



# Configuring Transcoding Resources

**Last Updated: March 12, 2009**

This chapter describes the transcoding support available in Cisco Unified Communications Manager Express (Cisco Unified CME).



**Note**

- To configure a DSP farm profile for multi-party ad hoc and meet-me conferencing in Cisco Unified CME 4.1 and later versions, see [“Meet-Me Conferencing in Cisco Unified CME 4.1 and Later versions” on page 952](#).
- To configure DSP farms for meet-me conferencing in Cisco CME 3.2 to Cisco Unified CME 4.0, see [“Meet-Me Conferencing in Cisco CME 3.2 to Cisco Unified CME 4.0” on page 953](#).

## Finding Feature Information in This Module

Your Cisco Unified CME version may not support all of the features documented in this module. For a list of the versions in which each feature is supported, see the [“Feature Information for Transcoding Resources” section on page 486](#).

## Contents

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## Prerequisites for Configuring Transcoding Resources

- Cisco Unified CME 3.2 or a later version.

# Restrictions for Configuring Transcoding Resources

- Before Cisco CME 3.2, only G.729 is supported for two-party voice calls.
- In Cisco CME 3.2 to Cisco Unified CME 4.0, transcoding between G.711 and G.729 does not support the following:
  - Meet-me conferencing
  - Multiple-party ad-hoc conferencing
  - Transcoding security

## Information About Transcoding Resources

To configure transcoding support, you should understand the following concepts:

- [Transcoding Support, page 450](#)
- [Transcoding When a Remote Phone Uses G.729r8, page 453](#)
- [Secure DSP Farm Transcoding, page 454](#)

## Transcoding Support

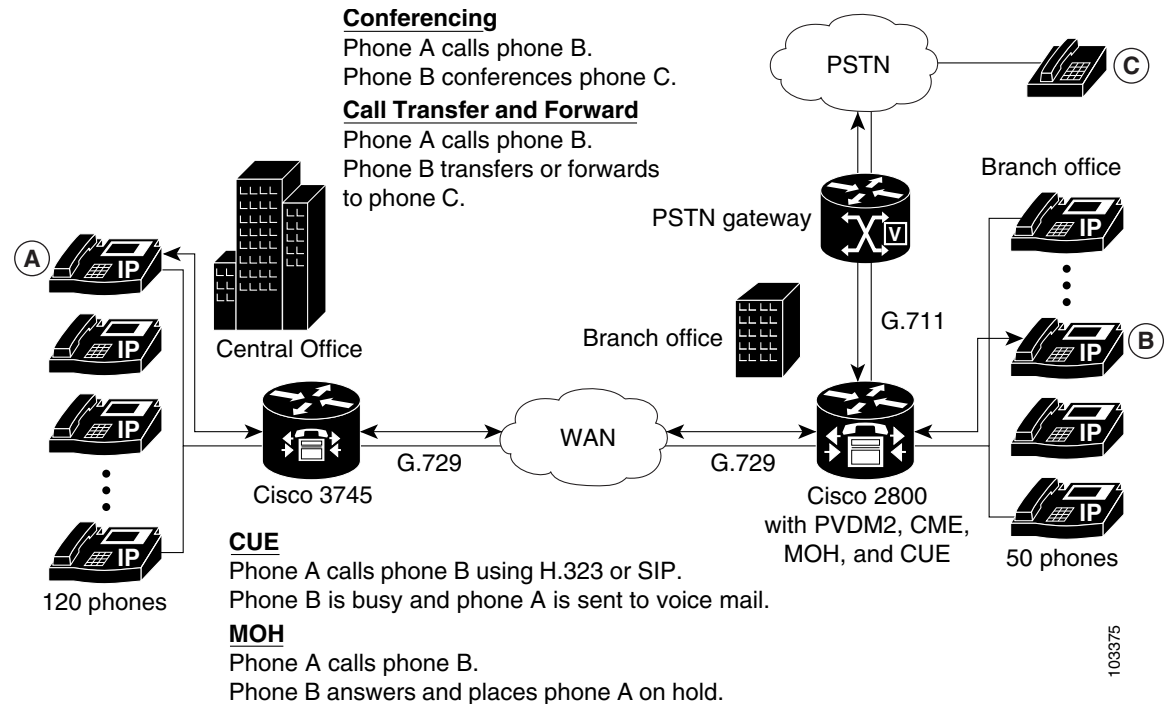
Transcoding compresses and decompresses voice streams to match endpoint-device capabilities. Transcoding is required when an incoming voice stream is digitized and compressed (by means of a codec) to save bandwidth, and the local device does not support that type of compression.

Cisco CME 3.2 and later versions support transcoding between G.711 and G.729 codecs for the following features:

- Ad hoc conferencing—One or more remote conferencing parties uses G.729.
- Call transfer and forward—One leg of a Voice over IP (VoIP)-to-VoIP hairpin call uses G.711 and the other leg uses G.729. A hairpin call is an incoming call that is transferred or forwarded over the same interface from which it arrived.
- Cisco Unity Express—An H.323 or SIP call using G.729 is forwarded to Cisco Unity Express. Cisco Unity Express supports only G.711, so G.729 must be transcoded.
- Music on hold (MOH)—The phone receiving MOH is part of a system that uses G.729. The G.711 MOH is transcoded into G.729 resulting in a poorer quality sound due to the lower compression of G.729.

Each of the preceding call situations is illustrated in [Figure 16](#).

**Figure 16** *Three-Way Conferencing, Call Transfer and Forward, Cisco Unity Express, and MOH Between G.711 and G.729*



Transcoding is facilitated through DSPs, which are located in network modules. All network modules have single inline memory module (SIMM) sockets or packet voice/data modules (PVDM) slots that each hold a Packet Voice DSP Module (PVDM). Each PVDM holds DSPs. A router can have multiple network modules.

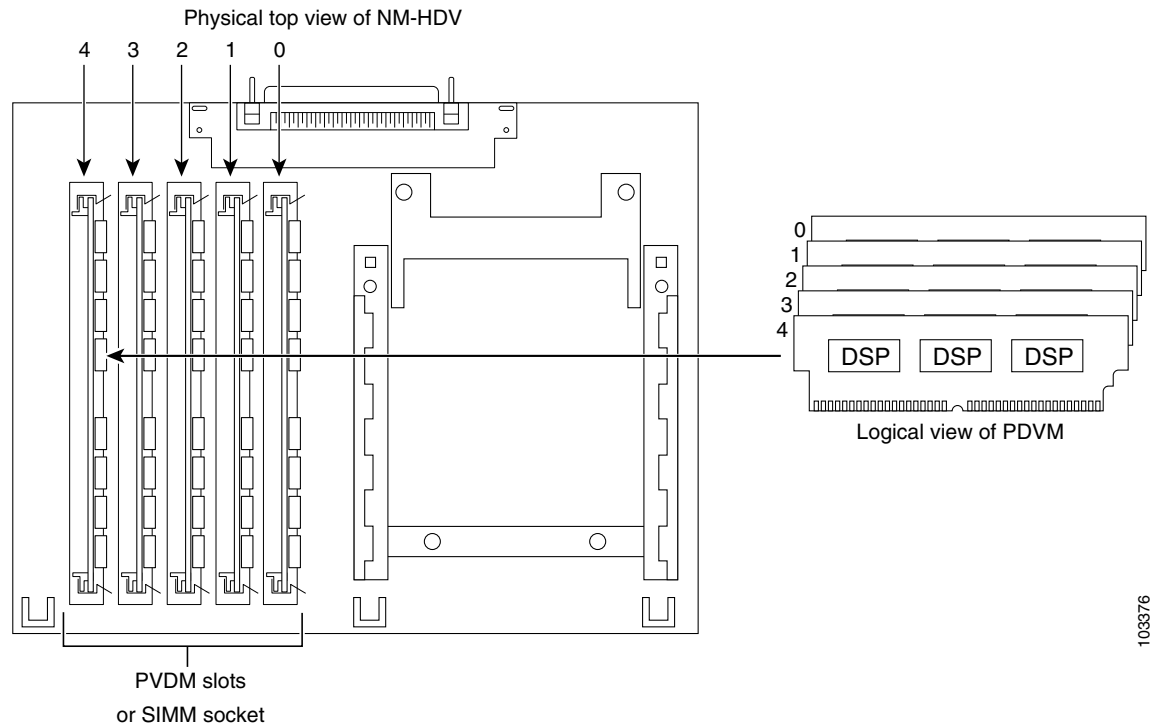
Cisco Unified CME routers and external voice routers on the same LAN must be configured with digital signal processors (DSPs) that support transcoding. DSPs reside either directly on a voice network module, such as the NM-HD-2VE, on PVDM2s that are installed in a voice network module, such as the NM-HDV2, or on PVDM2s that are installed directly onto the motherboard, such as on the Cisco 2800 and 3800 series voice gateway routers.

- DSPs on the NM-HDV, NM-HDV2, NM-HD-1V, NM-HD-2V, and NM-HD-2VE can be configured for transcoding.
- PVDM2-xx on the Cisco 2800 series and the Cisco 3800 series motherboards can also be configured for transcoding.

Transcoding of G.729 calls to G.711 allows G.729 calls to participate in existing G.711 software-based, three-party conferencing, thus eliminating the need to divide DSPs between transcoding and conferencing.

Figure 17 shows an NM-HDV with five SIMM sockets or PVDM slots that each hold a 12-Channel PVDM (PVDM-12). Each PVDM-12 holds three TI 549 DSPs. Each DSP supports four channels.

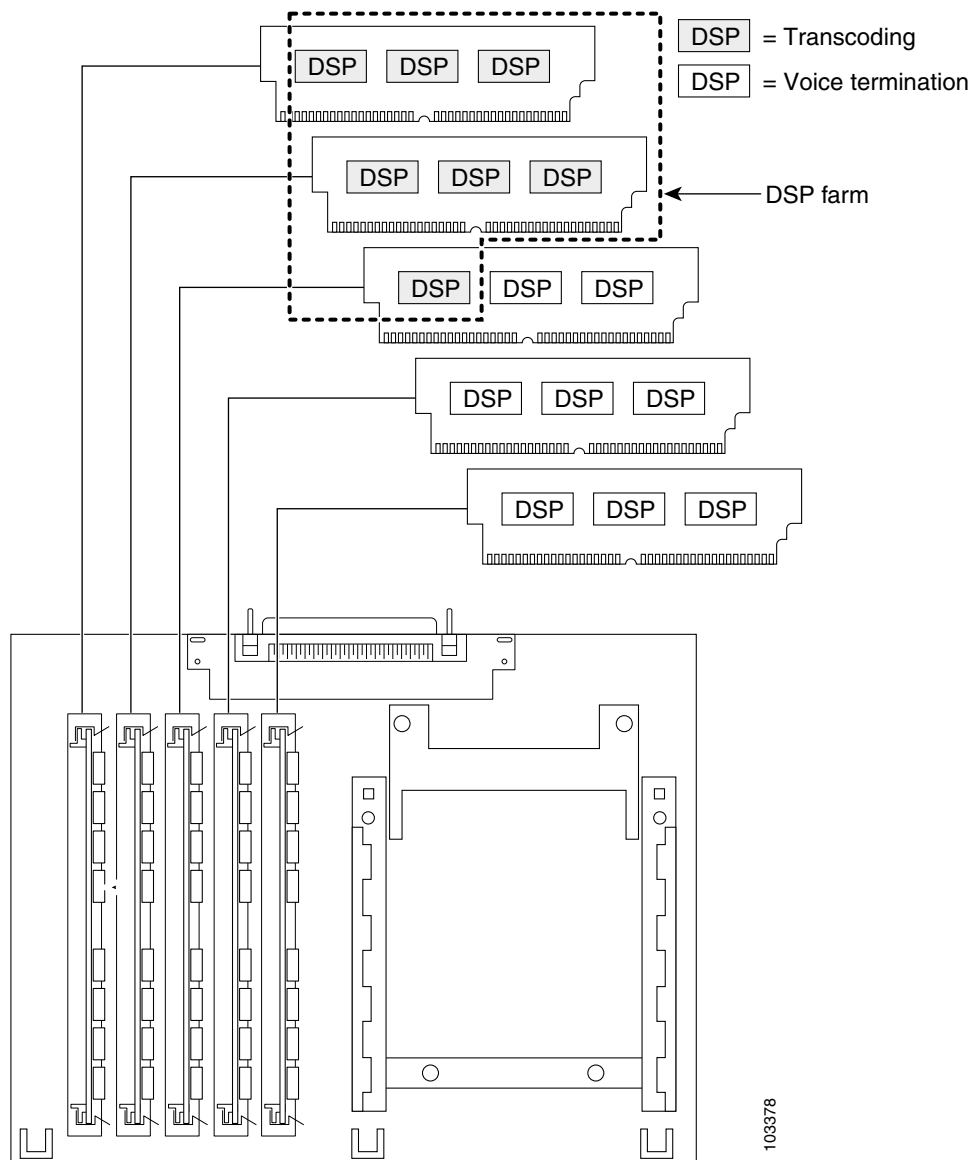
**Figure 17** *NM-HDV Supports Up to Five PVDMs*



Use DSP resources to provide voice termination of the digital voice trunk group or resources for a DSP farm. DSP resources available for transcoding and not used for voice termination are referred to as a DSP farm. Figure 18 shows a DSP farm managed by Cisco Unified CME.

Figure 18

DSP Farm



## Transcoding When a Remote Phone Uses G.729r8

A situation in which transcoding resources may be used is when you use the **codec** command to select the G.729r8 codec to help save network bandwidth for a remote IP phone. If a conference is initiated, all phones in the conference switch to G.711 mu-law. To allow the phone to retain its G.729r8 codec setting when joined to a conference, you can use the **codec g729r8 dspfarm-assist** command to specify that this phone's calls should use the resources of a DSP farm for transcoding. For example, there are two remote phones (A and B) and a local phone (C) that initiates a conference with them. Both A and B are configured to use the G.729r8 codec with the assistance of the DSP-farm transcoder. In the conference, the call leg from C to the conference uses the G.711 mu-law codec, and the call legs from A and B to the Cisco Unified CME router use the G.729r8 codec.

Consider your options carefully when deciding to use the **codec g729r8 dspfarm-assist** command. The benefit is that it allows calls to use the G.729r8 codec on the call leg between the IP phone and the Cisco Unified CME router, which saves network bandwidth. The disadvantage is that for situations requiring G.711 codecs, such as conferencing and Cisco Unity Express, DSP resources that are possibly scarce are used to transcode the call, and delay is introduced while voice is shuttled to and from the DSP. In addition, the overuse of this feature can mask configuration errors in the codec selection mechanisms involving dial peers and codec lists.

Therefore, we recommend using the **codec g729r8 dspfarm-assist** command sparingly and only when absolutely required for bandwidth savings or when you know the phone will be participating very little, if at all, in calls that require a G.711 codec.

Because of how Cisco Unified CME uses voice channels with Skinny Client Control Protocol (SCCP) endpoints, you must configure at least two available transcoding sessions when establishing a call that requires transcoding configured with the **codec g729r8 dspfarm-assist** command. Only one session is used after the voice path is established with transcoding. However, during the SCCP manipulations, a temporary session may be allocated. If this temporary session cannot be allocated, the transcoding request is not honored, and the call continues with the G.711 codec.

If the **codec g729r8 dspfarm-assist** command is configured for a phone and a DSP resource is not available when needed for transcoding, a phone registered to the local Cisco Unified CME router will use G.711 instead of G.729r8. This is not true for nonSCCP call legs; if DSP resources are not available for the transcoding required for a conference, for example, the conference is not created.

## Secure DSP Farm Transcoding

Cisco Unified CME uses the secure transcoding DSP farm capability only in the case described in the [“Transcoding When a Remote Phone Uses G.729r8” section on page 453](#). If a call using the **codec g729r8 dspfarm-assist** command is secure, Cisco Unified CME looks for a secure transcoding resource. If it cannot find one, transcoding is not done. If the call is not secure, Cisco Unified CME looks for a nonsecure transcoding resource. If it cannot find one, Cisco Unified CME looks for a secure transcoding resource. Even if Cisco Unified CME uses a secure transcoding resource, the call is not secure, and a more expensive secure DSP Farm resource is not needed for a nonsecure call because Cisco Unified CME cannot find a less expensive nonsecure transcoder.

## How to Configure Transcoding Resources

This section contains the following tasks:

- [Determining DSP Resource Requirements for Transcoding, page 455](#) (required)
- [Provisioning Network Modules or PVDMS for Transcoding, page 455](#) (required)

### DSP Farms for NM-HDs and NM-HDV2s

- [Configuring DSP Farms for NM-HDs and NM-HDV2s, page 456](#) (required)

### DSP Farms for NM-HDVs

- [Configuring DSP Farms for NM-HDVs, page 461](#) (required)
- [Configuring the Cisco Unified CME Router to Act as the DSP Farm Host, page 463](#) (required)
- [Modifying DSP Farms for NM-HDVs After Upgrading Cisco IOS Software, page 466](#) (optional)
- [Modifying the Number of Transcoding Sessions for NM-HDVs, page 467](#) (optional)

- [Tuning DSP-Farm Performance on an NM-HDV, page 468](#) (optional)
- [Verifying DSP Farm Operation, page 469](#) (optional)

#### DSP Farms with Cisco Unified CME 4.2 and Later Versions

- [Registering the DSP Farm with Cisco Unified CME 4.2 or a Later Version in Secure Mode, page 473](#) (optional)

## Determining DSP Resource Requirements for Transcoding

To determine if there are enough DSPs available on your router for transcoding services, perform the following steps.



#### Note

For more information about DSP resources for transcoding, see the [“Allocation of DSP Resources”](#) section in the “Configuring Enhanced Conferencing and Transcoding for Voice Gateway Routers” chapter of the [Cisco Unified Communications Manager and Cisco IOS Interoperability Guide](#).

### SUMMARY STEPS

1. **show voice dsp**
2. **show sdspfarm sessions**
3. **show sdspfarm units**

### DETAILED STEPS

- |               |   |
|---------------|---|
| <b>Step 1</b> | Use the <b>show voice dsp</b> command to display current status of digital signal processor (DSP) voice channels. |
| <b>Step 2</b> | Use the <b>show sdspfarm sessions</b> command to display the number of transcoder sessions that are active.       |
| <b>Step 3</b> | Use the <b>show sdspfarm units</b> command to display the number of DSP farms that are configured.                |

## Provisioning Network Modules or PVDMs for Transcoding

DSPs can reside directly on any one of the following:

- A voice network module, such as the NM-HD-2VE,
- PVDM2s that are installed in a voice network module, such as the NM-HDV2. A single network module can hold up to five PVDMs.
- PVDM2s that are installed directly onto the motherboard, such as on the Cisco 2800 and 3800 series voice gateway routers.

You must determine the number of PVDM2s or network modules that are required to support your conferencing and transcoding services and install the modules on your router.

## SUMMARY STEPS

1. Determine performance requirements.
2. Determine the number of DSPs that are required.
3. Determine the number of DSPs that are supportable.
4. Verify your solution.
5. Install hardware

## DETAILED STEPS

- 
- |               |   |
|---------------|---|
| <b>Step 1</b> | Determine the number of transcoding sessions that your router must support.   |
| <b>Step 2</b> | <p>Determine the number of DSPs that are required to support transcoding sessions. See Table 5 and Table 6 in the “Allocation of DSP Resources” section of the “Configuring Enhanced Conferencing and Transcoding for Voice Gateway Routers” chapter of the <i>Cisco Unified Communications Manager and Cisco IOS Interoperability Guide</i>.</p> <p>If voice termination is also required, determine the additional number of DSPs required.</p> <p>For example: 16 transcoding sessions (30-ms packetization) and 4 G.711 voice calls require two DSPs.</p> |
| <b>Step 3</b> | Determine the maximum number of NMs or NM farms that your router can support by using Table 4 in the “Allocation of DSP Resources” section of the “Configuring Enhanced Conferencing and Transcoding for Voice Gateway Routers” chapter of the <i>Cisco Unified Communications Manager and Cisco IOS Interoperability Guide</i> .   |
| <b>Step 4</b> | Ensure that your requirements fall within router capabilities, taking into account whether your router supports multiple NMs or NM farms. If necessary, reassess performance requirement.   |
| <b>Step 5</b> | Install PVDMs, NMs, and NM farms as needed. See the “Connecting Voice Network Modules” chapter in the <i>Cisco Network Modules Hardware Installation Guide</i> .  |
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## What to Do Next

Perform one of the following options, depending on the type of network module to be configured:

- To set up DSP farms on NM-HDs and NM-HDV2s, see the “Configuring DSP Farms for NM-HDs and NM-HDV2s” section on page 456.
- To set up DSP farms for NM-HDVs, see the “Configuring DSP Farms for NM-HDVs” section on page 461.

## Configuring DSP Farms for NM-HDs and NM-HDV2s

To configure DSP farms for NM-HDs or NM-HDV2s and to configure secure transcoding profiles, perform the following procedure.

## SUMMARY STEPS

1. **enable**
2. **configure terminal**



3. **voice-card** *slot*
4. **dsp services dspfarm**
5. **exit**
6. **sccp local** *interface-type interface-number*
7. **sccp ccm** *ip-address identifier identifier-number*
8. **sccp**
9. **sccp ccm group** *group-number*
10. **bind interface** *interface-type interface-number*
11. **associate ccm** *identifier-number priority priority-number*
12. **associate profile** *profile-identifier register device-name*
13. **keepalive retries** *number*
14. **switchover method** {**graceful** | **immediate**}
15. **switchback method** {**graceful** | **guard** *timeout-guard-value* | **immediate** | **uptime** *uptime-timeout-value*}
16. **switchback interval** *seconds*
17. **exit**
18. **dspfarm profile** *profile-identifier transcode* [*security*]
19. **trustpoint** *trustpoint-label*
20. **codec** *codec-type*
21. **maximum sessions** *number*
22. **associate application sccp**
23. **end**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>voice-card</b> <i>slot</i>  <b>Example:</b> Router(config)# voice-card 1	Enters voice-card configuration mode for the network module on which you want to enable DSP-farm services.
Step 4	<b>dsp services dspfarm</b>  <b>Example:</b> Router(config-voicecard)# dsp services dspfarm	Enables DSP-farm services for the voice card.

	Command or Action	Purpose
Step 5	<b>exit</b>  <b>Example:</b> Router(config-voicecard)# exit	Exits voice-card configuration mode.
Step 6	<b>sccp local interface-type interface-number</b>  <b>Example:</b> Router(config)# sccp local FastEthernet 0/0	<p>Selects the local interface that the SCCP applications (transcoding and conferencing) should use to register with Cisco Unified CME.</p> <ul style="list-style-type: none"> <li><i>interface-type</i>—Interface type that the SCCP application uses to register with Cisco Unified CME. The type can be an interface address or a virtual-interface address such as Ethernet.</li> <li><i>interface-number</i>—Interface number that the SCCP application uses to register with Cisco Unified CME.</li> </ul>
Step 7	<b>sccp ccm ip-address identifier identifier-number</b>  <b>Example:</b> Router(config)# sccp ccm 10.10.10.1 identifier 1	<p>Specifies the Cisco Unified CME address.</p> <ul style="list-style-type: none"> <li><i>ip-address</i>—IP address of the Cisco Unified CME router.</li> <li><b>identifier identifier-number</b>—Number that identifies the Cisco Unified CME router.</li> <li>Repeat this step to specify the address of a secondary Cisco Unified CME router.</li> </ul>
Step 8	<b>sccp</b>  <b>Example:</b> Router(config)# sccp	Enables SCCP and its associated transcoding and conferencing applications.
Step 9	<b>sccp ccm group group-number</b>  <b>Example:</b> Router(config)# sccp ccm group 1	<p>Creates a Cisco Unified CME group and enters SCCP configuration mode for Cisco Unified CME.</p> <ul style="list-style-type: none"> <li><i>group-number</i>—Number that identifies the Cisco Unified CME group.</li> </ul> <p><b>Note</b> A Cisco Unified CME group is a naming device under which data for the DSP farms is declared. Only one group is required.</p>
Step 10	<b>bind interface interface-type interface-number</b>  <b>Example:</b> Router(config-sccp-ccm)# bind interface FastEthernet 0/0	<p>(Optional) Binds an interface to a Cisco Unified CME group so that the selected interface is used for all calls that belong to the profiles that are associated to this Cisco Unified CME group.</p> <ul style="list-style-type: none"> <li>This command is optional, but we recommend it if you have more than one profile or if you are on different subnets, to ensure that the correct interface is selected.</li> </ul>

	Command or Action	Purpose
Step 11	<b>associate ccm</b> <i>identifier-number</i> <b>priority</b> <i>priority-number</i>  <b>Example:</b> Router(config-sccp-ccm)# associate ccm 1 priority 1	Associates a Cisco Unified CME router with a group and establishes its priority within the group. <ul style="list-style-type: none"> <li><i>identifier-number</i>—Number that identifies the Cisco Unified CME router. See the <b>sccp ccm</b> command in <a href="#">Step 7</a>.</li> <li><b>priority</b>—The priority of the Cisco Unified CME router in the Cisco Unified CME group. Only one Cisco Unified CME group is possible. Default: 1.</li> </ul>
Step 12	<b>associate profile</b> <i>profile-identifier</i> <b>register</b> <i>device-name</i>  <b>Example:</b> Router(config-sccp-ccm)# associate profile 1 register mtp000a8eaca80	Associates a DSP farm profile with a Cisco Unified CME group. <ul style="list-style-type: none"> <li><i>profile-identifier</i>—Number that identifies the DSP farm profile.</li> <li><i>device-name</i>—MAC address with the “mtp” prefix added, where the MAC address is the burnt-in address of the physical interface that is used to register as the SCCP device.</li> </ul>
Step 13	<b>keepalive retries</b> <i>number</i>  <b>Example:</b> Router(config-sccp-ccm)# keepalive retries 5	Sets the number of keepalive retries from SCCP to Cisco Unified CME. <ul style="list-style-type: none"> <li><i>number</i>—Number of keepalive attempts. Range: 1 to 32. Default: 3.</li> </ul>
Step 14	<b>switchover method</b> [ <b>graceful</b>   <b>immediate</b> ]  <b>Example:</b> Router(config-sccp-ccm)# switchover method immediate	Sets the switchover method that the SCCP client uses when its communication link to the active Cisco Unified CME system goes down. <ul style="list-style-type: none"> <li><b>graceful</b>—Switchover happens only after all the active sessions have been terminated gracefully.</li> <li><b>immediate</b>—Switches over to any one of the secondary Cisco Unified CME systems immediately.</li> </ul>
Step 15	<b>switchback method</b> [ <b>graceful</b>   <b>guard</b> <i>timeout-guard-value</i>   <b>immediate</b>   <b>uptime</b> <i>uptime-timeout-value</i> ]  <b>Example:</b> Router(config-sccp-ccm)# switchback method immediate	Sets the switch back method that the SCCP client uses when the primary or higher priority Cisco Unified CME becomes available again. <ul style="list-style-type: none"> <li><b>graceful</b>—Switchback happens only after all the active sessions have been terminated gracefully.</li> <li><b>guard</b> <i>timeout-guard-value</i>—Switchback happens either when the active sessions have been terminated gracefully or when the guard timer expires, whichever happens first. Timeout value is in seconds. Range: 60 to 172800. Default: 7200.</li> <li><b>immediate</b>—Switches back to the higher order Cisco Unified CME immediately when the timer expires, whether there is an active connection or not.</li> <li><b>uptime</b> <i>uptime-timeout-value</i>—Initiates the uptime timer when the higher-order Cisco Unified CME system comes alive. Timeout value is in seconds. Range: 60 to 172800. Default: 7200.</li> </ul>

	Command or Action	Purpose
Step 16	<b>switchback interval</b> <i>seconds</i>  <b>Example:</b> Router(config-sccp-ccm)# switchback interval 5	Sets the amount of time that the DSP farm waits before polling the primary Cisco Unified CME system when the current Cisco Unified CME switchback connection fails. <ul style="list-style-type: none"> <li><i>seconds</i>—Timer value, in seconds. Range: 1 to 3600. Default: 60.</li> </ul>
Step 17	<b>exit</b>  <b>Example:</b> Router(config-sccp-ccm)# exit	Exits SCCP configuration mode.
Step 18	<b>dspfarm profile</b> <i>profile-identifier</i> <b>transcode</b> [ <b>security</b> ]  <b>Example:</b> Router(config)# dspfarm profile 1 transcode security	Enters DSP farm profile configuration mode and defines a profile for DSP farm services. <ul style="list-style-type: none"> <li><i>profile-identifier</i>—Number that uniquely identifies a profile. Range: 1 to 65535.</li> <li><b>transcode</b>—Enables profile for transcoding.</li> <li><b>security</b>—Enables secure DSP farm services. This keyword is supported in Cisco Unified CME 4.2 and later versions.</li> </ul>
Step 19	<b>trustpoint</b> <i>trustpoint-label</i>  <b>Example:</b> Router(config-dspfarm-profile)# trustpoint dspfarm	(Optional) Associates a trustpoint with a DSP farm profile.
Step 20	<b>codec</b> <i>codec-type</i>  <b>Example:</b> Router(config-dspfarm-profile)# codec g711ulaw	Specifies the codecs supported by a DSP farm profile. <ul style="list-style-type: none"> <li><i>codec-type</i>—Specifies the preferred codec. Type ? for a list of supported codecs.</li> <li>Repeat this step for each supported codec.</li> </ul>
Step 21	<b>maximum sessions</b> <i>number</i>  <b>Example:</b> Router(config-dspfarm-profile)# maximum sessions 5	Specifies the maximum number of sessions that are supported by the profile. <ul style="list-style-type: none"> <li><i>number</i>—Number of sessions supported by the profile. Range: 0 to X. Default: 0.</li> <li>The X value is determined at run time depending on the number of resources available with the resource provider.</li> </ul>
Step 22	<b>associate application</b> <b>sccp</b>  <b>Example:</b> Router(config-dspfarm-profile)# associate application sccp	Associates SCCP with the DSP farm profile.
Step 23	<b>end</b>  <b>Example:</b> Router(config-dspfarm-profile)# end	Returns to privileged EXEC mode.

## What to Do Next

- To register the DSP Farm to Cisco Unified CME in secure mode, see the [“Registering the DSP Farm with Cisco Unified CME 4.2 or a Later Version in Secure Mode”](#) section on page 473

## Configuring DSP Farms for NM-HDVs

To configure DSP farms for NM-HDVs, perform the following steps.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice-card** *slot*
4. **dsp services dspfarm**
5. **exit**
6. **sccp local** *interface-type interface-number*
7. **sccp ccm** *ip-address priority priority-number*
8. **sccp**
9. **dspfarm transcoder maximum sessions** *number*
10. **dspfarm**
11. **end**

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"><li>• Enter your password if prompted.</li></ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>voice-card</b> <i>slot</i>  <b>Example:</b> Router(config)# voice-card 1	Enters voice-card configuration mode and identifies the slot in the chassis in which the NM-HDV or NM-HDV farm is located.
Step 4	<b>dsp services dspfarm</b>  <b>Example:</b> Router(config-voicecard)# dsp services dspfarm	Enables DSP-farm services on the NM-HDV or NM-HDV farm.

	Command or Action	Purpose
Step 5	<b>exit</b>  <b>Example:</b> Router(config-voicecard)# exit	Returns to global configuration mode.
Step 6	<b>sccp local interface-type interface-number</b>  <b>Example:</b> Router(config)# sccp local FastEthernet 0/0	Selects the local interface that the SCCP applications (transcoding and conferencing) should use to register with Cisco Unified CME. <ul style="list-style-type: none"> <li><i>interface-type</i>—Interface type that the SCCP application uses to register with Cisco Unified CME. The type can be an interface address or a virtual-interface address such as Ethernet.</li> <li><i>interface-number</i>—Interface number that the SCCP application uses to register with Cisco Unified CME.</li> </ul>
Step 7	<b>sccp ccm ip-address priority priority-number</b>  <b>Example:</b> Router(config)# sccp ccm 10.10.10.1 priority 1	Specifies the Cisco Unified CME address. <ul style="list-style-type: none"> <li><i>ip-address</i>—IP address of the Cisco Unified CME router.</li> <li><b>priority priority</b>—Priority of the Cisco Unified CME router relative to other connected routers. Range: 1 (highest) to 4 (lowest).</li> </ul>
Step 8	<b>sccp</b>  <b>Example:</b> Router(config)# sccp	Enables SCCP and its associated transcoding and conferencing applications.
Step 9	<b>dspfarm transcoder maximum sessions number</b>  <b>Example:</b> Router(config)# dspfarm transcoder maximum sessions 12	Specifies the maximum number of transcoding sessions to be supported by the DSP farm. A DSP can support up to four transcoding sessions.  <b>Note</b> When you assign this value, take into account the number of DSPs allocated for conferencing services.
Step 10	<b>dspfarm</b>  <b>Example:</b> Router(config)# dspfarm	Enables the DSP farm.
Step 11	<b>end</b>  <b>Example:</b> Router(config)# end	Returns to privileged EXEC mode.

## Configuring the Cisco Unified CME Router to Act as the DSP Farm Host

To configure the Cisco Unified CME router to act as the DSP farm host, perform the following tasks.

- [Determining DSP Resource Requirements for Transcoding, page 455](#)
- [Setting the Cisco Unified CME Router to Receive IP Phone Messages, page 463](#)
- [Configuring the Cisco Unified CME Router to Act as the DSP Farm Host, page 463](#)

### Determining the Maximum Number of Transcoder Sessions

To determine the maximum number of transcoder sessions that can occur at one time perform the following steps.

#### SUMMARY STEPS

1. **dspfarm transcoder maximum sessions**
2. **show sdspfarm sessions**
3. **show sdspfarm units**
4. Determine maximum number of transcoder sessions based on values in steps 2 and 3.

#### DETAILED STEPS

- 
- |               |   |
|---------------|---|
| <b>Step 1</b> | Use the <b>dspfarm transcoder maximum sessions</b> command to set the maximum number of transcoder sessions you have configured.  |
| <b>Step 2</b> | Use the <b>show sdspfarm sessions</b> command to display the number of transcoder sessions that are active.   |
| <b>Step 3</b> | Use the <b>show sdspfarm units</b> command to display the number of DSP farms that are configured.  |
| <b>Step 4</b> | Obtain the maximum number of transcoder sessions by multiplying the number of transcoder sessions from Step 2 (configured in Step 1 using the <b>dspfarm transcoder maximum sessions</b> command) by the number of DSP farms from Step 3. |
- 

### Setting the Cisco Unified CME Router to Receive IP Phone Messages

To set the Cisco Unified CME router to receive IP phone messages, perform the following steps.

**Note**

You can unregister all active calls' transcoding streams with the **sdspfarm unregister force** command.

#### Prerequisites

Identify the MAC address of the SCCP client interface. For example, if you have the following configuration:

```
interface FastEthernet 0/0
 ip address 10.5.49.160 255.255.0.0
 .
 .
 .
```

```
sccp local FastEthernet 0/0
sccp
```

The **show interface FastEthernet 0/0** command will yield a MAC address. In the following example, the MAC address of the Fast Ethernet interface is 000a.8aea.ca80:

```
Router# show interface FastEthernet 0/0
.
.
.
FastEthernet0/0 is up, line protocol is up
Hardware is AmdFE, address is 000a.8aea.ca80 (bia 000a.8aea.ca80)
```

SUMMARY STEPS

- 1. enable
- 2. configure terminal
- 3. telephony-service
- 4. ip source-address ip-address [port port] [any-match | strict-match]
- 5. sdspfarm units number
- 6. sdspfarm transcode sessions number
- 7. sdspfarm tag number device-number
- 8. end

DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"><li>• Enter your password if prompted.</li></ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.



	Command or Action	Purpose
Step 3	<b>telephony-service</b>	Enters telephony-service configuration mode.
	<b>Example:</b> Router(config)# telephony-service	
Step 4	<b>ip source-address</b> <i>ip-address</i> [ <b>port</b> <i>port</i> ] [ <b>any-match</b>   <b>strict-match</b> ]	Enables a router to receive messages from Cisco Unified IP phones through the router's IP addresses and ports. <ul style="list-style-type: none"> <li><i>address</i>—Range: 0 to 5. Default: 0.</li> <li><b>port port</b>—(Optional) TCP/IP port used for SCCP. Default: 2000.</li> <li><b>any-match</b>—(Optional) Disables strict IP address checking for registration. This is the default.</li> <li><b>strict-match</b>—(Optional) Requires strict IP address checking for registration.</li> </ul>
	<b>Example:</b> Router(config-telephony)# ip source address 10.10.10.1 port 3000	
Step 5	<b>sdspfarm units</b> <i>number</i>	Specifies the maximum number of DSP farms that are allowed to be registered to the SCCP router. <ul style="list-style-type: none"> <li><i>number</i>—Range: 0 to 5. Default: 0.</li> </ul>
	<b>Example:</b> Router(config-telephony)# sdspfarm units 4	
Step 6	<b>sdspfarm transcode sessions</b> <i>number</i>	Specifies the maximum number of transcoder sessions for G.729 allowed by the Cisco Unified CME router. <ul style="list-style-type: none"> <li>One transcoder session consists of two transcoding streams between callers using transcode. Use the maximum number of transcoding sessions and conference calls that you want your router to support at one time.</li> <li><i>number</i>—See the <a href="#">“Determining the Maximum Number of Transcoder Sessions”</a> section on page 463. Range: 0 to 128. Default: 0.</li> </ul>
	<b>Example:</b> Router(config-telephony)# sdspfarm transcode sessions 40	
Step 7	<b>sdspfarm tag</b> <i>number device-name</i>	Permits a DSP farm unit to be registered to Cisco Unified CME and associates it with an SCCP client interface's MAC address. <ul style="list-style-type: none"> <li>Required only if you blocked automatic registration by using the <b>auto-reg-ephone</b> command.</li> <li><i>number</i>—The tag number. Range: 1 to 5.</li> <li><i>device-name</i>—MAC address of the SCCP client interface with the “MTP” prefix added.</li> </ul>
	<b>Example:</b> Router(config-telephony)# sdspfarm tag 1 mtp000a8eaca80 or Router(config-telephony)# sdspfarm tag 1 MTP000a8eaca80	
Step 8	<b>end</b>	Returns to privileged EXEC mode.
	<b>Example:</b> Router(config-telephony)# end	

## Configuring the Cisco Unified CME Router to Host a Secure DSP Farm

You must configure the Media Encryption Secure Real-Time Transport Protocol (SRTP) feature in the Cisco Unified CME 4.2 and later versions, making it a secure Cisco Unified CME, before it can host a secure DSP farm. See [“Configuring Security” on page 581](#) for information on configuring a secure Cisco Unified CME.

## Modifying DSP Farms for NM-HDVs After Upgrading Cisco IOS Software

To ensure continued support for existing DSP farms for NM-HDVs configured after upgrading the Cisco IOS software on your Cisco router, perform the following steps.



### Note

Perform this task if previously-configured DSP farms for NM-HDVs fail to register to Cisco Unified CME after you upgrade the Cisco IOS software release.

## Prerequisites

Confirm that device name for a dspfarm tag in telephony-service configuration is lower case by using the **show-running configuration** command.

Example:

```
Router#show-running configuration
Building configuration...
.
.
.
!
telephony-service
max-ephones 2
max-dn 20
ip source-address 142.103.66.254 port 2000
auto assign 1 to 2
system message Your current options
sdspfarm units 2
sdspfarm transcode sessions 16
sdspfarm tag 1 mtp00164767cc20 !<===Device name is MAC address with lower-case "mtp"
prefix
.
.
.
```

## SUMMARY STEPS

1. enable
2. configure terminal
3. no sdspfarm tag *number*
4. sdspfarm tag *number device-name*
5. end

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>no sdspfarm tag number</b>  <b>Example:</b> Router(config)# no sdspfarm tag 1	Disables the DSP farm.
Step 4	<b>sdspfarm tag number device-name</b>  <b>Example:</b> Router(config)# sdspfarm tag 1 MTP00164767cc20	Permits a digital-signal-processor (DSP) farm to be registered to Cisco Unified CME and associates it with a SCCP client interface's MAC address. <ul style="list-style-type: none"> <li>Required only if you blocked automatic registration by using the <b>auto-reg-ephone</b> command.</li> <li><i>device-name</i>—MAC address of the SCCP client interface with the “MTP” prefix added.</li> </ul>
Step 5	<b>dspfarm</b>  <b>Example:</b> Router(config)# dspfarm	Enables the DSP farm.
Step 6	<b>end</b>  <b>Example:</b> Router(config)# end	Returns to privileged EXEC mode.

## Modifying the Number of Transcoding Sessions for NM-HDVs

To modify the maximum number of transcoding sessions for NM-HDVs, perform the following steps.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **no dspfarm**
4. **dspfarm transcoder maximum sessions number**
5. **dspfarm**
6. **end**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>no dspfarm</b>  <b>Example:</b> Router(config)# no dspfarm	Disables the DSP farm.
Step 4	<b>dspfarm transcoder maximum sessions</b> <i>number</i>  <b>Example:</b> Router(config)# dspfarm transcoder maximum sessions 12	Specifies the maximum number of transcoding sessions to be supported by the DSP farm.
Step 5	<b>dspfarm</b>  <b>Example:</b> Router(config)# dspfarm	Enables the DSP farm.
Step 6	<b>end</b>  <b>Example:</b> Router(config)# end	Returns to privileged EXEC mode.

## Tuning DSP-Farm Performance on an NM-HDV

To tune DSP farm performance, perform the following steps.

## SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **scp ip precedence** *value*
4. **dspfarm rtp timeout** *seconds*
5. **dspfarm connection interval** *seconds*
6. **end**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>sccp ip precedence value</b>  <b>Example:</b> Router(config)# sccp ip precedence 5	(Optional) Sets the IP precedence value to increase the priority of voice packets over connections controlled by SCCP.
Step 4	<b>dsppfarm rtp timeout seconds</b>  <b>Example:</b> Router(config)# dsppfarm rtp timeout 60	(Optional) Configures the Real-Time Transport Protocol (RTP) timeout interval if the error condition “RTP port unreachable” occurs.
Step 5	<b>dsppfarm connection interval seconds</b>  <b>Example:</b> Router(config)# dsppfarm connection interval 60	(Optional) Specifies how long to monitor RTP inactivity before deleting an RTP stream.
Step 6	<b>end</b>  <b>Example:</b> Router(config)# end	Returns to privileged EXEC mode.

## Verifying DSP Farm Operation

To verify that the DSP farm is registered and running, perform the following steps in any order.

### SUMMARY STEPS

1. **show sccp [statistics | connections]**
2. **show dsppfarm units**
3. **show dsppfarm sessions**
4. **show dsppfarm sessions summary**
5. **show dsppfarm sessions active**
6. **show sccp connections details**
7. **debug sccp {all | errors | events | packets | parser}**
8. **debug dsppfarm {all | errors | events | packets}**
9. **debug ephone mtp**

## DETAILED STEPS

- Step 1** Use the **show sccp [statistics | connections]** command to display the SCCP configuration information and current status.

```
Router# show sccp statistics
```

```
SCCP Application Service(s) Statistics:
```

```
Profile ID:1, Service Type:Transcoding
TCP packets rx 7, tx 7
Unsupported pkts rx 1, Unrecognized pkts rx 0
Register tx 1, successful 1, rejected 0, failed 0
KeepAlive tx 0, successful 0, failed 0
OpenReceiveChannel rx 2, successful 2, failed 0
CloseReceiveChannel rx 0, successful 0, failed 0
StartMediaTransmission rx 2, successful 2, failed 0
StopMediaTransmission rx 0, successful 0, failed 0
Reset rx 0, successful 0, failed 0
MediaStreamingFailure rx 0
Switchover 0, Switchback 0
```

Use the **show sccp connections** command to display information about the connections controlled by the SCCP transcoding and conferencing applications. In the following example, the **secure** value of the **type** field indicates that the connection is encrypted:

```
Router# show sccp connections
```

sess_id	conn_id	stype	mode	codec	ripaddr	rport	sport
16777222	16777409	<b>secure</b> -xcode	sendrecv	g729b	10.3.56.120	16772	19534
16777222	16777393	<b>secure</b> -xcode	sendrecv	g711u	10.3.56.50	17030	18464

```
Total number of active session(s) 1, and connection(s) 2
```

- Step 2** Use the **show sdsfarm units** command to display the configured and registered DSP farms.

```
Router# show sdsfarm units
```

```
mtp-1 Device:MTP003080218a31 TCP socket:[2] REGISTERED
actual_stream:8 max_stream 8 IP:10.10.10.3 11470 MTP YOKO keepalive 1
Supported codec:G711Ulaw
                  G711Alaw
                  G729a
                  G729ab
```

```
max-mtps:1, max-streams:40, alloc-streams:8, act-streams:2
```

**Step 3** Use the **show sdsfarm sessions** command to display the transcoding streams.

```

Router# show sdsfarm sessions
Stream-ID:1 mtp:1 10.10.10.3 18404 Local:2000 START
  usage:Ip-Ip
  codec:G711Ulaw64k duration:20 vad:0 peer Stream-ID:2

Stream-ID:2 mtp:1 10.10.10.3 17502 Local:2000 START
  usage:Ip-Ip
  codec:G729AnnexA duration:20 vad:0 peer Stream-ID:1

Stream-ID:3 mtp:1 0.0.0.0 0 Local:0 IDLE
  usage:
  codec:G711Ulaw64k duration:20 vad:0 peer Stream-ID:0

Stream-ID:4 mtp:1 0.0.0.0 0 Local:0 IDLE
  usage:
  codec:G711Ulaw64k duration:20 vad:0 peer Stream-ID:0

Stream-ID:5 mtp:1 0.0.0.0 0 Local:0 IDLE
  usage:
  codec:G711Ulaw64k duration:20 vad:0 peer Stream-ID:0

Stream-ID:6 mtp:1 0.0.0.0 0 Local:0 IDLE
  usage:
  codec:G711Ulaw64k duration:20 vad:0 peer Stream-ID:0

Stream-ID:7 mtp:1 0.0.0.0 0 Local:0 IDLE
  usage:
  codec:G711Ulaw64k duration:20 vad:0 peer Stream-ID:0

Stream-ID:8 mtp:1 0.0.0.0 0 Local:0 IDLE
  usage:
  codec:G711Ulaw64k duration:20 vad:0 peer Stream-ID:0

```

**Step 4** Use the **show sdsfarm sessions summary** command to display a summary view the transcoding streams.

```

Router# show sdsfarm sessions summary

```

```

max-mtps:2, max-streams:240, alloc-streams:40, act-streams:2

```

ID	MTP	State	CallID	confID	Usage	Codec/Duration
1	2	IDLE	-1	0		G711Ulaw64k /20ms
2	2	IDLE	-1	0		G711Ulaw64k /20ms
3	2	START	-1	3	MoH (DN=3 , CH=1) FE=TRUE	G729 /20ms
4	2	START	-1	3	MoH (DN=3 , CH=1) FE=FALSE	G711Ulaw64k /20ms
5	2	IDLE	-1	0		G711Ulaw64k /20ms
6	2	IDLE	-1	0		G711Ulaw64k /20ms
7	2	IDLE	-1	0		G711Ulaw64k /20ms
8	2	IDLE	-1	0		G711Ulaw64k /20ms
9	2	IDLE	-1	0		G711Ulaw64k /20ms
10	2	IDLE	-1	0		G711Ulaw64k /20ms
11	2	IDLE	-1	0		G711Ulaw64k /20ms
12	2	IDLE	-1	0		G711Ulaw64k /20ms
13	2	IDLE	-1	0		G711Ulaw64k /20ms
14	2	IDLE	-1	0		G711Ulaw64k /20ms
15	2	IDLE	-1	0		G711Ulaw64k /20ms
16	2	IDLE	-1	0		G711Ulaw64k /20ms
17	2	IDLE	-1	0		G711Ulaw64k /20ms
18	2	IDLE	-1	0		G711Ulaw64k /20ms
19	2	IDLE	-1	0		G711Ulaw64k /20ms
20	2	IDLE	-1	0		G711Ulaw64k /20ms
21	2	IDLE	-1	0		G711Ulaw64k /20ms

```

22  2    IDLE  -1      0      G711Ulaw64k /20ms
23  2    IDLE  -1      0      G711Ulaw64k /20ms
24  2    IDLE  -1      0      G711Ulaw64k /20ms
25  2    IDLE  -1      0      G711Ulaw64k /20ms
26  2    IDLE  -1      0      G711Ulaw64k /20ms
27  2    IDLE  -1      0      G711Ulaw64k /20ms
28  2    IDLE  -1      0      G711Ulaw64k /20ms
29  2    IDLE  -1      0      G711Ulaw64k /20ms
30  2    IDLE  -1      0      G711Ulaw64k /20ms
31  2    IDLE  -1      0      G711Ulaw64k /20ms
32  2    IDLE  -1      0      G711Ulaw64k /20ms
33  2    IDLE  -1      0      G711Ulaw64k /20ms
34  2    IDLE  -1      0      G711Ulaw64k /20ms
35  2    IDLE  -1      0      G711Ulaw64k /20ms
36  2    IDLE  -1      0      G711Ulaw64k /20ms

```

- Step 5** Use the **show sdsfarm sessions active** command to display the transcoding streams for all active sessions.

```

Router# show sdsfarm sessions active

Stream-ID:1 mtp:1 10.10.10.3 18404 Local:2000 START
usage:Ip-Ip
codec:G711Ulaw64k duration:20 vad:0 peer Stream-ID:2

Stream-ID:2 mtp:1 10.10.10.3 17502 Local:2000 START
usage:Ip-Ip
codec:G729AnnexA duration:20 vad:0 peer Stream-ID:1

```

- Step 6** Use the **show sccp connections details** command to display the SCCP connections details such as call-leg details.

```

Router# show sccp connections details

bridge-info(bid, cid) - Normal bridge information(Bridge id, Calleg id)
mmbridge-info(bid, cid) - Mixed mode bridge information(Bridge id, Calleg id)

sess_id   conn_id   call-id   codec   pkt-period type      bridge-info(bid, cid)
mmbridge-info(bid, cid)

1         -         14        N/A     N/A       transmsp All RTPSPI Callegs   N/A

1         2         15        g729a   20        rtpspi   (4,14)           N/A

1         1         13        g711u   20        rtpspi   (3,14)           N/A

Total number of active session(s) 1, connection(s) 2, and callegs 3

```

- Step 7** Use the **debug sccp {all | errors | events | packets | parser}** command to set debugging levels for SCCP and its applications.
- Step 8** Use the **debug dspsfarm {all | errors | events | packets}** command to set debugging levels for DSP-farm service
- Step 9** Use the **debug ephone mtp** command to enable Message Transfer Part (MTP) debugging. Use this debug command with the **debug ephone mtp**, **debug ephone register**, **debug ephone state**, and **debug ephone pak** commands.



## Registering the DSP Farm with Cisco Unified CME 4.2 or a Later Version in Secure Mode

The DSP farm can reside on the same router with the Cisco Unified CME or on a different router. Some of the steps in the following tasks are optional depending the location of the DSP farm.

This section contains the following tasks:

- [Obtaining a Digital Certificate from a CA Server, page 473](#)
- [Copying the CA Root Certificate of the DSP Farm Router to the Cisco Unified CME Router, page 479](#)
- [Copying the CA Root Certificate of the Cisco Unified CME Router to the DSP farm Router, page 480](#)
- [Configuring Cisco Unified CME to Allow the DSP Farm to Register, page 480](#)
- [Verifying DSP Farm Registration with Cisco Unified CME, page 482](#)

### Obtaining a Digital Certificate from a CA Server

The CA server can be the same router as the DSP farm. The DSP farm router can be configured as a CA server. The configuration steps below show how to configure a CA server on the DSP farm router. Additional configurations are required for configuring CA server on an external Cisco router or using a different CA server by itself.

This section contains the following tasks:

- [Configuring a CA Server, page 473](#) (Optional)
- [Creating a Trustpoint, page 476](#)
- [Authenticating and Enrolling the Certificate with the CA Server, page 478](#)

### Configuring a CA Server

**Note**

Skip this procedure if the DSP farm resides on the same router as the Cisco Unified CME. Proceed to the [“Creating a Trustpoint”](#) section on page 476.

The CA server automatically creates a trustpoint where the certificates are stored. The automatically created trustpoint stores the CA root certificate.

### Prerequisites

- Cisco Unified CME 4.2 or a later version.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **crypto pki server** *label*
4. **database level complete**
5. **grant auto**

6. **database url** *root-url*
7. **no shutdown**
8. **crypto pki trustpoint** *label*
9. **revocation-check** *crl*
10. **rsa***keypair* *key-label*

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>crypto pki server</b> <i>label</i>  <b>Example:</b> Router(config)# crypto pki server dspcert	Defines a label for the certificate server and enters certificate-server configuration mode. <ul style="list-style-type: none"> <li><i>label</i>—Name for CA certificate server.</li> </ul>
Step 4	<b>database level complete</b>  <b>Example:</b> Router(cs-server)# database level complete	(Optional) Controls the type of data stored in the certificate enrollment database. The default if this command is not used is <b>minimal</b> . <ul style="list-style-type: none"> <li><b>complete</b>—In addition to the information given in the minimal and names levels, each issued certificate is written to the database.</li> </ul> <p><b>Note</b> The <b>complete</b> keyword produces a large amount of information; so specify an external TFTP server in which to store the data using of the <b>database url</b> command.</p>
Step 5	<b>grant auto</b>  <b>Example:</b> Router(cs-server)# grant auto	(Optional) Allows an automatic certificate to be issued to any requester. The recommended method and default if this command is not used is manual enrollment. <p><b>Tip</b> Use this command only during enrollment when testing and building simple networks. A security best practice is to disable this functionality using the <b>no grant auto</b> command after configuration so that certificates cannot be continually granted.</p>

	Command or Action	Purpose
Step 6	<p><b>database url</b> <i>root-url</i></p> <p><b>Example:</b> Router(cs-server)# database url nvram:</p>	<p>(Optional) Specifies the location where all database entries for the certificate server are to be written out. If this command is not specified, all database entries are written to NVRAM.</p> <ul style="list-style-type: none"> <li><i>root-url</i>—Location where database entries will be written out. The URL can be any URL that is supported by the Cisco IOS file system.</li> </ul> <p><b>Note</b> If the CA is going to issue a large number of certificates, select an appropriate storage location like flash or other storage device to store the certificates.</p> <p><b>Note</b> When the storage location chosen is flash and the file system type on this device is Class B (LEFS), make sure to check free space on the device periodically and use the <b>squeeze</b> command to free the space used up by deleted files. This process may take several minutes and should be done during scheduled maintenance periods or off-peak hours.</p>
Step 7	<p><b>no shutdown</b></p> <p><b>Example:</b> Router(cs-server)# no shutdown</p>	<p>(Optional) Enables the CA.</p> <p><b>Note</b> You should use this command only after you have completely configured the CA.</p>
Step 8	<p><b>exit</b></p> <p><b>Example:</b> Router(cs-server)# exit</p>	Exits certificate-server configuration mode.
Step 9	<p><b>crypto pki trustpoint</b> <i>label</i></p> <p><b>Example:</b> Router(config)# crypto pki trustpoint dspcert</p>	<p>(Optional) Declares a trustpoint and enters ca-trustpoint configuration mode.</p> <ul style="list-style-type: none"> <li><i>label</i>—Name for the trustpoint. The label</li> </ul> <p><b>Note</b> Use this command and the <b>enrollment url</b> command if this CA is local to the Cisco Unified CME router. These commands are not needed for a CA running on an external router.</p> <p>The <i>label</i> has to be the same as the <i>label</i> in Step 3.</p>

	Command or Action	Purpose
Step 10	<b>revocation-check</b> <i>crl</i>  <b>Example:</b> Router(ca-trustpoint)# <b>revocation-check</b> <i>crl</i>	(Optional) Checks the revocation status of a certificate and specifies one or more methods to check the status. If a second and third method are specified, each method is used only if the previous method returns an error, such as a server being down. <ul style="list-style-type: none"> <li><b>crl</b>—Certificate checking is performed by a certificate revocation list (CRL). This is the default behavior.</li> </ul>
Step 11	<b>rsakeypair</b> <i>key-label</i>  <b>Example:</b> Router(ca-trustpoint)# <b>rsakeypair</b> <i>caserver</i>	(Optional) Specifies an RSA key pair to use with a certificate. <ul style="list-style-type: none"> <li><i>key-label</i>—Name of the key pair, which is generated during enrollment if it does not already exist or if the <b>auto-enroll regenerate</b> command is used.</li> </ul> <b>Note</b> Multiple trustpoints can share the same key.

## Creating a Trustpoint

The trustpoint stores the digital certificate for the DSP farm. To create a trustpoint, perform the following procedure:

### Prerequisites

- Cisco Unified CME 4.2 or a later version.

### SUMMARY STEPS

- enable**
- configure terminal**
- crypto pki trustpoint** *label*
- enrollment url** *ca-url*
- serial-number** *none*
- fqdn** *none*
- ip-address** *none*
- subject-name** [*x.500-name*]
- revocation-check** *none*
- rsakeypair** *key-label*

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>crypto pki trustpoint label</b>  <b>Example:</b> Router(config)# crypto pki trustpoint dspcert	Declares the trustpoint that your RA mode certificate server should use and enters CA-trustpoint configuration mode. <ul style="list-style-type: none"> <li><i>label</i>—Name for the trustpoint and RA.</li> </ul>
Step 4	<b>enrollment url ca-url</b>  <b>Example:</b> Router(ca-trustpoint)# enrollment url http://10.3.105.40:80	Specifies the enrollment URL of the issuing CA certificate server (root certificate server). <ul style="list-style-type: none"> <li><i>ca-url</i>—URL of the router on which the root CA is installed.</li> </ul>
Step 5	<b>serial-number none</b>  <b>Example:</b> Router(ca-trustpoint)# serial-number none	Specifies whether the router serial number should be included in the certificate request. <ul style="list-style-type: none"> <li><b>none</b>—Specifies that a serial number will not be included in the certificate request.</li> </ul>
Step 6	<b>fqdn none</b>  <b>Example:</b> Router(ca-trustpoint)# fqdn none	Specifies a fully qualified domain name (FQDN) that will be included as “unstructuredName” in the certificate request. <ul style="list-style-type: none"> <li><b>none</b>—Router FQDN will not be included in the certificate request.</li> </ul>
Step 7	<b>ip-address none</b>  <b>Example:</b> Router(ca-trustpoint)# ip-address none	Specifies a dotted IP address or an interface that will be included as “unstructuredAddress” in the certificate request. <ul style="list-style-type: none"> <li><b>none</b>—Specifies that an IP address is not to be included in the certificate request.</li> </ul>
Step 8	<b>subject-name [x.500-name]</b>  <b>Example:</b> Router(ca-trustpoint)# subject-name cn=vg224, ou=ABU, o=Cisco Systems Inc.	Specifies the subject name in the certificate request. <p><b>Note</b> The example shows how to format the certificate subject name to be similar to that of an IP phone’s.</p>

	Command or Action	Purpose
Step 9	<b>revocation-check none</b>  <b>Example:</b> Router(ca-trustpoint)# revocation-check none	(Optional) Checks the revocation status of a certificate and specifies one or more methods to check the status. If a second and third method are specified, each method is used only if the previous method returns an error, such as a server being down. <ul style="list-style-type: none"> <li><b>none</b>—Certificate checking is not required.</li> </ul>
Step 10	<b>rsakeypair key-label</b>  <b>Example:</b> Router(ca-trustpoint)# rsakeypair dspcert	(Optional) Specifies an RSA key pair to use with a certificate. <ul style="list-style-type: none"> <li><b>key-label</b>—Name of the key pair, which is generated during enrollment if it does not already exist or if the <b>auto-enroll regenerate</b> command is used.</li> </ul> <b>Note</b> Multiple trustpoints can share the same key.  The <i>key-label</i> is the same as the <i>label</i> in Step 3.

## Authenticating and Enrolling the Certificate with the CA Server

### Prerequisites

- Cisco Unified CME 4.2 or a later version.

### SUMMARY STEPS

- enable**
- configure terminal**
- crypto pki authenticate trustpoint-label**
- crypto pki enroll trustpoint-label**

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.

	Command or Action	Purpose
Step 3	<b>crypto pki authenticate</b> <i>trustpoint-label</i>	Retrieves the CA certificate and authenticates it. Checks the certificate fingerprint if prompted.
	<b>Example:</b> Router(config)# <b>crypto pki authenticate</b> dspcert	<ul style="list-style-type: none"> <li><i>trustpoint-label</i>—Trustpoint label.</li> </ul> <b>Note</b> The <i>trustpoint-label</i> is the trustpoint label specified in the <a href="#">“Creating a Trustpoint”</a> section on page 476.
Step 4	<b>crypto pki enroll</b> <i>trustpoint-label</i>	Enrolls with the CA and obtains the certificate for this trustpoint.
	<b>Example:</b> Router(config)# <b>crypto pki enroll</b> dspcert	<ul style="list-style-type: none"> <li><i>trustpoint-label</i>—Trustpoint label.</li> </ul> <b>Note</b> The <i>trustpoint-label</i> is the trustpoint label specified in the <a href="#">“Creating a Trustpoint”</a> section on page 476.

## Copying the CA Root Certificate of the DSP Farm Router to the Cisco Unified CME Router

The DSP farm router and Cisco Unified CME router exchanges certificates during the registration process. These certificates are digitally signed by the CA server of the respective router. For the routers to accept each others digital certificate, they should have the CA root certificate of each other. Manually copy the CA root certificate of the DSP farm and Cisco Unified CME router to each other.

### Prerequisites

- Cisco Unified CME 4.2 or a later version.

### SUMMARY STEPS

- enable**
- configure terminal**
- crypto pki trustpoint** *name*
- enrollment terminal**
- crypto pki export** *trustpoint pem terminal*
- crypto pki authenticate** *trustpoint-label*
- You will be prompted to enter the CA certificate. Cut and paste the base 64 encoded certificate at the command line, then press Enter, and type “quit.” The router prompts you to accept the certificate. Enter “yes” to accept the certificate.

### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>	Enables privileged EXEC mode.
	<b>Example:</b> Router> <b>enable</b>	<ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>	Enters global configuration mode.
	<b>Example:</b> Router# <b>configure terminal</b>	

	Command or Action	Purpose
<b>Step 3</b>	<pre>crypto pki trustpoint label</pre> <p><b>Example:</b> Router(config)# crypto pki trustpoint dspcert</p>	<p>Declares the trustpoint that your RA mode certificate server should use and enters CA-trustpoint configuration mode.</p> <ul style="list-style-type: none"> <li><i>label</i>—Name for the trustpoint and RA.</li> </ul> <p><b>Note</b> The <i>label</i> is the trustpoint label specified in the <a href="#">“Creating a Trustpoint” section on page 476</a>.</p>
<b>Step 4</b>	<pre>enrollment terminal</pre> <p><b>Example:</b> Router(ca-trustpoint)# enrollment terminal</p>	Specifies manual cut-and-paste certificate enrollment.
<b>Step 5</b>	<pre>crypto pki export trustpoint pem terminal</pre> <p><b>Example:</b> Router(ca-trustpoint)# crypto pki export dspcert pem terminal</p>	Exports certificates and RSA keys that are associated with a trustpoint in a privacy-enhanced mail (PEM)-formatted file.
<b>Step 6</b>	<pre>crypto pki authenticate trustpoint-label</pre> <p><b>Example:</b> Router(config)# crypto pki authenticate vg224</p>	<p>Retrieves the CA certificate and authenticates it. Checks the certificate fingerprint if prompted.</p> <ul style="list-style-type: none"> <li><i>trustpoint-label</i>—Trustpoint label.</li> </ul> <p><b>Note</b> This command is optional if the CA certificate is already loaded into the configuration.</p>
<b>Step 7</b>	You will be prompted to enter the CA certificate. Cut and paste the base 64 encoded certificate at the command line, then press Enter, and type “quit.” The router prompts you to accept the certificate. Enter “yes” to accept the certificate.	Completes the copying of the CA root certificate of the DSP farm router to the Cisco Unified CME router.

## Copying the CA Root Certificate of the Cisco Unified CME Router to the DSP farm Router

Repeat the steps in the [“Copying the CA Root Certificate of the DSP Farm Router to the Cisco Unified CME Router” section on page 479](#) in the opposite direction, that is, from Cisco Unified CME router to the DSP farm router.

### Prerequisites

- Cisco Unified CME 4.2 or a later version.

## Configuring Cisco Unified CME to Allow the DSP Farm to Register

### Prerequisites

- Cisco Unified CME 4.2 or a later version.

### SUMMARY STEPS

- enable**
- configure terminal**
- telephony-service**



4. **sdspfarm units** *number*
5. **sdspfarm transcode sessions** *number*
6. **sdspfarm tag** *number device-name*
7. **exit**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>telephony-service</b>  <b>Example:</b> Router(config)# telephony-service	Enters telephony-service configuration mode.
Step 4	<b>sdspfarm units</b> <i>number</i>  <b>Example:</b> Router(config-telephony)# sdspfarm units 1	Specifies the maximum number of digital-signal-processor (DSP) farms that are allowed to be registered to the Skinny Client Control Protocol (SCCP) server.
Step 5	<b>sdspfarm transcode sessions</b> <i>number</i>  <b>Example:</b> Router(config-telephony)# sdspfarm transcode sessions 30	Specifies the maximum number of transcoding sessions allowed per Cisco Unified CME router. <ul style="list-style-type: none"> <li><i>number</i>—Declares the number of DSP farm sessions. Valid values are numbers from 1 to 128.</li> </ul>
Step 6	<b>sdspfarm tag</b> <i>number device-name</i>  <b>Example:</b> Router(config-telephony)# sdspfarm tag 1 vg224	Permits a DSP farm to register to Cisco Unified CME and associates it with a SCCP client interface's MAC address. <p><b>Note</b> The <i>device-name</i> in this step must be the same as the <i>device-name</i> in the <b>associate profile</b> command in Step 17 of the <a href="#">“Configuring DSP Farms for NM-HDs and NM-HDV2s”</a> section on page 456.</p>
Step 7	<b>exit</b>  <b>Example:</b> Router(config-telephony)# exit	Exits telephony-service configuration mode.

## Verifying DSP Farm Registration with Cisco Unified CME

Use the **show sdsfarm units** command to verify that the DSP farm is registering with Cisco Unified CME. Use the **show voice dsp group slot** command to show the status of secure conferencing.

### Prerequisites

- Cisco Unified CME 4.2 or a later version.

### show sdsfarm units: Example

```
Router# show sdsfarm units

mtp-2 Device:choc2851SecCFB1 TCP socket:[1] REGISTERED
actual_stream:8 max_stream 8 IP:10.1.0.20 37043 MTP YOKO keepalive 17391
Supported codec: G711Ulaw
                  G711Alaw
                  G729
                  G729a
                  G729ab
                  GSM FR

max-mtps:2, max-streams:60, alloc-streams:18, act-streams:0
```

### show voice dsp: Example

```
Router# show voice dsp group slot 1

dsp 13:
  State: UP, firmware: 4.4.706
  Max signal/voice channel: 16/16
  Max credits: 240
  Group: FLEX_GROUP_VOICE, complexity: FLEX
    Shared credits: 180, reserved credits: 0
    Signaling channels allocated: 2
    Voice channels allocated: 0
    Credits used: 0
  Group: FLEX_GROUP_XCODE, complexity: SECURE MEDIUM
    Shared credits: 0, reserved credits: 60
    Transcoding channels allocated: 0
    Credits used: 0
dsp 14:
  State: UP, firmware: 1.0.6
  Max signal/voice channel: 16/16
  Max credits: 240
  Group: FLEX_GROUP_CONF, complexity: SECURE CONFERENCE
    Shared credits: 0, reserved credits: 240
    Conference session: 1
    Credits used: 0
```

# Configuration Examples for Transcoding Resources

This section contains the following examples:

- [DSP Farms for NM-HDVs: Example, page 483](#)
- [DSP Farms for NM-HDs and NM-HDV2s: Example, page 483](#)
- [Cisco Unified CME Router as the DSP Farm Host: Example, page 484](#)

## DSP Farms for NM-HDVs: Example

The following example sets up a DSP farm of 4 DSPs to handle up to 16 sessions (4 sessions per DSP) on a router with an IP address of 10.5.49.160 and a priority of 1 among other servers.

```
voice-card 1
  dsp services dspfarm
  exit
sccp local FastEthernet 0/0
sccp
sccp ccm 10.5.49.160 priority 1
dspfarm transcoder maximum sessions 16
dspfarm

telephony-service
  ip source-address 10.5.49.200 port 2000
  sdspfarm units 4
  sdspfarm transcode sessions 40
  sdspfarm tag 1 mtp000a8eaca80
  sdspfarm tag 2 mtp123445672012
```

## DSP Farms for NM-HDs and NM-HDV2s: Example

The following example sets up six transcoding sessions on a router with one DSP farm, an IP address of 10.5.49.160, and a priority of 1 among servers.

```
voice-card 1
  dsp services dspfarm

sccp local FastEthernet 0/1
sccp
sccp ccm 10.5.49.160 identifier 1

sccp ccm group 123
  associate ccm 1 priority
  associate profile 1 register mtp123456792012
  keepalive retries 5
  switchover method immediate
  switchback method immediate
  switchback interval 5

dspfarm profile 1 transcode
  codec g711ulaw
  codec g711alaw
  codec g729ar8
  codec g729abr8
  maximum sessions 6
  associate application sccp
```

```
telephony-service
ip source-address 10.5.49.200 port 2000
sdspfarm units 1
sdspfarm transcode sessions 40
sdspfarm tag 1 mtp000a8eaca80
sdspfarm tag 2 mtp123445672012
```

## Cisco Unified CME Router as the DSP Farm Host: Example

The following example configures Cisco Unified CME router address 10.100.10.11 port 2000 to be the farm host using the DSP farm at mtp000a8eaca80 to allow for a maximum of 1 DSP farm and 16 transcoder sessions.

```
telephony-service
ip source address 10.100.10.11 port 2000
sdspfarm units 1
sdspfarm transcode sessions 16
sdspfarm tag 1 mtp000a8eaca80
```

## Where to go Next

### Music on Hold

Music on hold can require transcoding resources. See [“Configuring Music on Hold” on page 1227](#).

### Teleworker Remote Phones

Transcoding has benefits and disadvantages for remote teleworker phones. See the discussion in [“Configuring Phones to Make Basic Calls” on page 189](#).

## Additional References

The following sections provide references related to Cisco Unified CME features.

## Related Documents

Related Topic	Document Title
Cisco Unified CME configuration	<ul style="list-style-type: none"> <li><a href="#">Cisco Unified CME Command Reference</a></li> <li><a href="#">Cisco Unified CME Documentation Roadmap</a></li> </ul>
Cisco IOS commands	<ul style="list-style-type: none"> <li><a href="#">Cisco IOS Voice Command Reference</a></li> <li><a href="#">Cisco IOS Software Releases 12.4T Command References</a></li> </ul>
Cisco IOS configuration	<ul style="list-style-type: none"> <li><a href="#">Cisco IOS Voice Configuration Library</a></li> <li><a href="#">Cisco IOS Software Releases 12.4T Configuration Guides</a></li> </ul>
Phone documentation for Cisco Unified CME	<ul style="list-style-type: none"> <li><a href="#">User Documentation for Cisco Unified IP Phones</a></li> </ul>

## Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	<p><a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a></p>

## Feature Information for Transcoding Resources

Table 42 lists the features in this module and enhancements to the features by version.

To determine the correct Cisco IOS release to support a specific Cisco Unified CME version, see the *Cisco Unified CME and Cisco IOS Software Version Compatibility Matrix* at [http://www.cisco.com/en/US/docs/voice\\_ip\\_comm/cucme/requirements/guide/33matrix.htm](http://www.cisco.com/en/US/docs/voice_ip_comm/cucme/requirements/guide/33matrix.htm).

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.



### Note

Table 42 lists the Cisco Unified CME version that introduced support for a given feature. Unless noted otherwise, subsequent versions of Cisco Unified CME software also support that feature.

**Table 42**      **Feature Information for Transcoding Resources**

Feature Name	Cisco Unified CME Version	Feature Information
Secure Transcoding	4.2	Secure transcoding for calls using the <b>codec g729r8 dspfarm-assist</b> command was introduced.
Transcoding Support	3.2	Transcoding between G.711 and G.729 was introduced.