



Configuring Music on Hold

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This chapter describes the music on hold features in Cisco Unified Communications Manager Express (Cisco Unified CME).

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 Music on Hold” section on page 1254](#).

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Prerequisites for Music on Hold

- Phones receiving MOH in a system using G.729 require transcoding between G.711 and G.729. For information about transcoding, see [“Configuring Transcoding Resources” on page 449](#).

Restrictions for Music on Hold

- IP phones do not support multicast at 224.x.x.x addresses.
- Cisco Unified CME 3.3 and earlier versions do not support MOH for local Cisco Unified CME phones that are on hold with other Cisco Unified CME phones; these parties hear a periodic repeating tone instead.

- Cisco Unified CME 4.0 and later versions support MOH for internal calls only if the **multicast moh** command is used to enable the flow of packets to the subnet on which the phones are located.
- Internal extensions that are connected through a Cisco VG224 Analog Voice Gateway or through a WAN (remote extensions) do not hear MOH on internal calls.
- Multicast MOH is not supported on a phone if the phone is configured with the **mtp** command or the **paging-dn** command with the **unicast** keyword.

Information About Music on Hold

To enable Music on Hold (MOH), you should understand the following concept:

- [Music on Hold Summary, page 1228](#)
- [Music on Hold from a Live Feed, page 1229](#)
- [Multicast MOH, page 1230](#)
- [Music on Hold for SIP Phones, page 1230](#)
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Music on Hold Summary

MOH is an audio stream that is played to PSTN and VoIP G.711 or G.729 callers who are placed on hold by phones in a Cisco Unified CME system. This audio stream is intended to reassure callers that they are still connected to their calls.

[Table 72](#) provides a summary of options for MOH for PSTN and multicast MOH for local IP phones.

Table 72 *Music on Hold (MOH)*

Audio Source	Description	How to Configure
Flash memory	No external audio input is required.	Configuring Music on Hold from an Audio File
Live feed	The multicast audio stream has minimal delay for local IP phones. The MOH stream for PSTN callers is delayed by a few seconds. If the live feed audio input fails, callers on hold hear silence.	Configuring Music on Hold from a Live Feed
Live feed and flash memory	The live feed stream has a few seconds of delay for both PSTN and local IP phone callers. The flash MOH acts as backup for the live-feed MoH. We recommend this option if you want live-feed because it provides guaranteed MOH if the live-feed input is not found or fails.	Configuring Music on Hold from an Audio File and Configuring Music on Hold from a Live Feed For configuration example, see the “Examples” section on page 1246 .

Music on Hold

MOH is an audio stream that is played to PSTN and VoIP G.711 or G.729 callers who are placed on hold by phones in a Cisco Unified CME system. This audio stream is intended to reassure callers that they are still connected to their calls.

When the phone receiving MOH is part of a system that uses a G.729 codec, transcoding is required between G.711 and G.729. The G.711 MOH must be translated to G.729. Note that because of compression, MOH using G.729 is of significantly lower fidelity than MOH using G.711. For information about transcoding, see [“Configuring Transcoding Resources” on page 449](#).

The audio stream that is used for MOH can derive from one of two sources:

- **Audio file**—A MOH audio stream from an audio file is supplied from an .au or .wav file held in router flash memory. For configuration information, see the [“Configuring Music on Hold from an Audio File” section on page 1232](#).
- **Live feed**—A MOH audio stream from a live feed is supplied from a standard line-level audio connection that is directly connected to the router through an FXO or “ear and mouth” (E&M) analog voice port. For configuration information, see the [“Configuring Music on Hold from a Live Feed” section on page 1235](#)

If you configure both a live feed *and* an audio file as the source for MOH, the router seeks the live feed first. If the live feed is found, it displaces the audio file source. If the live feed is not found or fails at any time, the router falls back to the audio file source specified in the MOH audio file configuration. This is the recommended configuration. For configuration example, see the [“Examples” section on page 1240](#).

Music on Hold from a Live Feed

The live-feed feature is typically used to connect to a CD jukebox player. To configure MOH from a live feed, you establish a voice port and dial peer for the call and also create a “dummy” ephone-dn. The ephone-dn must have a phone or extension number assigned to it so that it can make and receive calls, but the number is never assigned to a physical phone. Only one live MOH feed is supported per system.

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

If you use an FXO port as the live-feed MOH interface, connect the MOH source to the FXO port using a MOD-SC cable if the MOH source has a different connector than the FXO RJ-11 connector. MOH from a live feed is supported on the VIC2-2FXO, VIC2-4FXO, EM-HDA-3FXS/4FXO, EM-HDA-6FXO, and EM2-HDA-4FXO.

You can directly connect a live-feed source to an FXO port if the **signal loop-start live-feed** command is configured on the voice port; otherwise, the port must connect through an external third-party adapter to provide a battery feed. An external adapter must supply normal telephone company (telco) battery voltage with the correct polarity to the tip and ring leads of the FXO port and it must provide transformer-based isolation between the external audio source and the tip and ring leads of the FXO port.

Music from a live feed is continuously fed into the MOH playout buffer instead of being read from a flash file, so there is typically a 2-second delay. An outbound call to a MOH live-feed source is attempted (or reattempted) every 30 seconds until the connection is made by the directory number that has been configured for MOH. If the live-feed source is shut down for any reason, the flash memory source will be automatically activated.

A live-feed MOH connection is established as an automatically connected voice call that is made by the Cisco Unified CME MOH system or by an external source directly calling in to the live-feed MOH port. An MOH call can be from or to the PSTN or can proceed via VoIP with voice activity detection (VAD) disabled. The call is assumed to be an incoming call unless the optional **out-call** keyword is used with the **moh** command during configuration.

The Cisco Unified CME router uses the audio stream from the call as the source for the MOH stream, displacing any audio stream that is available from a flash file. An example of an MOH stream received over an incoming call is an external H.323-based server device that calls the ephone-dn to deliver an audio stream to the Cisco Unified CME router.

For configuration information, see the [“Configuring Music on Hold from a Live Feed” section on page 1235](#).

Multicast MOH

In Cisco CME 3.0 and later versions, you can configure the MOH audio stream as a multicast source. A Cisco Unified CME router that is configured for multicast MOH also transmits the audio stream on the physical IP interfaces of the specified router to permit access to the stream by external devices.

Certain IP phones do not support multicast MOH because they do not support IP multicast. In Cisco Unified CME 4.0 and later versions, you can disable multicast MOH to individual phones that do not support multicast. Callers hear a repeating tone when they are placed on hold.

Music on Hold for SIP Phones

In Cisco Unified CME 4.1 and later versions, the MOH feature is supported when a call is put on hold from a SIP phone and when the user of a SIP phone is put on hold by a SIP, SCCP, or POTS endpoint. The holder (party that pressed the hold key) or holdee (party who is put on hold) can be on the same Cisco Unified CME or a different Cisco Unified CME connected through a SIP trunk. MOH is also supported for call transfers and conferencing, with or without a transcoding device.

Configuring MOH for SIP phones is the same as configuring MOH for SCCP phones. For configuration information, see the [“How to Configure Music on Hold” section on page 1232](#).

Music On Hold Enhancement

Cisco Unified CME 8.0 and later versions enhance the MOH feature by playing different media streams to PSTN and VoIP callers who are placed on hold. The MOH enhancement allows you to configure up to five additional media streams supplied from multiple media files stored in a router's flash memory and eliminates the need for separate routers for streaming MOH media files.

Cisco Unified CME 8.0 MOH enhancement allows you to create MOH groups and assign ephone extension numbers to these MOH groups to receive different media streams. Callers to the extension numbers configured under the MOH groups can listen to different MOH media streams when they are placed on hold.

You can configure up to five MOH groups. The size of each media source file can range between 64KB to 10MB long on the Cisco Unified CME router for ephones in different departments in a branch. A MOH group is linked to an ephone using the extension number of that ephone. For configuration information, see the [“Configuring Music on Hold Groups to Support Different Media Sources” section on page 1241](#).

You can also configure individual directory numbers to select any MOH group as a MOH source on the Cisco Unified CME router. The extension number of a directory associates an ephone to a specific MOH group and callers to these extension numbers can listen to different media streams when placed on hold. For configuration information, see the [“Assigning a MOH Group to a Directory Number” section on page 1245](#).

Similarly, callers from internal directory numbers can listen to different media streams when a MOH group is assigned for an internal call. For configuration information, see the [“Assigning a MOH Group to all Internal Calls \(SCCP Only\)” section on page 1247](#)

Following precedence rules are applicable when an ephone caller is placed on hold:

- **MOH group** defined for internal calls takes highest precedence
- **MOH group** defined in ephone-dn takes the second highest precedence
- **MOH group** defined in ephone-dn-template takes precedence if MOH group is not defined in ephone-dn or internal call.
- Extension numbers defined in a **MOH-group** has the least precedence
- Phones not associated with any MOH groups default to the MOH parameters defined in the **moh** command under telephony-service configuration mode.

**Note**

If a selected MOH group does not exist, the caller will hear tone on hold.

**Note**

We recommend that departments in a branch must have mutually exclusive extension numbers and multicast destinations for configuring MOH groups.

Caching MOH Files for Enhanced System Performance

Caching MOH files helps enhance the system performance by reducing the CPU usage. However, caching requires memory buffer to store a large MOH file. You can set up a buffer file size for caching MOH files that you might use in the future. The default MOH file buffer size is 64 KB (8 seconds). The maximum buffer size (per file) can be configured anywhere between 64 KB (8 minutes) to 10000 KB

(approximately 20 minutes), You can use the **moh-file-buffer** command to allocate MOH file buffer for future MOH files, see the, [Configuring Buffer Size for MOH Files, page 1248](#). To verify if a file is being cached and to update a cached moh-file, see the, [Verifying MOH File Caching, page 1250](#)

**Note**

If the file size is too large, buffer size falls back to 64 KB.

How to Configure Music on Hold

This section contains the following tasks:

- [Configuring Music on Hold from an Audio File, page 1232](#)
- [Configuring Music on Hold from a Live Feed, page 1235](#)
- [Configuring Music on Hold Groups to Support Different Media Sources, page 1241](#)
- [Assigning a MOH Group to a Directory Number, page 1245](#)
- [Configuring Buffer Size for MOH Files, page 1248](#)
- [Verifying MOH File Caching, page 1250](#)
- [Verifying Music on Hold Group Configuration, page 1251](#)

Configuring Music on Hold from an Audio File

To configure MOH when you are using a file to supply the audio stream, perform the following steps.

**Note**

If you configure MOH from an audio file and from a live feed, the router seeks the live feed first. If a live feed is found, it displaces an audio file source. If the live feed is not found or fails at any time, the router falls back to the audio file source.

**Note**

The MOH file packaged with the CME software is completely royalty free.

Prerequisites

- SIP phones require Cisco Unified CME 4.1 or a later version.
- A music file must be in stored in the router's flash memory. This file should be in G.711 format. The file can be in .au or .wav file format, but the file format must contain 8-bit 8-kHz data; for example, ITU-T A-law or mu-law data format.

Restrictions

- To change the audio file to a different file, you must remove the first file using the **no moh** command before specifying a second file. If you configure a second file without removing the first file, the MOH mechanism stops working and may require a router reboot to clear the problem.

- The volume level of a MOH file cannot be adjusted through Cisco IOS software, so it cannot be changed when the file is loaded into the flash memory of the router. To adjust the volume level of a MOH file, edit the file in an audio editor before downloading the file to router flash memory.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **telephony-service**
4. **moh *filename***
5. **multicast moh *ip-address* port *port-number* [route *ip-address-list*]**
6. **exit**
7. **ephone *phone-tag***
8. **multicast-moh**
9. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	telephony-service Example: Router(config)# telephony-service	Enters telephony-service configuration mode.
Step 4	moh <i>filename</i> Example: Router(config-telephony)# moh minuet.au	Enables music on hold using the specified file. <ul style="list-style-type: none"> • If you specify a file with this command and later want to use a different file, you must disable use of the first file with the no moh command before configuring the second file.

Command or Action	Purpose
<p>Step 5</p> <pre>multicast moh <i>ip-address</i> port <i>port-number</i> [route <i>ip-address-list</i>]</pre> <p>Example: Router(config-telephony)# multicast moh 239.10.16.4 port 16384 route 10.10.29.17 10.10.29.33</p>	<p>Specifies that this audio stream is to be used for multicast and also for MOH.</p> <p>Note This command is required to use MOH for internal calls and it must be configured after MOH is enabled with the moh command.</p> <ul style="list-style-type: none"> • <i>ip-address</i>—Destination IP address for multicast. • port <i>port-number</i>—Media port for multicast. Range is 2000 to 65535. We recommend port 2000 because it is already used for normal RTP media transmissions between IP phones and the router. <p>Note Valid port numbers for multicast include even numbers that range from 16384 to 32767. (The system reserves odd values.)</p> <ul style="list-style-type: none"> • route—(Optional) List of explicit router interfaces for the IP multicast packets. • <i>ip-address-list</i>—(Optional) List of up to four explicit routes for multicast MOH. The default is that the MOH multicast stream is automatically output on the interfaces that correspond to the address that was configured with the ip source-address command. <p>Note For MOH on internal calls, packet flow must be enabled to the subnet on which the phones are located.</p>
<p>Step 6</p> <pre>exit</pre> <p>Example: Router(config-telephony)# exit</p>	<p>Exits telephony-service configuration mode.</p>
<p>Step 7</p> <pre>ephone <i>phone-tag</i></pre> <p>Example: Router(config)# ephone 28</p>	<p>Enters ephone configuration mode.</p>

	Command or Action	Purpose
Step 8	multicast-moh Example: Router(config-ephone)# no multicast-moh	(Optional) Enables multicast MOH on a phone. This is the default. <ul style="list-style-type: none"> This command is supported in Cisco Unified CME 4.0 and later versions. The no form of this command disables MOH for phones that do not support multicast. Callers hear a repeating tone when they are placed on hold. This command can also be configured in ephone-template configuration mode. The value set in ephone configuration mode has priority over the value set in ephone-template mode.
Step 9	end Example: Router(config-ephone)# end	Returns to privileged EXEC mode.

Examples

The following example enables music on hold and specifies the music file to use:

```
telephony-service
moh minuet.wav
```

The following example enables MOH and specifies a multicast address for the audio stream:

```
telephony-service
moh minuet.wav
multicast moh 239.23.4.10 port 2000
```

Configuring Music on Hold from a Live Feed

To configure music on hold from a live feed, perform the following steps.



Note

If you configure MOH from an audio file and from a live feed, the router seeks the live feed first. If a live feed is found, it displaces an audio file source. If the live feed is not found or fails at any time, the router falls back to the audio file source.

Prerequisites

- SIP phones require Cisco Unified CME 4.1 or a later version.
- VIC2-2FXO, VIC2-4FXO, EM-HDA-3FXS/4FXO, EM-HDA-6FXO, or EM2-HDA-4FXO
- For a live feed from VoIP, VAD must be disabled.

Restrictions

- A foreign exchange station (FXS) port cannot be used for a live feed.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice-port** *port*
4. **input gain** *decibels*
5. **auto-cut-through** (E&M only)
6. **operation 4-wire** (E&M only)
7. **signal immediate** (E&M only)
8. **signal loop-start live-feed** (FXO only)
9. **no shutdown**
10. **exit**
11. **dial peer voice** *tag* **pots**
12. **destination-pattern** *string*
13. **port** *port*
14. **exit**
15. **ephone-dn** *dn-tag*
16. **number** *number*
17. **moh** [**out-call** *outcall-number*] [**ip** *ip-address* **port** *port-number* [**route** *ip-address-list*]]
18. **exit**
19. **ephone** *phone-tag*
20. **multicast-moh**
21. **end**

DETAILED STEPS

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

	Command or Action	Purpose
Step 3	voice-port <i>port</i> Example: Router(config)# voice-port 1/1/0	Enters voice-port configuration mode. <ul style="list-style-type: none"> <i>Port</i> argument is platform-dependent; type ? to display syntax.
Step 4	input gain <i>decibels</i> Example: Router(config-voice-port)# input gain 0	Specifies, in decibels, the amount of gain to be inserted at the receiver side of the interface. <ul style="list-style-type: none"> <i>decibels</i>—Acceptable values are integers –6 to 14.
Step 5	auto-cut-through Example: Router(config-voice-port)# auto-cut-through	(E&M ports only) Enables call completion when a PBX does not provide an M-lead response. <ul style="list-style-type: none"> MOH requires that you use this command with E&M ports.
Step 6	operation 4-wire Example: Router(config-voice-port)# operation 4-wire	(E&M ports only) Selects the 4-wire cabling scheme. <ul style="list-style-type: none"> MOH requires that you specify 4-wire operation with this command for E&M ports.
Step 7	signal immediate Example: Router(config-voice-port)# signal immediate	(E&M ports only) For E&M tie trunk interfaces, directs the calling side to seize a line by going off-hook on its E-lead and to send address information as dual tone multifrequency (DTMF) digits.
Step 8	signal loop-start live-feed Example: Router(config-voice-port)# signal loop-start live-feed	(FXO ports only) Enables an MOH audio stream from a live feed to be directly connected to the router through an FXO port. <ul style="list-style-type: none"> This command is supported in Cisco IOS Release 12.4(15)T and later releases
Step 9	no shutdown Example: Router(config-voice-port)# no shutdown	Activates the voice port. <ul style="list-style-type: none"> To shut the voice port down and disable MOH from a live feed, use the shutdown command.
Step 10	exit Example: Router(config-voice-port)# exit	Exits voice-port configuration mode.
Step 11	dial peer voice tag pots Example: Router(config)# dial peer voice 7777 pots	Enters dial-peer configuration mode.
Step 12	destination-pattern <i>string</i> Example: Router(config-dial-peer)# destination-pattern 7777	Specifies either the prefix or the full E.164 telephone number to be used for a dial peer.

	Command or Action	Purpose
Step 13	port <i>port</i> Example: Router(config-dial-peer)# port 1/1/0	Associates the dial peer with the voice port that was specified in Step 3 .
Step 14	exit Example: Router(config-dial-peer)# exit	Exits dial-peer configuration mode.
Step 15	ephone-dn <i>dn-tag</i> Example: Router(config)# ephone-dn 55	Enters ephone-dn configuration mode. <ul style="list-style-type: none"> <i>dn-tag</i>—Unique sequence number that identifies this ephone-dn during configuration tasks. Range is 1 to 288.
Step 16	number <i>number</i> Example: Router(config-ephone-dn)# number 5555	Configures a valid extension number for this ephone-dn. <ul style="list-style-type: none"> This number is not assigned to any phone; it is only used to make and receive calls that contain an audio stream to be used for MOH. <i>number</i>—String of up to 16 digits that represents a telephone or extension number to be associated with this ephone-dn.

	Command or Action	Purpose
Step 17	<p>moh [out-call <i>outcall-number</i>] [ip <i>ip-address</i> port <i>port-number</i> [route <i>ip-address-list</i>]]</p> <p>Example:</p> <pre>Router(config-ephone-dn)# moh out-call 7777 ip 239.10.16.8 port 2311 route 10.10.29.3 10.10.29.45 or Router(config-ephone-dn)# moh out-call 7777</pre>	<p>Specifies that this ephone-dn is to be used for an incoming or outgoing call that is the source for an MOH stream.</p> <ul style="list-style-type: none"> (Optional) out-call <i>outcall-number</i>—Indicates that the router is calling out for a live feed for MOH and specifies the number to be called. Forces a connection to the local voice port that was specified in Step 3. If this command is used without this keyword, the MOH stream is received from an incoming call. (Optional) ip <i>ip-address</i>—Destination IP address for multicast. <p>If you are configuring MOH from a live feed and from an audio file for backup, do not configure a multicast IP address for this command. If the live feed fails or is not found, MOH will fall back to the ip address that you configured using the multicast moh command in telephony-service configuration mode. See the “Configuring Music on Hold from an Audio File” section on page 1232.</p> <p>If you specify an address for multicast with this command and a different address with the multicast moh command in telephony-service configuration mode, you can send the MOH audio stream to two multicast addresses.</p> <ul style="list-style-type: none"> (Optional) port <i>port-number</i>—Media port for multicast. Range is 2000 to 65535. We recommend port 2000 because it is already used for RTP media transmissions between IP phones and the router. (Optional) route <i>ip-address-list</i>—Indicates specific router interfaces on which to transmit the IP multicast packets. Up to four IP addresses can be listed. Default: The MOH multicast stream is automatically output on the interfaces that correspond to the address that was configured with the ip source-address command.
Step 18	<p>exit</p> <p>Example:</p> <pre>Router(config-ephone-dn)# exit</pre>	Exits ephone-dn configuration mode.
Step 19	<p>ephone <i>phone-tag</i></p> <p>Example:</p> <pre>Router(config)# ephone 28</pre>	Enters ephone configuration mode.

	Command or Action	Purpose
Step 20	multicast-moh Example: Router(config-ephone)# no multicast-moh	(Optional) Enables multicast MOH on a phone. This is the default. <ul style="list-style-type: none"> This command is supported in Cisco Unified CME 4.0 and later versions. The no form of this command disables MOH for phones that do not support multicast. Callers hear a repeating tone when they are placed on hold. This command can also be configured in ephone-template configuration mode. The value set in ephone configuration mode has priority over the value set in ephone-template mode.
Step 21	end Example: Router(config-ephone)# end	Returns to privileged EXEC mode.

Examples

The following example enables MOH from an outgoing call on voice port 1/1/0 and dial peer 7777:

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

The following example enables MOH from a live feed and if the live feed is not found or fails at any time, the router falls back to the music file (music-on-hold.au) and multicast address for the audio stream specified in the telephony-service configuration:

```
voice-port 0/1/0
 auto-cut-through
 operation 4-wire
 signal immediate
 timeouts call-disconnect 1
 description MOH Live Feed
!
dial-peer voice 7777 pots
 destination-pattern 7777
 port 0/1/0
!
telephony-service
 max-ephones 24
 max-dn 192
 ip source-address 10.232.222.30 port 2000
 moh music-on-hold.au
 multicast moh 239.1.1.1 port 2000
!
```

```
ephone-dn 52  
number 1  
moh out-call 7777
```

Configuring Music on Hold Groups to Support Different Media Sources

To configure a MOH group in Cisco Unified CME to support different MOH media sources, perform the following steps.

Prerequisites

- Cisco Unified CME 8.0 or a later version.

Restrictions

- Media files from live-feed source are not supported.
- Each MOH group must contain a unique flash media file name, extension numbers, and multicast destination. If you enter any extension ranges, MOH filenames, and Multicast IP addresses that already exist in another MOH-group, an error message is issued and the new input in the current voice MOH-group is discarded.
- Media file CODEC format is limited to G.711 and 8bit m-law
- MOH enhancement for internal calls is supported on SCCP phones only
- MOH enhancement is not supported if supplementary-service media-renegotiate is configured under voice service VoIP

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **voice moh-group** *moh-group-tag*
4. **description** *string*
5. **moh** *filename*
6. **multicast moh** *ip-address* **port** *port-number* **route** *ip-address-list*
7. **extension-range** *starting-extension* to *ending-extension*
8. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	voice moh-group <i>moh-group-tag</i> Example: Router(config-telephony)# voice moh-group 1	Enters the voice moh-group configuration mode. You can create up to five voice moh-groups for ephones receiving music on hold audio files when placed on hold. Range for the voice moh-groups is 1 to 5.
Step 4	description <i>string</i> Example: Router(config-voice-moh-group)# description moh group for sales	(Optional) Allows you to add a brief description specific to a voice MOH group. You can use up to 80 characters to describe the voice MOH group.
Step 5	moh <i>filename</i> Example: Router(config-voice-moh-group)# moh flash:/minuet.au	Enables music on hold using the specified MOH source file. The MOH file must be in .au and .wav format. MOH filename length should not exceed 128 characters. You must provide the directory and filename of the MOH file in URL format. For example: moh flash:/minuet.au <ul style="list-style-type: none"> If you specify a file with this command and later want to use a different file, you must disable use of the first file with the no moh command before configuring the second file.

	Command or Action	Purpose
Step 6	<p>multicast moh <i>ip-address</i> port <i>port-number</i> route <i>ip-address-list</i></p> <p>Example:</p> <pre>Router(config-voice-moh-group)# multicast moh 239.10.16.4 port 16384 route 10.10.29.17 10.10.29.33</pre>	<p>Specifies that this audio stream is to be used for multicast and also for MOH.</p> <p>Note This command is required to use MOH for internal calls and it must be configured after MOH is enabled with the moh command.</p> <ul style="list-style-type: none"> • <i>ip-address</i>—Destination IP address for multicast. • port <i>port-number</i>—Media port for multicast. Range is 2000 to 65535. We recommend port 2000 because it is already used for normal RTP media transmissions between IP phones and the router. <p>Note Valid port numbers for multicast include even numbers that range from 16384 to 32767. (The system reserves odd values.)</p> <ul style="list-style-type: none"> • route—(Optional) List of explicit router interfaces for the IP multicast packets. • <i>ip-address-list</i>—(Optional) List of up to four explicit routes for multicast MOH. The default is that the MOH multicast stream is automatically output on the interfaces that correspond to the address that was configured with the ip source-address command. <p>Note For MOH on internal calls, packet flow must be enabled to the subnet on which the phones are located.</p>
Step 7	<p>extension-range <i>starting-extension</i> <i>to ending-extension</i></p> <p>Example:</p> <pre>Router(config-voice-moh-group)#extension-range 1000 to 1999 Router(config-voice-moh-group)#extension-range 2000 to 2999</pre>	<p>(Optional) Identifies MOH callers calling the extension numbers specified in a MOH group. Extension number must be in hexadecimal digits (0-9) or (A-F). Both extension numbers (starting extension and ending extension) must contain equal number of digits. Repeat this command to add additional extension ranges.</p> <ul style="list-style-type: none"> • <i>starting-extension</i>—(Optional) Lists the starting extension number for a moh-group. • <i>ending-extension</i>—(Optional) Lists the ending extension number for a moh-group. <p>Note The ending extension number must be greater than or equal to the starting extension number. Extension-ranges must not overlap with any other extension-range configured in any other MOH group.</p> <p>Note If extension range is defined and a moh-group is also defined in an ephone-dn, the ephone-dn parameters takes precedence.</p>

	Command or Action	Purpose
Step 8	end	Returns to privileged EXEC mode.
	Example: Router(config-voice-moh-group)# end	

Examples

In the following example total six MOH groups are configured. MOH group 1 through 5 are configured under voice-moh-group configuration mode and MOH group 0 is the MOH source file configured under telephony-services.

```

router# show voice moh-group
telephony-service
moh alaska.wav
Moh multicast 239.1.1.1 port 16384 route 10.1.4.31 10.1.1.2

voice moh-group 1
description this moh group is for sales
moh flash:/hello.au
multicast moh 239.1.1.1 port 16386 route 239.1.1.3 239.1.1.3
extension-range 1000 to 1999
extension-range 2000 to 2999
extension-range 3000 to 3999
extension-range A1000 to A1999

voice moh-group 2
description (not configured)
moh flash1:/minuet.au
multicast moh 239.23.4.10 port 2000
extension-range 7000 to 7999
extension-range 8000 to 8999

voice moh-group 3
description This is for marketing
moh flash2:/happy.au
multicast moh 239.15.10.1 port 3000
extension-range 9000 to 9999

voice moh-group 4
description (not configured)
moh flash:/audio/sun.au
multicast moh 239.16.12.1 port 4000
extension-range 10000 to 19999

voice moh-group 5
description (not configured)
moh flash:/flower.wav
multicast moh 239.12.1.2 port 5000
extension-range 0012 to 0024
extension-range 0934 to 0964

=== Total of 6 voice moh-groups ===

```

Assigning a MOH Group to a Directory Number

To assign a MOH group to a directory number, perform the following steps.

Prerequisites

- Cisco Unified CME 8.0 or a later version
- MOH groups must be configured under global configuration mode.

Restrictions

- Do not use same extension number for different MOH groups.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ephone-dn** *ephone-dn-tag*
4. **number** *tag*
5. **moh-group** *moh-group-tag*
6. **ephone-dn-template** *ephone-dn-template-tag*
7. **exit**

DETAILED STEPS

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

	Command or Action	Purpose
Step 3	ephone-dn <i>tag</i> Example: Router(config)# ephone-dn 1	Enters ephone-dn configuration mode. In ephone-dn configuration mode, you assign an extension number using the number command. You can also configure a MOH group to an ephone-dn-template for use across a range of ephone-dns. If two different MOH groups are configured as a result of this command, the MOH group configured under the ephone-dn configuration takes precedence. Note MOH group configuration for ephone-template-dn configuration command is temporarily prohibited when any directory number using that template is on hold.
Step 4	number Router(config)# ephone-dn 1 Router(config-ephone-dn)# number 1001	Allows you to define an extension number and associate this number to a telephone,
Step 5	moh-group <i>tag</i> Example: Router(config-telephony)#voice moh-group 1 Router(config-voice-moh-group)#	Allows you to assign a MOH group to a directory number. <ul style="list-style-type: none"> MOH group <i>tag</i>— identifies the unique number assigned to a MOH group for configuration tasks.
Step 6	end Example: Router(config-ephone)# end	Returns to privileged EXEC mode.

Examples

In the following example different moh groups are assigned to different directory numbers (ephone-dn) moh group1 is assigned to ephone-dn 1, moh-group 4 is assigned to ephone-dn 4, and moh-group 5 is assigned to ephone-dn 5.

```
ephone-dn 1 octo-line
  number 7001
  name DN7001
  moh-group 1
!
ephone-dn 2 dual-line
  number 7002
  name DN7002
  call-forward noan 6001 timeout 4
!
ephone-dn 3
  number 7003
  name DN7003
  snr 7005 delay 3 timeout 10
  allow watch
  call-forward noan 8000 timeout 30
!
ephone-dn 4 dual-line
  number 7004
  allow watch
  call-forward noan 7001 timeout 10
```

```
moh-group 4
!  
ephone-dn 5  
  number 7005  
  name DN7005  
moh-group 5  
!
```

Assigning a MOH Group to all Internal Calls (SCCP Only)

To assign a MOH group to all internal calls, perform the following steps.

Prerequisites

- Cisco Unified CME 8.0 or a later version.
- MOH groups must be configured under global configuration mode.

Restrictions

- Do not use same extension number for different MOH groups.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **telephony service**
4. **internal-call moh-group tag**
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none">• Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	telephony-service Example: Router(config-telephony)# ephone-dn 1	Enters telephony-service configuration mode. In ephone-dn configuration mode, you assign an extension number using the number command.

	Command or Action	Purpose
Step 4	<pre> internal-call moh-group tag Router(config)# Router(config-telephony)# internal call moh-group 4 </pre>	<p>Allows to assign a MOH-group for all internal directory numbers.</p> <ul style="list-style-type: none"> Moh group <i>tag</i>— identifies the unique number assigned to a MOH group for configuration tasks, Range for the tag is from 0 to 5, where 0 represents MOH configuration in telephony service.
Step 5	<pre> end </pre> <p>Example: Router(config-ephone)# end</p>	Returns to privileged EXEC mode.

Examples

The following examples shows moh-group 4 configured for internal directory calls.

```

telephony-service
sdspfarm conference mute-on *6 mute-off *8
sdspfarm units 4
sdspfarm transcode sessions 2
sdspfarm tag 1 moto-HW-Conf
moh flash1:/minuet.au
Moh multicast 239.1.1.1 port 16384 route 10.1.4.31 10.1.1.2
internal-call moh-group 4
em logout 0:0 0:0 0:0
max-ephones 110
max-dn 288
ip source-address 15.2.0.5 port 2000
auto assign 1 to 1
caller-id block code *9999
service phone settingsAccess 1
service phone spanTOPCPort 0
service dss
timeouts transfer-recall 12

```

Configuring Buffer Size for MOH Files

Prerequisites

- Cisco Unified CME 8.0 or a later version.

Restrictions

- MOH file caching is prohibited if live-feed is enabled for MOH-group 0.
- MOH file buffer size must be larger than the MOH file (size) that needs to be cached.
- Sufficient system memory must be available for MOH file caching.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **telephony service**
4. **moh-file-buffer** *file size*
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none">• Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	telephony-service Example: Router(config-telephony)# ephone-dn 1	Enters telephony-service configuration mode. In ephone-dn configuration mode, you assign an extension number using the number command.
Step 4	moh-file-buffer <i>file size</i> Example: Router(config-telephony)# moh-file-buffer 2000	(Optional) Allows to set a buffer for the MOH file size. You can configure a max file buffer size (per file) anywhere between 64 KB (8 seconds) to 10000 KB (approximately 20 minutes), Default moh-file-buffer size is 64 KB (8 seconds). Note A large buffer size is desirable to cache the largest MOH file and a better system performance.
Step 5	end Example: Router(config-ephone)# end	Returns to privileged EXEC mode.

Examples

The following examples shows 90 KB as the configured moh-file-buffer size.

```
telephony-service
sdspfarm conference mute-on *6 mute-off *8
sdspfarm units 4
sdspfarm transcode sessions 2
sdspfarm tag 1 moto-HW-Conf
moh flash1:/minuet.au
Moh multicast 239.1.1.1 port 16384 route 10.1.4.31 10.1.1.2
moh-file-buffer 90
em logout 0:0 0:0 0:0
max-ephones 110
max-dn 288
```

```
ip source-address 15.2.0.5 port 2000
auto assign 1 to 1
caller-id block code *9999
service phone settingsAccess 1
service phone spanTOPCPort 0
service dss
timeouts transfer-recall 12
```

Verifying MOH File Caching

- Step 1** Use the **show ephone moh** command to verify if the a MOH file is being cached. The following examples shows that the minuet.au music file in MOH group 1 is not cached. Follow steps a through d to verify the MOH file is being cached.

```
Router #show ephone moh
Skinny Music On Hold Status (moh-group 1)
Active MOH clients 0 (max 830), Media Clients 0
File flash:/minuet.au (not cached) type AU Media_Payload_G711Ulaw64k 160 bytes
Moh multicast 239.10.16.6 port 2000
```

- d.** If the file is not cached as in MOH group 1 in the above example, then check file size in the flash.

For example:

```
Router#dir flash:/minuet.au
Directory of flash:/minuet.au 32  -rw- 1865696  Apr 25 2009 00:47:12 +00:00  moh1.au
```

- e.** Under telephony-service, configure “moh-file-buffer <file size>”. Default file size is 64 KB (8 seconds). Make sure you enter a larger file size to cache large MOH files that you may use in future.

For example:

```
Router(config)# telephony-service
Router(config-telephony)# moh-file-buffer 2000
```

- f.** Under voice moh-group <group tag>, configure “no moh”, and immediately configure “moh <filename>”. This allows the MOH server to read the file immediately from flash again.

For example:

```
Router(config-telephony)#voice moh-group 1
Router(config-voice-moh-group)#no moh
Router(config-voice-moh-group)#moh flash:/minuet.au
```

- g.** Depending on the size of the file, you should see the MOH file caching after a few minutes (approximately, 2 minutes).

For example:

```
Router #show ephone moh
Skinny Music On Hold Status - group 1
Active MOH clients 0 (max 830), Media Clients 0
File flash:/moh1.au (cached) type AU Media_Payload_G711Ulaw64k 160 bytes
Moh multicast 239.10.16.6 port 2000
```



Note

MOH file caching is prohibited under the following conditions: if live feed is configured in moh-group 0, If file buffer size smaller than file size, or insufficient system memory.

Verifying Music on Hold Group Configuration

- Step 1** Use the **show voice moh-group** command to display one or the entire moh-group configuration. The following example shows all six MOH groups with extension ranges, MOH files, and multicast destination addresses.

```

router# show voice moh-group
telephony-service
moh alaska.wav
Moh multicast 239.1.1.1 port 16384 route 10.1.4.31 10.1.1.2

voice moh-group 1
description this moh group is for sales
moh flash:/audio?minuet.au
multicast moh 239.1.1.1 port 16386 route 239.1.1.2 239.1.1.3
extension-range 1000 to 1999
extension-range 2000 to 2999
extension-range 3000 to 3999
extension-range 20000 to 22000
extension-range A1000 to A1999

voice moh-group 2
description (not configured)
moh flash:/audio/hello.au
multicast moh 239.23.4.10 port 2000
extension-range 7000 to 7999
extension-range 8000 to 8999

voice moh-group 3
description This is for marketing
moh flash:/happy.au
multicast moh 239.15.10.1 port 3000
extension-range 9000 to 9999

voice moh-group 4
description (not configured)
moh flash:/audio/sun.au
multicast moh 239.16.12.1 port 4000
extension-range 10000 to 19999

voice moh-group 5
description (not configured)
moh flash:/flower.wav
multicast moh 239.12.1.2 port 5000
extension-range 0012 to 0024
extension-range 0934 to 0964

=== Total of 6 voice moh-groups ===

```

- Step 2** Use the **show ephone moh** to display information about the different MOH group configured. The following example displays information about five different MOH groups.

```

Router #show ephone moh
Skinny Music On Hold Status (moh-group 1)
Active MOH clients 0 (max 830), Media Clients 0
File flash:/minuet.au (not cached) type AU Media_Payload_G711Ulaw64k 160 bytes
Moh multicast 239.10.16.6 port 2000

Skinny Music On Hold Status (moh-group 2)
Active MOH clients 0 (max 830), Media Clients 0
File flash:/audio/hello.au type AU Media_Payload_G711Ulaw64k 160 bytes
Moh multicast on 239.10.16.6 port 2000 via 0.0.0.0

```

```

Skinny Music On Hold Status (moh-group 3)
Active MOH clients 0 (max 830), Media Clients 0
File flash:/bells.au type AU Media_Payload_G711Ulaw64k 160 bytes
Moh multicast on 239.10.16.5 port 2000 via 0.0.0.0

```

```

Skinny Music On Hold Status (moh-group 4)
Active MOH clients 0 (max 830), Media Clients 0
File flash:/3003.au type AU Media_Payload_G711Ulaw64k 160 bytes
Moh multicast on 239.10.16.7 port 2000 via 0.0.0.0

```

```

Skinny Music On Hold Status (moh-group 5)
Active MOH clients 0 (max 830), Media Clients 0
File flash:/4004.au type AU Media_Payload_G711Ulaw64k 160 bytes
Moh multicast on 239.10.16.8 port 2000 via 0.0.0.0

```

Step 3 Use the **show voice moh-group statistics** command to display the MOH subsystem statistics information. In the following example, the MOH Group Streaming Interval Timing Statistics shows the media packet counts during streaming intervals. Each packet counter is of 32 bit size and holds a count limit of 4294967296. This means that with 20 milliseconds packet interval (for G.711), the counters will restart from 0 any time after 2.72 years (2 years 8 months). Use the **clear voice moh-group statistics** once in every two years to reset the packet counters.

MOH Group Packet Transmission Timing Statistics shows the maximum and minimum amount of time (in microseconds) taken by the MOH groups to send out media packets.

The MOH Group Loopback Interval Timing Statistics is available when loopback interface is configured as part of the multicast MOH routes as in the case of SRST. These counts are loopback packet counts within certain streaming timing intervals.

```
router#show voice moh-group statistics
```

```

MOH Group Streaming Interval Timing Statistics:
Grp#  ~19 msec    20~39    40~59    60~99    100~199    200+ msec
=====
0:      25835    17559966    45148          0          0          1
1:      19766    17572103    39079          0          0          1
2:      32374    17546886    51687          0          0          1
3:      27976    17555681    47289          0          0          1
4:      34346    17542940    53659          0          0          1
5:      14971    17581689    34284          0          0          1

```

```
MOH Group Packet Transmission Timing Statistics:
```

```

Grp#  max(usec)  min(usec)
=====
0:      97        7.
1:      95        7.
2:      97        7.
3:      96        7.
4:      94        7.
5:      67        7.

```

```
MOH Group Loopback Interval Timing Statistics:
```

```
loopback event array: svc_index=1542, free_index=1549, max_q_depth=31
```

```

Grp#  ~19 msec    20~39    40~59    60~99    100~199    200+ msec
=====
0:      8918821    8721527    10023          0          1          1
1:      9007373    8635813     7184          0          1          1
2:      8864760    8772851    12758          0          1          1
3:      8924447    8715457    10464          0          1          1
4:      8858393    8778957    13017          0          1          1
5:      9005511    8639936     4919          0          1          1

```

Statistics collect time: 4 days 2 hours 5 minutes 39 seconds.

- Step 4** Use the **clear voice moh-group statistics** command to clear the display of MOH subsystem statistics information.

For Example:

```
router#clear voice moh-group statistics
All moh group stats are cleared
```

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">Cisco Unified CME Command ReferenceCisco Unified CME Documentation Roadmap
Cisco IOS commands	<ul style="list-style-type: none">Cisco IOS Voice Command ReferenceCisco IOS Software Releases 12.4T Command References
Cisco IOS configuration	<ul style="list-style-type: none">Cisco IOS Voice Configuration LibraryCisco IOS Software Releases 12.4T Configuration Guides
Phone documentation for Cisco Unified CME	<ul style="list-style-type: none">User Documentation for Cisco Unified IP Phones

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>	http://www.cisco.com/techsupport

Feature Information for Music on Hold

Table 73 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.

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 73 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 73 Feature Information for Music on Hold

Feature Name	Cisco Unified CME Version	Feature Information
Music on Hold	8.0	Music on hold from different media sources was added.
	4.1	Music on hold for SIP phones was supported.
	4.0	<ul style="list-style-type: none"> • Music on hold was introduced for internal calls. • The ability to disable multicast MOH per phone was introduced.
	3.0	The ability to use a live audio feed as a multicast source was introduced.
	2.1	Music on hold from a live audio feed was introduced for external calls.
	2.0	Music on hold from an audio file was introduced for external calls.