phones > Setting Up Initial Extensions and Phones**. You can use the automated, partially automated, or manual procedures described there.

1. **telephony-service**
2. **voicemail** *phone-number*
3. **exit**
4. **ephone-dn** *dn-tag*

5. **call-forward busy** *directory-number*
6. **call-forward noan** *directory-number timeout seconds*
7. **exit**

## DETAILED STEPS

|        | Command or Action  | Purpose   |
|--------|--|---|
| Step 1 | <b>telephony-service</b><br><br><b>Example:</b><br>Router(config)# telephony-service   | Enters telephony-service configuration mode.  |
| Step 2 | <b>voicemail</b> <i>phone-number</i><br><br><b>Example:</b><br>Router(config-telephony-service)# voicemail<br>2000                                     | Defines the telephone number that is speed-dialed when the Messages button on a Cisco IP phone is pressed.  |
| Step 3 | <b>exit</b><br><br><b>Example:</b><br>Router(config-telephony-service)# exit   | Exits telephony-service configuration mode.   |
| Step 4 | <b>ephone-dn</b> <i>dn-tag</i><br><br><b>Example:</b><br>Router(config)# ephone-dn 1   | Enters ephone-dn configuration mode to create an extension (ephone-dn) for a Cisco IP phone line. <ul style="list-style-type: none"> <li>• <i>dn-tag</i>—Unique sequence number that identifies this ephone-dn during configuration tasks. Range is from 1 to the maximum number of ephone-dns allowed on the router platform. Consult CLI help for the maximum value for this argument.</li> </ul>   |
| Step 5 | <b>call-forward busy</b> <i>directory-number</i><br><br><b>Example:</b><br>Router(config-ephone-dn)# call-forward busy<br>2000                         | Configures call forwarding so that incoming calls to a busy extension (ephone-dn) are forwarded to voice mail. <ul style="list-style-type: none"> <li>• <i>directory-number</i>—Telephone number to which calls are forwarded. Represents a fully qualified E.164 number or extension number.</li> </ul>  |
| Step 6 | <b>call-forward noan</b> <i>directory-number timeout seconds</i><br><br><b>Example:</b><br>Router(config-ephone-dn)# call-forward noan<br>2000 time 30 | Configures call forwarding so that incoming calls to a busy extension (ephone-dn) are forwarded to voice mail. <ul style="list-style-type: none"> <li>• <i>directory-number</i>—Telephone number to which calls are forwarded. Represents a fully qualified E.164 number.</li> <li>• <b>timeout seconds</b>—Sets the duration for which a call can ring with no answer before the call is forwarded to another extension. Range is from 3 to 60000. There is no default value.</li> </ul> |
| Step 7 | <b>exit</b><br><br><b>Example:</b><br>Router(config-ephone-dn)# exit   | Exits ephone-dn configuration mode.   |

## Configuring MWIs

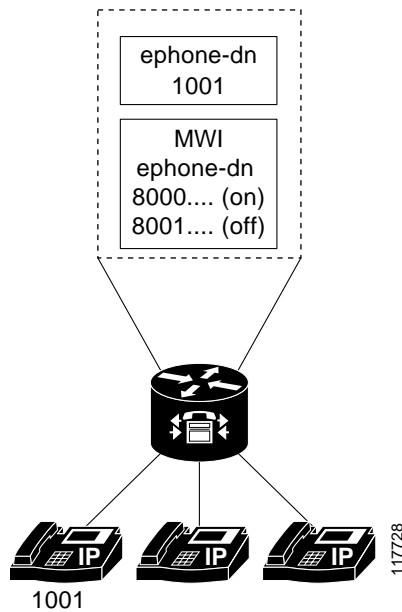
The MWI mechanism turns on the light indicator on Cisco IP phones and other devices, such as the Cisco ATA-186, to inform the user that a voice-mail message is waiting. The MWI mechanism is initiated after someone leaves a voice-mail message and is turned off after the user listens to voice mail. The internal MWI mechanism of the CME router is explained in [Figure 3](#).



### Note

For extensions associated with analog telephone adaptors (ATAs), the message-waiting indication (MWI) is a lit function button on the ATA and a stutter dial tone on the connected analog phone.

**Figure 3** MWI Mechanism on a Cisco CME Router Hosting Cisco Unity Express



In the network topology in [Figure 3](#), the following events take place:

1. The Cisco IP phone with the extension 1001 receives a call, and the call is not answered.
2. The Cisco IP phone with the extension 1001 forwards the call to voice mail.
3. The greeting for extension 1001 plays, and a voice-mail message is left.
4. Cisco Unity Express places an MWI notification call to the MWI processing ephone-dn 8000 and appends 1001 as the calling party ID for the notification call. The number 80001001 is dialed.

5. Ephone-dn 8000 accepts the MWI notification call and switches on the message-waiting light for extension 1001.
6. When the phone user at extension 1001 listens to all of the voice mail, Cisco Unity Express places an MWI notification call to ephone-dn 8001 and appends 1001 as the calling party ID. The number 80011001 is dialed.

For these events to occur, the **mwi on** and **mwi off** commands are required. MWI status notification calls are processed by dummy ephone-dns, which are ephone-dns that are not used for phone calls. One MWI processing ephone-dn must be allocated to activate MWIs, and another must be allocated to deactivate MWIs.

## SUMMARY STEPS

1. **ephone-dn** *dn-tag*
2. **number** *number*
3. **mwi** { **on** | **off** }
4. **exit**

## DETAILED STEPS

|        | Command   | Purpose  |
|--------|---|--|
| Step 1 | <b>ephone-dn</b> <i>dn-tag</i><br><br><b>Example:</b><br>Router(config)# ephone-dn 4            | Enters ephone-dn configuration mode and configures the ephone-dns for the Cisco IP phone lines.  |
| Step 2 | <b>number</b> <i>number</i><br><br><b>Example:</b><br>Router(config-ephone-dn)# number 8000.... | Associates a telephone or extension number with an extension. <ul style="list-style-type: none"> <li>• <i>number</i>—MWI ephone-dn numbers have to be followed by dots (.). The number of dots must be equivalent to the extension length of the system. For example, if the extension length is four digits, the ephone-dn's numbers would have to use the format "8000..." and "8001...".</li> </ul> |

|        | Command   | Purpose   |
|--------|---|---|
| Step 3 | <pre>mwi {on   off}</pre> <p><b>Example:</b><br/>Router(config-ephone-dn)# mwi on</p> | <p>Configures specific ephone-dns to receive MWI notification from an external voice-mail system. The MWI notification is set for all the IP phones connected to the Cisco CME router.</p> <ul style="list-style-type: none"> <li>• <b>on</b>—Sets a Cisco IP phone extension to process MWI to ON, using the <i>number</i> argument in the <b>number</b> command configured in ephone-dn configuration mode.</li> <li>• <b>off</b>—Sets a Cisco IP phone extension to process MWI to OFF, using the <i>number</i> argument in the <b>number</b> command configured in ephone-dn configuration mode.</li> </ul> |
| Step 4 | <pre>exit</pre> <p><b>Example:</b><br/>Router(config-ephone-dn)# exit</p>             | <p>Exits ephone-dn configuration mode.</p>  |

## Verifying MWIs

To verify that MWIs are configured properly, perform the following steps:

### SUMMARY STEPS

1. Test MWI.
2. **show telephony-service ephone-dn**
3. **show ccn application**

### DETAILED STEPS

**Step 1** Test MWI.

To test that the MWI ephone-dns are working correctly, dial 8000 plus the extension of a phone near you. The MWI should light on that phone. Next, dial 8001 plus the same phone's extension number. The MWI light should turn off.

**Step 2** **show telephony-service ephone-dn**

Use this Cisco IOS command to make sure that the MWI on and off numbers are followed by trailing dots (.) and that the number of dots is equivalent to the extension length of the system. For example, if the extension length is four digits, the MWI on and off ephone-dns have to use the format "8000...." and "8001....".

```
Router# show telephony-service ephone-dn
```

```
ephone-dn 30
  number 8000....
  mwi on
```

```
ephone-dn 31
  number 8001....
  mwi off
```

**Step 3 show ccn application**

If the MWI on and off ephone-dns' number formats are shown as correct for the **show telephony-service ephone-dn** output, but MWI still does not work, use Cisco Unity Express's **show ccn application** command to ensure that the MWI on and off numbers are the same as those configured in Cisco CME.

```
Router# show ccn application

Name:                ciscozwiapplication
Description:         ciscozwiapplication
Script:              setmwi.aef
ID number:           0
Enabled:             yes
Maximum number of sessions: 4
strMWI_OFF_DN:      8001
strMWI_ON_DN:       8000
CallControlGroupID: 0
```

If they do not match, run Cisco Unity Express's interface and go to **Administration > Synchronize Information > Synchronize**. Then run the **show ccn application** command again to verify that Cisco CME's and Cisco Unity Express's MWI on and off numbers match.

## Troubleshooting Tips

If the MWI ephone-dn numbers match for Cisco CME and Cisco Unity Express, and MWI still does not work, do the following:

- Check the SIP gateway address for Cisco Unity Express and run Cisco Unity Express's **show ccn subsystem SIP** command. The SIP gateway address should be the same address as the Cisco CME router's. MWI will not work if the Cisco CME router address and the IP address of the SIP subsystem are different. Typically, a default gateway address is used.
- From Cisco Unity Express, make sure that ciscozwiapplication is enabled. MWI will not work if the application is disabled.

If MWI does not work for a particular ephone-dn, make sure that the ephone-dn has a valid mailbox on the system. The DN must be associated with a user, and the user must have a mailbox on the Cisco Unity Express system. If the DN does have a mailbox, run the Cisco Unity Express **mwi refresh telephonenumber** command.

Also check that the mailbox has a new voice-mail message over four seconds in length, which is the minimum required for message activation.

## Configuring Cisco CME V3.2 and Higher for WAN H.323 Calls to Cisco Unity Express Voice Mail



### Note

This section describes how to configure Cisco CME to receive WAN H.323 calls from a WAN interface. You can start with a new Cisco CME configuration or modify an existing one. Integration configuration does not require changes to your existing configuration structure. It requires adding the configuration described in this section.

For Cisco Unity Express, WAN H.323 calls must be converted to SIP. To enable H.323-to-SIP conversion you must use the **allow-connections** command. A dial peer and translation rule are required too. In addition to the dial peer created in the [“Configuring Dial Peers for Cisco CME Phones to Call Cisco Unity Express Voice Mail”](#) section on page 10 for the voice-mail extension number, a dial peer is required for incoming calls to your voice mail’s E.164 number (for example, 4085552000). A translation rule must be created to convert the E.164 call to the voice-mail pilot number (for example, 2000) so the call can be sent to voice mail.

## SUMMARY STEPS

1. **voice service voip**
2. **allow-connections h323 to sip**
3. **exit**
4. **dial-peer voice tag voip**
5. **destination-pattern** [+] *string* [T]
6. **translate-outgoing called** *name-tag*
7. **session protocol sipv2**
8. **session target ipv4:destination-pattern**
9. **dtmf-relay sip-notify**
10. **codec** *codec*
11. **no vad**
12. **exit**
13. **voip-incoming translation-rule** called *tag-number*
14. **translation-rule** *tag-number*
15. **rule** *tag-name input-matched-pattern substituted-pattern*
16. **exit**

## DETAILED STEPS

|        | Command or Action  | Purpose  |
|--------|--|--|
| Step 1 | <b>voice service voip</b><br><br><b>Example:</b><br>Router(config)# voice service voip                                 | Enters voice-service configuration mode and specifies the Voice over IP (VoIP) encapsulation type.   |
| Step 2 | <b>allow-connections h323 to sip</b><br><br><b>Example:</b><br>Router(config-voip-serv)# allow-connections h323 to sip | Allows connections from H.323 endpoints to SIP endpoints in a Cisco Multiservice IP-to-IP Gateway. <ul style="list-style-type: none"> <li>• For Cisco CME 3.2 and later, H.323-to-SIP connections are allowed only for Cisco CME systems running Cisco Unity Express.</li> </ul> |
| Step 3 | <b>exit</b><br><br><b>Example:</b><br>Router(config-voip-serv)# exit   | Exits voice-service configuration mode.  |

|         | Command or Action   | Purpose   |
|---------|---|---|
| Step 4  | <pre>dial-peer voice tag voip</pre> <p><b>Example:</b><br/>Router(config)# dial-peer voice 2 voip</p>                                   | <p>Enters dial-peer configuration mode and specifies a voice-encapsulation type.</p> <ul style="list-style-type: none"> <li><i>tag</i>—Digits that define a particular dial peer. Range is from 1 to 2147483647.</li> </ul>   |
| Step 5  | <pre>destination-pattern [+] string [T]</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# destination-pattern 2...</p>             | <p>Specifies either the prefix or the full E.164 telephone number (depending on your dial plan) to be used for a dial peer.</p> <ul style="list-style-type: none"> <li><i>+</i>—Character that indicates an E.164 standard number.</li> <li><i>string</i>—Series of digits that specify a pattern for the E.164 or private dialing plan telephone number. Consult CLI help for valid entries.</li> <li><i>T</i>—Control character that indicates that the destination-pattern value is a variable-length dial string. Using this control character enables the router to wait until all digits are received before routing the call.</li> </ul> |
| Step 6  | <pre>translate-outgoing called name-tag</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# translate-outgoing called 1</p>          | <p>Applies a translation rule to manipulate dialed digits on an outbound plain old telephony service (POTS) or VoIP call leg.</p> <ul style="list-style-type: none"> <li><i>name-tag</i>—Tag number by which the rule set is referenced.</li> <li>This command is only required if you want users to be able to check voicemail by dialing in from the public switched telephone network (PSTN).</li> </ul>   |
| Step 7  | <pre>session protocol sipv2</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# session protocol sipv2</p>                           | <p>Specifies SIP as the session protocol for calls between the host Cisco CME router and the Cisco Unity Express module.</p>  |
| Step 8  | <pre>session target ipv4:destination-pattern</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# session target ipv4:10.10.10.10</p> | <p>Designates a network-specific address to receive calls from a Voice over IP (VoIP) dial peer.</p> <ul style="list-style-type: none"> <li><i>destination-pattern</i>—IP address of the dial peer that is to receive calls. Enter the IP address of the Cisco Unity Express module.</li> </ul>   |
| Step 9  | <pre>dtmf-relay sip-notify</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# dtmf-relay sip-notify</p>                             | <p>Forwards DTMF tones using SIP notify messages.</p>   |
| Step 10 | <pre>codec codec</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# codec g711ulaw</p>  | <p>Specifies the voice coder rate of speech for a dial peer.</p> <ul style="list-style-type: none"> <li><i>codec</i>—The allowable codec is dependent on the router that you are using. Consult CLI help for valid entries.</li> </ul> <p><b>Note</b> Cisco Unity Express 1.0 and 1.1 support mu-law only.</p>  |
| Step 11 | <pre>no vad</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# no vad</p>   | <p>Disables voice activity detection (VAD) for the calls using a particular dial peer.</p>  |

|         | Command or Action  | Purpose  |
|---------|--|--|
| Step 12 | <code>exit</code><br><br><b>Example:</b><br><code>Router(config-dial-peer)# exit</code>  | Exits the dial-peer configuration mode.  |
| Step 13 | <code>voip-incoming translation-rule called tag-number</code><br><br><b>Example:</b><br><code>Router(config)#&gt; voip-incoming translation-rule called 1</code> | Sets the incoming translation rule for a called number that originates from H.323-compatible clients. <ul style="list-style-type: none"> <li><i>tag-number</i>—Tag number by which the rule set is referenced. This is an arbitrarily chosen number. Consult CLI help for the range of numbers. There is no default value.</li> <li>This command is required only if you want users to be able to check voice mail by dialing in from the PSTN.</li> </ul>   |
| Step 14 | <code>translation-rule tag-number</code><br><br><b>Example:</b><br><code>Router(config)#&gt; translation-rule 1</code>   | Creates a translation name and enters translation-rule configuration mode to apply rules to the translation name. <ul style="list-style-type: none"> <li><i>tag-number</i>—Tag number by which the rule set is referenced. This is an arbitrarily chosen number. Consult CLI help for the range of numbers. There is no default value.</li> </ul>  |
| Step 15 | <code>rule tag-number input-matched-pattern substituted-pattern</code><br><br><b>Example:</b><br><code>Router(config-translate)#&gt; rule 1 4085552 2</code>     | Applies a translation rule to a called-party number. <ul style="list-style-type: none"> <li><i>tag-number</i>—Tag number by which the rule set is referenced. This is an arbitrarily chosen number.</li> <li><i>input-matched-pattern</i>—String of digits for which pattern matching is performed.</li> <li><i>substituted-pattern</i>—Replacement digit string that results after pattern matching is performed. Regular expressions are used to carry out this process.</li> <li>This command is required only if you want users to be able to check voice mail by dialing in from the PSTN.</li> </ul> |
| Step 16 | <code>exit</code><br><br><b>Example:</b><br><code>Router(config-translate)#&gt; exit</code>  | Exits translate rule configuration mode.   |

## Configuring Cisco CME Versions 3.0 and 3.1 for WAN H.323 Calls to Cisco Unity Express Voice Mail



### Note

This section describes how to configure Cisco CME to receive WAN H.323 calls from a WAN interface. You can start with a new Cisco CME configuration or modify an existing one. Integration configuration does not require changes to your existing configuration structure. It requires adding the configuration described in this section.

For Cisco Unity Express, WAN H.323 calls are forwarded differently from calls from within routers. Instead of being matched to an ephone-dn, WAN H.323 calls must first go to loopback ephone-dns before ringing an extension, so they can be translated into SIP and forwarded to voice mail if the extension is busy or does not answer.

Loopback ephone-dns consist of two ephone-dns. The first loopback ephone-dn terminates the WAN H.323 call and translates it to SIP to allow communication with Cisco Unity Express. The called number is converted from the translation rule number (9408....) to an E.164 number (408....) and forwarded to the second loopback ephone-dn. The second loopback ephone-dn transfers the E.164 number (408....). The **dialplan-pattern** command truncates the number (4081...) to an extension number (1001, for example, if the called number were 4085551001), and the call is sent to the correct ephone-dn. If the called extension is busy or unanswered, the call is forwarded to voice mail (2000).

```
translation-rule 1
  rule 1 ^408 9408

ephone-dn 20
  number 9408555....
  loopback-dn 21 forward 10
  no huntstop

ephone-dn 21
  number AA
  loopback-dn 20

telephony-service
  dialplan-pattern 1 4085551... extension-length 4 extension pattern 1...

ephone-dn 1
  number 1001

telephony-service
  voicemail 2000
```

WAN H.323 calls are sent to loopback ephone-dns using [translation rules](#). Translation rules are used to translate the called number of a WAN H.323 call to a number that triggers the use of loopback ephone-dns. In the following example, the **voip-incoming translation-rule** and **translation-rule** commands convert all called numbers starting with 408 to 9408:

```
voip-incoming translation-rule called 1
translation-rule 1
  rule ^408 9408
```

The translation rule sends calls to loopback ephone-dns with matching numbers (for example, 9408555....). Here is an example of a pair of loopback ephone-dns:

```
ephone-dn 20
  number 9408555....
  loopback-dn 21 forward 10
  preference 2
  no huntstop

ephone-dn 21
  number AA
  loopback-dn 20
  no huntstop
```

All calls starting with 408 are converted to 9408 by translation rule 1, so calls can be picked up by loopback ephone-dns with the **number 9408555....** command and translated back to 408555.... with the **loopback-dn 21 forward 10** command.

**Note**

Other Cisco IOS commands can be used for configuring loopback ephone-dns. For more information, go to the [Cisco CallManager Express](#) index and click the desired Cisco CME version and then **System Administrator Guide > Loopback Call Routing**.

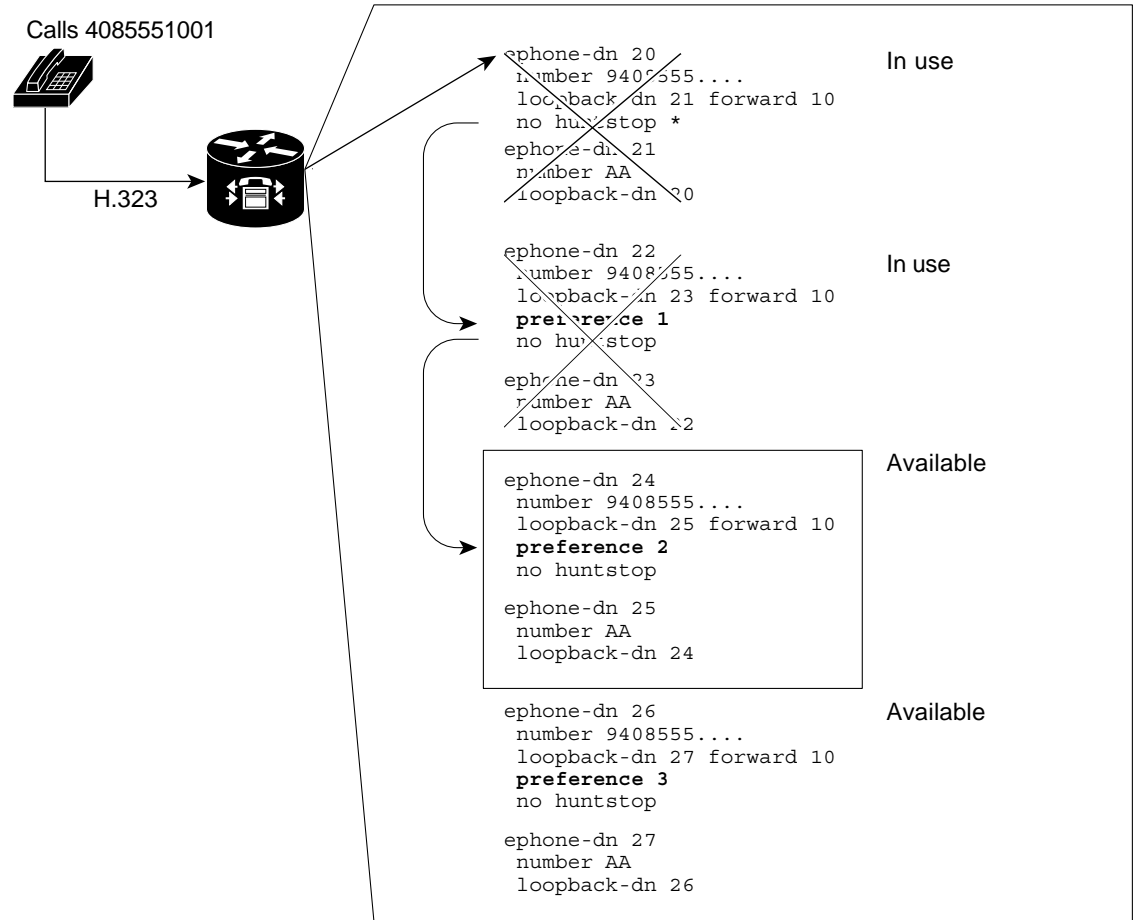
## Number of Loopback Ephone-dns Needed

Multiple loopback ephone-dns are needed to handle anticipated WAN H.323 call volume that will be forwarded to Cisco Unity Express. WAN H.323 calls are picked up by the highest-preference loopback ephone-dn available. As seen in [Figure 4](#), if there are four loopback ephone-dns and the first two are in use, the call will go to the available loopback ephone-dn with the highest preference. In the case of [Figure 4](#), ephone-dn 24 is used. Note that a loopback ephone-dn with no specified preference defaults to the highest preference of zero (0).

When deciding on the number of loopback ephone-dn pairs for your configuration, consider the number of calls that will be forwarded to voice mail on each gateway. If all loopback ephone-dn pairs are in use, WAN H.323 calls cannot go through. To keep this from happening, configure enough loopback ephone-dn pairs to accommodate peak traffic.

The number of allowable loopback ephone-dn pairs per Cisco CME system is equal to the maximum number of ephone-dns minus the ephone-dns in use. To find the ephone-dn maximums for your Cisco CME systems, refer to CLI help for the **ephone-dn** command.

Figure 4 Loopback Ephone-dn Pickup Preference for New WAN H.323 Calls



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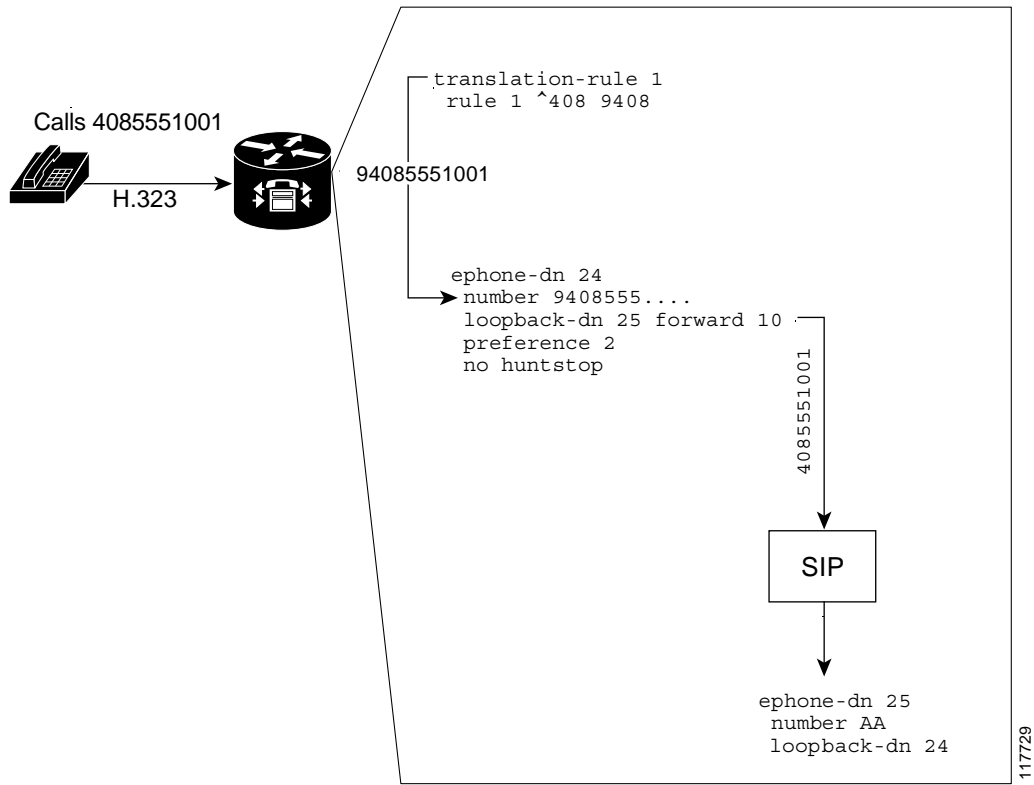
## Loopback Ephone-dn Interaction

The first loopback ephone-dn does the following:

- Accepts the called number.
- Terminates the call.
- Translates the call to SIP.
- Forwards the call to the second loopback ephone-dn.

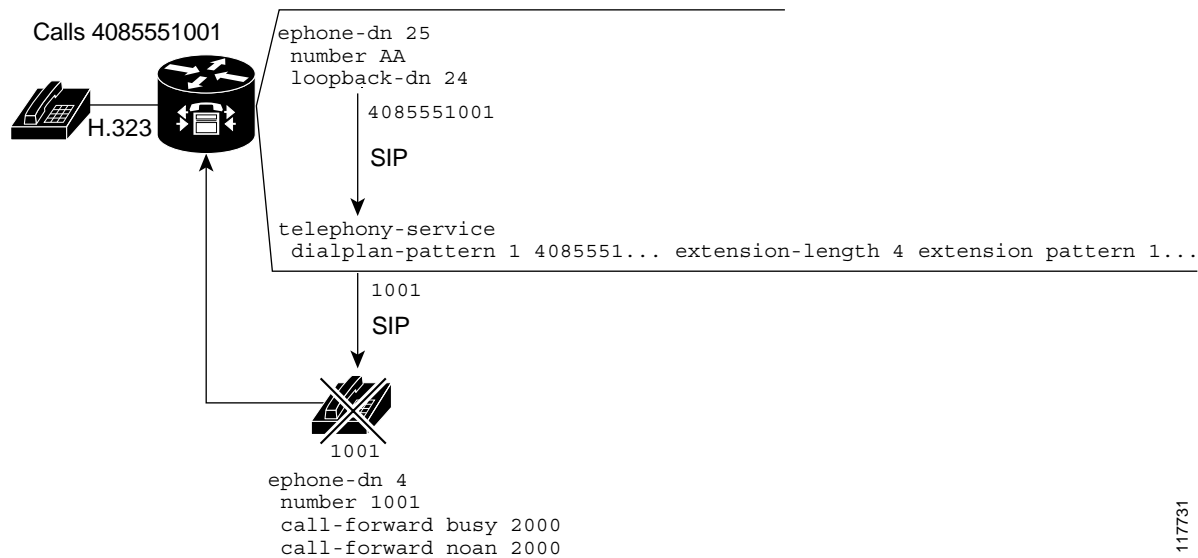
The **forward number** keyword and argument in the **loopback-dn** command forwards a designated number of the called number's last digits to the second loopback ephone-dn. See [Figure 5](#).

Figure 5 Translation Rule and First Loopback Ephone-dns



As shown in [Figure 6](#), the second loopback ephone-dn forwards the last ten digits of the SIP call. The **dialplan pattern** command converts the E.164 or ten-digit number to an extension number and sends the call to the appropriate ephone-dn. If the call is unanswered or busy, the call is forwarded to voice mail.

Figure 6 Second Loopback-dn and Dial-Plan Pattern



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To forward an unanswered or busy call to Cisco Unity Express voice mail, a second dial-plan pattern is required. When Cisco Unity Express is used as the voice-mail system for Cisco CME and a Cisco Unity Express pilot number matches the extension pattern used in a **dialplan-pattern** command in telephony-service mode, the Cisco Unity Express pilot number is automatically expanded to the matching full E.164 number format when the call is forwarded to Cisco Unity Express. You must create a dial peer for this expanded number in addition to the dial peer for the extension number. Because Cisco Unity Express does not support E.164 format for its pilot numbers, you must create a translation rule under the expanded-number dial peer that converts the expanded number back to its extension equivalent. The Cisco Unity Express pilot number is translated back to its extension equivalent, which is then passed through to Cisco Unity Express.

In the following example, the Cisco Unity Express pilot number is 2000. Dial-plan pattern 2 expands that number to 4085552000 when calls are forwarded from extensions. Calls to the Cisco Unity Express pilot number are picked up by dial peer 2, which sends the call to the session target (Cisco Unity Express) and uses translation rule 2 to convert the number back to a four-digit extension (2000), which is passed through to Cisco Unity Express.

```

voip-incoming translation-rule called 1
translation-rule 1
rule ^408 9408

translation-rule 2
rule 1 4085552 2

dial-peer voice 1 voip
description "SIP Dial Peer to Cisco Unity Express using four-digit number"
destination-pattern 2...
session protocol sipv2
session target ipv4:10.10.10.2
dtmf-relay sip-notify
codec g711ulaw
no vad
  
```

```

dial-peer voice 2 voip
  description "SIP dial peer to Cisco Unity Express with E.164 translated to four-digit
number"
  destination-pattern 4085552...
  translate-outgoing called 2
  session protocol sipv2
  session target ipv4:10.10.10.2
  dtmf-relay sip-notify
  codec g711ulaw
  no vad

telephony-service
  max-ephones 5
  max-dn 96
  ip source-address 10.1.1.100 port 2000
  create cnf-files version-stamp Jan 01 2002 00:00:00
  dialplan-pattern 1 4085551... extension-length 4 extension-pattern 1...
  dialplan-pattern 2 4085552... extension-length 4 extension-pattern 2...
  voicemail 2000

```

## Prerequisites

- Regardless of whether you have a Cisco CME and Cisco Unity Express configuration or not, you must start voice-mail configuration with the basic configuration elements described in the [“Prerequisites for Integrating Cisco CME with Cisco Unity Express” section on page 2](#). Your configuration can include additional Cisco CME configuration features.
- Cisco Unity Express must be configured on all of the host Cisco CME routers. For more information, see the [“How to Integrate Cisco with Cisco Unity Express” section on page 5](#).

## Restrictions

Ephone-dns used for loopback cannot be dual-line ephone-dns.

## SUMMARY STEPS

1. **voip-incoming translation-rule called** *tag-number*
2. **translation-rule** *tag-number*
3. **rule** *name-tag input-matched-pattern substituted-pattern*
4. **rule** *name-tag input-matched-pattern substituted-pattern*
5. **exit**
6. **ephone-dn** *first-dn-tag*
7. **number** *number*
8. **loopback-dn** *second-dn-tag forward number-of-digits*
9. **preference** *preference-order*
10. **no huntstop**
11. **exit**
12. **ephone-dn** *second-dn-tag*
13. **number** *dummy-number*
14. **loopback-dn** *first-dn-tag*

15. **exit**
16. **telephony-service**
17. **dialplan-pattern** *dial-plan-tag pattern extension-length length extension-pattern pattern*
18. **dialplan-pattern** *dial-plan-tag pattern extension-length length extension-pattern pattern*
19. **exit**
20. **dial-peer voice** *tag voip*
21. **destination-pattern** *[+] string [T]*
22. **session protocol sipv2**
23. **session target ipv4:destination-pattern**
24. **dtmf-relay sip-notify**
25. **codec** *codec*
26. **no vad**
27. **exit**
28. Repeat the commands from Step 20 through Step 26.
29. **translate-outgoing called** *name-tag*
30. **exit**

## DETAILED STEPS

|        | Command or Action   | Purpose   |
|--------|---|---|
| Step 1 | <b>voip-incoming translation-rule called</b><br><i>tag-number</i><br><br><b>Example:</b><br>Router(config)#> translation-rule 1 | Sets the incoming translation rule for a called number that originates from H.323-compatible clients. <ul style="list-style-type: none"> <li>• <i>tag-number</i>—Tag number by which the rule set is referenced. This is an arbitrarily chosen number. Consult CLI help for the range of numbers. There is no default value.</li> </ul>             |
| Step 2 | <b>translation-rule</b> <i>tag-number</i><br><br><b>Example:</b><br>Router(config)#> translation-rule 1                         | Creates a translation name and enters translation-rule configuration mode to apply rules to the translation name. <ul style="list-style-type: none"> <li>• <i>tag-number</i>—Tag number by which the rule set is referenced. This is an arbitrarily chosen number. Consult CLI help for the range of numbers. There is no default value.</li> </ul> |

|        | Command or Action  | Purpose   |
|--------|--|---|
| Step 3 | <pre>rule name-tag input-matched-pattern substituted-pattern</pre> <p><b>Example:</b><br/>Router(config-translate)#&gt; rule 1 ^408 9408</p> | <p>Applies a translation rule to a called-party number.</p> <ul style="list-style-type: none"> <li><i>name-tag</i>—Tag number by which the rule set is referenced. This is an arbitrarily chosen number.</li> <li><i>input-matched-pattern</i>—String of digits for which pattern matching is performed.</li> </ul> <p><b>Note</b> The caret (^) symbol declares that the called number must match the <i>input-matched-pattern</i> and that the called number should not be embedded within the called number.</p> <ul style="list-style-type: none"> <li><i>substituted-pattern</i>—Replacement digit string that results after pattern matching is performed. Regular expressions are used to carry out this process.</li> </ul> |
| Step 4 | <pre>rule name-tag input-matched-pattern substituted-pattern</pre> <p><b>Example:</b><br/>Router(config-translate)#&gt; rule 2 4085552 2</p> | <p>Applies a translation-rule to the voice-mail pilot number.</p> <ul style="list-style-type: none"> <li>See Step 2 for a description of the arguments and keywords.</li> <li>The example converts the number 4085552000 to 2000.</li> </ul>  |
| Step 5 | <pre>exit</pre> <p><b>Example:</b><br/>Router(config-translate)#&gt; exit</p>  | <p>Exits translation- rule configuration mode.</p>  |
| Step 6 | <pre>ephone-dn first-dn-dag</pre> <p><b>Example:</b><br/>Router(config)#&gt; ephone-dn 1</p>   | <p>Enters ephone-dn configuration mode and creates the first of a pair of loopback ephone-dns.</p> <ul style="list-style-type: none"> <li><i>first-dn-tag</i>—Unique sequence number that identifies this ephone-dn during configuration tasks. Range is platform- and version-dependent. Refer to CLI help.</li> </ul>   |
| Step 7 | <pre>number number</pre> <p><b>Example:</b><br/>Router(config-ephone-dn)# number 940855551..</p>   | <p>Associates a number with ephone-dn.</p> <ul style="list-style-type: none"> <li><i>number</i>—String of up to 16 digits that represents an E.164 number to be associated with this ephone-dn. Wildcards or dots (.) are allowed.</li> </ul>   |
| Step 8 | <pre>loopback-dn second-dn-tag forward number-of-digits</pre> <p><b>Example:</b><br/>Router(config-ephone-dn)# loopback-dn 2 forward 10</p>  | <p>Converts the loopback ephone-dn number to SIP, forwards a specified number of digits, and sends the call to the <i>second-dn-tag</i> number.</p> <ul style="list-style-type: none"> <li><i>second-dn-tag</i>—Use the tag number of the second loopback ephone-dn.</li> <li><b>forward</b> <i>number-of-digits</i>—Number of digits in the <i>number</i> argument of the <b>number</b> command to forward to the second loopback ephone-dn. Forwards the last digits. For example, if the <i>number-of-digits</i> were 4 and the <i>number</i> were 4085551111, 1111 would be forwarded. Range is from 1 to 32. Default is to forward all digits.</li> </ul>  |

|         | Command or Action  | Purpose   |
|---------|--|---|
| Step 9  | <p><code>preference preference-order</code></p> <p><b>Example:</b><br/> Router(config-ephone-dn)# preference 1</p> | <p>Sets dial-peer preference for an ephone-dn.</p> <ul style="list-style-type: none"> <li><i>preference-order</i>—Preference order for the primary number associated with an extension (ephone-dn). Range is from 0 to 10, where 0 is the highest preference and 10 is the lowest preference. Default is 0.</li> </ul>                        |
| Step 10 | <p><code>no huntstop</code></p> <p><b>Example:</b><br/> Router(config-ephone-dn)# no huntstop</p>                  | <p>Disables huntstop and allows call-hunting behavior for an extension (ephone-dn).</p>   |
| Step 11 | <p><code>exit</code></p> <p><b>Example:</b><br/> Router(config-ephone-dn)# exit</p>                                | <p>Exits ephone-dn configuration mode.</p>  |
| Step 12 | <p><code>ephone-dn second-dn-tag</code></p> <p><b>Example:</b><br/> Router(config)# ephone-dn 2</p>                | <p>Enters ephone-dn configuration mode for the second loopback ephone-dn.</p> <ul style="list-style-type: none"> <li><i>second-dn-tag</i>—Unique sequence number that identifies this ephone-dn during configuration tasks. Range is platform- and version-dependent. Refer to CLI help.</li> </ul>   |
| Step 13 | <p><code>number dummy-number</code></p> <p><b>Example:</b><br/> Router(config-ephone-dn)# number AA</p>            | <p>Associates a dummy or unused number with the ephone-dn. This dummy number is not used because the first loopback ephone-dn is configured to send the call to the <i>second-dn-tag</i> number.</p> <ul style="list-style-type: none"> <li><i>dummy-number</i>—Use letters instead of numbers to ensure that no number is called.</li> </ul> |
| Step 14 | <p><code>loopback-dn first-dn-tag</code></p> <p><b>Example:</b><br/> Router(config-ephone-dn)# loopback-dn 1</p>   | <p>Binds the second loopback ephone-dn to the first and forwards the SIP-translated call.</p> <ul style="list-style-type: none"> <li><i>dn-tag</i>—Use the dn-tag of the first loopback ephone-dn.</li> </ul>   |
| Step 15 | <p><code>exit</code></p> <p><b>Example:</b><br/> Router(config-ephone-dn)# exit</p>                                | <p>Exits ephone-dn configuration mode.</p>  |
| Step 16 | <p><code>telephony-service</code></p> <p><b>Example:</b><br/> Router(config)# exit</p>                             | <p>Enters telephony-service configuration mode.</p>   |

|         | Command or Action  | Purpose   |
|---------|--|---|
| Step 17 | <p><b>dialplan-pattern</b> <i>dial-plan-tag pattern</i><br/> <b>extension-length</b> <i>length extension-pattern</i><br/> <i>pattern</i></p> <p><b>Example:</b><br/> Router(config-telephony)# dialplan-pattern 1<br/> 4085551... extension-pattern 1...</p> | <p>Creates an extension number from an E.164 number.</p> <ul style="list-style-type: none"> <li><i>dial-plan-tag</i>—Unique number that identifies the dial-plan pattern that is being defined during configuration tasks. Range is from 1 to 5. There is no default value.</li> <li><i>pattern</i>—Dial-plan pattern, such as the area code, the prefix, the first one or two digits of the extension number, and wildcard markers or dots (.) for the remainder of the digits in the extension number.</li> <li><b>extension-length</b> <i>length</i>—Number of extension digits. Range is from 1 to 32. There is no default value.</li> <li><b>extension-pattern</b> <i>pattern</i>—Defines the extension number leading digit pattern to use when the leading digits of the extension number are different from 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 1... would include extensions 1000 to 1999.</li> </ul> |
| Step 18 | <p><b>dialplan-pattern</b> <i>dial-plan-tag pattern</i><br/> <b>extension-length</b> <i>length extension-pattern</i><br/> <i>pattern</i></p> <p><b>Example:</b><br/> Router(config-telephony)# dialplan-pattern 2<br/> 4085552... extension-pattern 2...</p> | <p>Expands the voice-mail pilot number to an E.164 number.</p> <ul style="list-style-type: none"> <li>See Step 17 for a description of the arguments and keywords.</li> </ul>   |
| Step 19 | <p><b>exit</b></p> <p><b>Example:</b><br/> Router(config-telephony)# exit</p>  | <p>Exits telephony-service configuration mode.</p>  |
| Step 20 | <p><b>dial-peer voice</b> <i>tag voip</i></p> <p><b>Example:</b><br/> Router(config)# dial-peer 1 voice voip</p>   | <p>Creates a dial peer to Cisco Unity Express using a four-digit number.</p>  |
| Step 21 | <p><b>destination-pattern</b> [<b>+</b>] <i>string</i> [<b>T</b>]</p> <p><b>Example:</b><br/> Router(config-dial-peer)# destination-pattern 2...</p>   | <p>Specifies either the prefix or the full E.164 telephone number (depending on your dial plan) to be used for a dial peer.</p> <ul style="list-style-type: none"> <li><b>+</b>—Character that indicates an E.164 standard number.</li> <li><i>string</i>—Series of digits that specify a pattern for the E.164 or private dialing plan telephone number. Consult CLI help for valid entries.</li> <li><b>T</b>—Control character that indicates that the destination-pattern value is a variable-length dial string. Using this control character enables the router to wait until all digits are received before routing the call.</li> </ul>   |

|         | Command or Action   | Purpose  |
|---------|---|--|
| Step 22 | <pre>session protocol sipv2</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# session protocol sipv2</p>                           | Specifies SIP as the session protocol for calls between the host Cisco CME router and the Cisco Unity Express module.  |
| Step 23 | <pre>session target ipv4:destination-pattern</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# session target ipv4:10.10.10.10</p> | Designates a network-specific address to receive calls from a VoIP dial peer. <ul style="list-style-type: none"> <li><i>destination-pattern</i>—IP address of the dial peer that is to receive calls. Enter the IP address of the Cisco Unity Express module.</li> </ul> |
| Step 24 | <pre>dtmf-relay sip-notify</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# dtmf-relay sip-notify</p>                             | Forwards DTMF tones using SIP notify messages.   |
| Step 25 | <pre>codec codec</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# codec g711ulaw</p>  | Specifies the voice coder rate of speech for a dial peer. <ul style="list-style-type: none"> <li><i>codec</i>—The allowable codec is dependent on the router that you are using. Consult CLI help for valid entries.</li> </ul>  |
| Step 26 | <pre>no vad</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# no vad</p>   | Disables voice activity detection (VAD) for the calls using a particular dial peer.  |
| Step 27 | <pre>exit</pre> <p><b>Example:</b><br/>Router(config-dial-peer)# exit</p>   | Exits dial-peer configuration mode.  |

| Command or Action  | Purpose   |
|--|---|
| <p><b>Step 28</b> Repeat the commands from Step 20 through Step 26.</p> <p><b>Example:</b><br/> Router(config)# dial-peer voice 1 voip<br/> Router(config-dial-peer)# destination-pattern 4085552...<br/> Router(config-dial-peer)# session protocol sipv2<br/> Router(config-dial-peer)# session target<br/> Router(config-dial-peer)# ipv4:10.3.2.153<br/> Router(config-dial-peer)# dtmf-relay sip-notify<br/> Router(config-dial-peer)# codec g711ulaw<br/> Router(config-dial-peer)# no vad</p> | <p>Creates a second dial peer to Cisco Unity Express using an E.164 number.</p>   |
| <p><b>Step 29</b> <code>translate-outgoing called</code> <i>name-tag</i></p> <p><b>Example:</b><br/> Router(config-dial-peer)# translate-outgoing called 2</p>   | <p>Applies a translation rule to manipulate dialed digits on an outbound POTS or VoIP call leg.</p> <ul style="list-style-type: none"> <li>• <i>name-tag</i>—Tag number by which the rule set is referenced.</li> </ul> |
| <p><b>Step 30</b> <code>exit</code></p> <p><b>Example:</b><br/> Router(config-dial-peer)# exit</p>   | <p>Exits dial-peer configuration mode.</p>  |

# Configuration Examples for Integrating Cisco CME with Cisco Unity Express

This section provides the following configuration examples:

- [Single Router Configuration: Example, page 33](#)
- [WAN H.323 Configuration for Cisco CME Versions 3.2 and Higher: Example, page 35](#)
- [WAN H.323 Configuration for Cisco CME Versions 3.0 and 3.1: Example, page 36](#)

## Single Router Configuration: Example

The following example is for a single router running Cisco CME and Cisco Unity Express. The voice-mail number is 2000. The **destination-pattern** command under dial peer 1 assigns a set of phone numbers dedicated to applications such as Cisco Unity Express. If no other applications are going to be used, you could set the destination pattern to 2000 only.

The Cisco CME router interface is FastEthernet 0/0, and the IP address is 10.3.6.33. The Cisco Unity express IP address is 10.3.6.33. The service-engine interface is used to link the two IP addresses and the FastEthernet 0/0 and Service-Engine 0/0 ports.

Ephone-dn 1 through ephone-dn 9 forward busy and unanswered calls to voice-mail extension 2000. The MWI is switched on and off, respectively, by ephone-dn 30 and ephone-dn 31.

```
ip dhcp pool phone1
 host 10.40.0.11 255.255.0.0
 client-identifier 0100.0a41.2b7d.e9
 option 150 ip 10.40.0.1
 default-router 10.40.0.1

ip dhcp pool phone2
 host 10.40.0.12 255.255.0.0
 client-identifier 0100.09b7.f755.f5
 option 150 ip 10.40.0.1
 default-router 10.40.0.1

ip dhcp pool phone3
 host 10.40.0.13 255.255.0.0
 client-identifier 0100.0c30.de5e.a8
 option 150 ip 10.40.0.1
 default-router 10.40.0.1

!interface FastEthernet0/0
 ip address 10.3.6.33 255.255.0.0
 duplex auto
 speed auto

interface Service-Engine0/0
 ip unnumbered FastEthernet0/0
 service-module ip address 10.3.6.133 255.255.0.0
 service-module ip default-gateway 10.3.6.33
 hold-queue 60 out

interface FastEthernet0/1
 ip address 10.40.0.1 255.255.0.0
 duplex auto
 speed auto
```

```
ip classless
ip route 10.3.6.133 255.255.255.255 Service-Engine0/0
ip http server
ip http path flash:

dial-peer voice 1 voip
destination-pattern 2...
session protocol sipv2
session target ipv4:10.3.6.133
dtmf-relay sip-notify
codec g711ulaw
no vad

telephony-service
load 7960-7940 P00303010102
max-ephones 24
max-dn 48
ip source-address 10.40.0.1 port 2000
system message Welcome to CUE
create cnf-files version-stamp 7960 Jan 12 2004 16:00:52
voicemail 2000
max-conferences 8
web admin system name test password test
dn-webedit
time-webedit

ephone-dn 1
number 1001
description user1
name user1
call-forward busy 2000
call-forward noan 2000 timeout 10

ephone-dn 2
number 1002
description user2
name user2
call-forward busy 2000
call-forward noan 2000 timeout 10

ephone-dn 3
number 1003
description user3
name user3
call-forward busy 2000
call-forward noan 2000 timeout 10

ephone-dn 4
number 1004
description user4
name user4
call-forward busy 2000
call-forward noan 2000 timeout 10

ephone-dn 5
number 1005
description user5
name user5
call-forward busy 2000
call-forward noan 2000 timeout 10

ephone-dn 6
number 1006
description user6
```

```
name user6
call-forward busy 2000
call-forward noan 2000 timeout 10

ephone-dn 7
number 1007
call-forward busy 2000
call-forward noan 2000 timeout 10

ephone-dn 8
number 1008
call-forward busy 2000
call-forward noan 2000 timeout 10

ephone-dn 30
number 8000....
mwi on

ephone-dn 31
number 8001....
mwi off

ephone 1
username "user1" password null
mac-address 000A.412B.7DE9
type 7910
button 1:1

ephone 2
username "user2" password null
mac-address 0009.B7F7.55F5
type 7960
button 1:2 2:3 3:4 4:5 5:8

ephone 3
username "user3" password null
mac-address 000C.30DE.5EA8
button 1:6 2:7
```

## WAN H.323 Configuration for Cisco CME Versions 3.2 and Higher: Example

The following configuration example shows how to integrate a Cisco CME hosting Cisco Unity Express with WAN H.323 networks. For this configuration, a dial peer is created for the voice-mail pilot number (2000). Note that this dial peer is also necessary for a single-router configuration. The second dial peer is for incoming E.164 calls (4085552000) to voice mail. It enables callers from the PSTN to check voice mail and is optional. Translation rule 1 converts the E.164 voice-mail number to the voice-mail pilot number (2000), so the call can be sent to voice mail. Finally, H.323 calls are translated to SIP with the **allow-connections** command.

```
voice service voip
allow-connections h323 to sip

dial-peer voice 1 voip
description "SIP Dial Peer to Cisco Unity Express using four-digit number"
destination-pattern 2...
session protocol sipv2
session target ipv4:10.3.2.153
dtmf-relay sip-notify
codec g711ulaw
no vad
```

```

dial-peer voice 2 voip
description "SIP dial peer to Cisco Unity Express with E.164 translated to four-digit
number"
destination-pattern 4085552...
translate-outgoing called 1
session protocol sipv2
session target ipv4:10.3.2.153
dtmf-relay sip-notify
codec g711ulaw
no vad

voip-incoming translation-rule called 1

translation-rule 1
rule 1 4085552 2

```

## WAN H.323 Configuration for Cisco CME Versions 3.0 and 3.1: Example

The following configuration example shows how to integrate a Cisco CME hosting Cisco Unity Express with WAN H.323 networks. This configuration uses Cisco CME loopback ephone-dns to send WAN H.323 calls to Cisco Unity Express.

The voice-mail pilot number is 2000. The **destination-pattern** command under dial peer 1 assigns a set of phone numbers dedicated to applications such as Cisco Unity Express. If no other applications are going to be used, you could set the destination pattern to 2000 only.

The configuration includes three ephone-dns (ephone-dn 1 through ephone-dn 3) and three pairs of loopback ephone-dns (ephone-dns 20/21, ephone-dns 22/23, and ephone-dns 24/25).

All incoming calls starting with 408555 are transferred to loopback ephone-dns using translation rule 1, which prepends a 9 to the called numbers. The prepended number is picked up by a pair of available loopback ephone-dns with the highest preference. The loopback ephone-dns translate the WAN H.323 call to SIP and remove the prepended 9. Dial-plan pattern 1 converts the 10-digit E.164 number to an extension number, and the call reaches its intended destination, where it is answered, unanswered, or encounters a busy signal.

The **call-forward** command in ephone-dn configuration mode and dial-plan pattern 2 are required for facilitating the transfer of unanswered or busy calls to Cisco Unity Express voice mail. When calls are forwarded to voice mail, the **dialplan-pattern** command automatically expands the voice-mail pilot number to its matching E.164 format. Dial-peer 2 allows for the acceptance and transference of the E.164 number. Because Cisco Unity Express does not support E.164 pilot numbers, translation rule 2 converts the expanded number back to its extension equivalent.

```

ip dhcp pool Phone1
host 10.1.1.1 255.255.255.255
client-identifier 0100.09b7.f754.49
option 150 ip 10.1.1.100
default-router 10.1.1.100

ip dhcp pool Phone2
host 10.1.1.2 255.255.255.255
client-identifier 0100.0f34.87ee.75
default-router 10.1.1.100
option 150 ip 10.1.1.100

ip dhcp pool Phone3
host 10.1.1.3 255.255.255.255
client-identifier 0100.0943.6645.9d
default-router 10.1.1.100

```

```
option 150 ip 10.1.1.100

ip host host1 10.1.1.6
ip host host2 10.1.1.2
no ftp-server write-enable

voip-incoming translation-rule called 1

translation-rule 1
rule 1 ^408 9408

translation-rule 2
rule 1 4085552 2

interface GigabitEthernet0/0
ip address 10.3.2.53 255.255.0.0
duplex auto
speed auto

interface GigabitEthernet0/1
ip address 10.1.1.100 255.255.255.255
duplex auto
speed auto

interface Service-Engine1/0
ip unnumbered GigabitEthernet0/0
service-module ip address 10.3.2.153 255.255.0.0
service-module ip default-gateway 10.3.2.53

ip classless
ip route 0.0.0.0 0.0.0.0 10.3.0.1
ip route 10.3.2.153 255.255.255.255 Service-Engine1/0
ip http server
ip http path flash:

control-plane

dial-peer voice 1 voip
description "SIP Dial Peer to Cisco Unity Express using four-digit number"
destination-pattern 2...
session protocol sipv2
session target ipv4:10.3.2.153
dtmf-relay sip-notify
codec g711ulaw
no vad

dial-peer voice 2 voip
description "SIP dial peer to Cisco Unity Express with E.164 translated to four-digit number"
destination-pattern 4085552...
translate-outgoing called 2
session protocol sipv2
session target ipv4:10.3.2.153
dtmf-relay sip-notify
codec g711ulaw
no vad

telephony-service
max-ephones 5
max-dn 96
ip source-address 10.1.1.100 port 2000
create cnf-files version-stamp Jan 01 2002 00:00:00
dialplan-pattern 1 4085551... extension-length 4 extension-pattern 1...
dialplan-pattern 2 4085552... extension-length 4 extension-pattern 2...
voicemail 2000
```

```
max-conferences 8
web admin system name sysadmin password sysadmin

ephone-dn 1
number 1001
name user1
call-forward busy 2000
call-forward noan 2000 timeout 10

ephone-dn 2
number 1002
name user2
call-forward busy 2000
call-forward noan 2000 timeout 10

ephone-dn 3
number 1003
name user3
call-forward busy 2000
call-forward noan 2000 timeout 10

ephone-dn 10
number 8000....
mwi on

ephone-dn 11
number 8001....
mwi off

ephone-dn 20
number 9408555....
loopback-dn 21 forward 10
no huntstop

ephone-dn 21
number AA
loopback-dn 20

ephone-dn 22
number 9408555....
loopback-dn 23 forward 10
preference 1
no huntstop

ephone-dn 23
number AA
loopback-dn 22

ephone-dn 24
number 9408555....
loopback-dn 25 forward 10
preference 2
no huntstop

ephone-dn 25
number AA
loopback-dn 24

ephone 1
username "user1" password null
mac-address 0009.B7F7.5449
button 1:1

ephone 2
```

```

username "usar2" password null
mac-address 000F.3487.EE75
button 1:2

ephone 3
username "user3" password null
mac-address 0009.4366.459D
button 1:3

```

## Additional References

The following sections provide references related to configuring Cisco CallManager Express and Cisco Unity Express for WAN H.323 calls.

## Related Documents

| Related Topic  | Document Title   |
|--|--|
| Cisco Unity Express 1.0 and higher system administration | <a href="#">Cisco Unity Express Administrator Guide</a>              |
| Cisco CME System 3.0 and higher system administration    | <a href="#">Cisco CallManager Express System Administrator Guide</a> |
| Cisco CME System 3.0 and higher command reference        | <a href="#">Cisco CallManager Express Command Reference</a>          |
| Cisco IOS voice commands                                 | <a href="#">Cisco IOS Voice Command Reference, Release 12.3T</a>     |
| Cisco IOS commands                                       | <a href="#">Cisco IOS Commands Master List, Release 12.3</a>         |

## Standards

| Standards   | Title |
|---|-------|
| No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature. | —     |

## MIBs

| MIBs  | 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 locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:<br><a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a> |

## RFCs

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

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