Music On Hold

Music On Hold Overview

Use the integrated Music On Hold (MOH) feature to place on-net and off-net users on hold with music from a streaming source. This source makes music available to any on-net or off-net device that you place on hold. On-net devices include station devices and applications that an interactive voice response (IVR) or call distributor places on hold, consult hold, or park hold. Off-net users include those users who are connected through Media Gateway Control Protocol (MGCP) or Skinny Call Control Protocol (SCCP) gateways, Cisco IOS H.323 gateways, and Cisco IOS Media Gateway Control Protocol gateways. The system also makes the Music On Hold feature available for Cisco IP POTS phones that connect to the Cisco IP network through Foreign Exchange Station (FXS) ports on Cisco IOS H.323 or MGCP and for Cisco MGCP or SCCP gateways.

Start Cisco Unified Communications Manager to create a media resource manager. Music On Hold server registers to the media resource manager with its music on hold resources. Music On Hold server is a software application that provides music on hold audio sources and connects a music on hold audio source to multiple streams.

When an end device or feature places a call on hold, Cisco Unified Communications Manager connects the held device to a music resource. When the held device is retrieved, it disconnects from the music on hold resource and resumes normal activity.

Caller-Specific Music On Hold

For SIP calls that a phone receives over the SIP trunk, Cisco Unified Communications Manager can use a different MOH audio source.

An external application, such as the Cisco Unified Customer Voice Portal (CVP) contact center solution, determines the most appropriate MOH audio source based on the caller ID, dialed number, or IVR interaction when a call is received from the public switched telephone network (PSTN).

For details, see the Cisco Unified Customer Voice Portal documentation at http://www.cisco.com/c/en/us/support/customer-collaboration/unified-customer-voice-portal/tsd-products-support-series-home.html.

Increased Capacity of IP Voice Media Streaming Application and Expanded MOH Audio Source

Cisco IP Voice Media Streaming application is installed automatically when you install Cisco Unified Communications Manager. Activate this application to enable the Music On Hold (MOH) feature.

With this release, the capacity of Cisco Unified Communications Manager to support unique and concurrent MOH audio sources, while the Music On Hold service is running on the MOH server, is increased from 51 to 501. The MOH audio sources are numbered from 1 to 501 with the fixed MOH audio source remaining at the number 51.

The fixed MOH device cannot use an audio source that connects through a USB MOH device, because Cisco Unified Communications Manager does not support USB when running on VMware. Use of the fixed MOH USB device is not supported on VMware. However, provision the external sound device for use with deployments that utilize Cisco Unified Survivable Remote Site Telephony (SRST) multicast MOH.

You can configure each MOH audio source to use a custom announcement as an initial greeting and/or an announcement that is played periodically to callers who are hearing the music. Cisco Unified Communications Manager provides 500 custom announcements that you can use on one or multiple MOH audio sources. These announcements are not distributed between the Cisco Unified Communications Manager servers within a cluster. You have to upload these custom announcement files to each server that provides the MOH and announcement services. You must also upload each custom music file for MOH audio sources to each server.

Performance Impact of Media Devices with Services

The Cisco IP Voice Media Streaming application runs as a service for four media devices—annunciator (ANN), software conference bridge, Music On Hold (MOH), and software media termination point. Activate this service on a Cisco Unified Communications Manager server as coresident with call processing. When you activate this service, ensure that you configure these media devices for limited capacity to avoid any impact on the call processing. The default settings for the media devices are defined based on this coresident operation. You can adjust these settings by reducing the use of one or more media devices to increase other settings.

For example, if you are not using software media termination point devices, you can choose the **Run Flag** setting for the SW MTP to **False**, select **System** > **Service Parameters** > **Cisco IP Voice Media Streaming App service** > **MTP Parameters** , and add the **MTP Call Count** setting to **Media Resource** > **MOH Server** > **Maximum Half Duplex Streams** configuration. Depending on the call traffic, you can modify the default settings. However, monitor the server performance activity for CPU, memory, and IO wait. For higher capacity clusters, such as the ones using 7500 user OVA configuration, it is possible to increase the default media device settings for Call Count by 25%.

For installations where you expect high usage of the media devices, such as Music On Hold, or where high call volumes require higher number of media connections, activate the Cisco IP Voice Media Streaming application service on one or more of the Cisco Unified Communications Manager servers which do not have call processing activated. Activating this service limits the impact of media device usage to other services, such as call processing. Then, you can increase the configuration settings for maximum number of calls for the media devices.

When you activate Cisco IP Voice Media Streaming application as co-resident with Cisco Unified Communications Manager service, it can impact call processing performance. To increase the capacity settings

for Music On Hold or annunciator from the default settings, it is suggested to activate Cisco IP Voice Media Streaming application on a server without activating Cisco Unified Communications Manager.

The CPU performance is impacted by MOH when active callers are on hold or when multicast MOH audio streams are configured.

Table 1: General Performance Results

Configuration Notes	CPU Performance
Dedicated MOH server, 1000 held calls, 500 MOH sources with greeting and periodic announcements.	25–45% (7500 user OVA configuration)
Native call queuing with dedicated MOH server and annunciator server, 1000 queued calls, 500 MOH sources with greeting and periodic announcements. An annunciator can play up to 300 simultaneous greeting announcements.	25–45% (7500 user OVA configuration)
Dedicated MOH server, 500 held calls, 500 MOH sources with greeting and periodic announcements.	15–35% (7500 user OVA configuration)

Table 2: Extrapolated Recommendations

Configuration	Recommendation Limit
When Cisco IP Voice Media Streaming application is co-resident with Cisco Unified Communications Manager on 2500 OVA (moderate call processing).	MOH: 500 held callers, 100 MOH sources, and 48 to 64 annunciator callers.
When Cisco IP Voice Media Streaming application is a dedicated server on 2500 OVA.	MOH: 750 held callers, 250 MOH sources, and 250 annunciator callers.
When Cisco IP Voice Media Streaming application is co-resident with Cisco Unified Communications Manager on 7500/10K OVA (moderate call processing).	MOH: 500 held callers, 250 MOH sources, and 128 annunciator callers.
When Cisco IP Voice Media Streaming application is a dedicated server on 7500/10K OVA.	MOH: 1000 held callers, 500 MOH sources, and 300-700 annunciator callers (with 1 MOH codec). **Note** Reduce annunciator to 300 for two MOH codecs.

Note These recommendations are specific to MOH/ANN devices. If you combine these devices with the software media termination point (MTP) and call forward busy (CFB) devices, reduce the limits to provide streams.

Configuration Limitations for Capacity Planning

The Cisco IP Voice Media Streaming application and Self Provisioning IVR services use a media kernel driver to create and control Real-time Transfer Protocol (RTP) streams. This media kernel driver has a capacity of 6000 streams. These streams allow the media devices and IVR to make resource reservations.

These reservations are based on the following capacity calculations:

Media Device	Capacity
Annunciator	(Call Count service parameter) * 3 Where 3 indicates total of receiving (RX) and transmitting (TX) calls for endpoint and 1 for .wav file.
Software Conference Bridge	(Call Count service parameter) * 2 Where 2 indicates total streams of RX and TX endpoints.
Software Media Termination Point	(Call Count service parameter) * 2 Where 2 indicates total streams of RX and TX endpoints.
Music On Hold	((Maximum Half Duplex Streams) * 3) + (501 * 2 * [number of enabled MOH codecs]) Where: • (Maximum Half Duplex Streams) is a configuration setting on the MOH device configuration administration web page. • 3 indicates total steams of RX, TX, and greeting announcement .wav file. • 501 indicates the maximum number of Music On Hold (MOH) sources. • 2 indicates music .wav stream and possible multicast TX stream. • [number of enabled MOH codecs] is based on how many MOH codecs are enabled in the Cisco IP Voice Media Streaming application service parameters.
Self Provisioning IVR Service	(500 * 2) Where 500 indicates callers, and 2 indicates total streams from RX and TX streams.

Hence, to enable MOH to support a maximum of 1000 callers, use the following equation: `1000 * 3 + 501 * 2 * 1 = 4002` driver streams with one enabled codec and `1000 * 3 +501 * 2 * 2 = 5004` with two enabled codecs. Reduce the remaining devices and deactivate the Self Provisioning IVR service to limit total reservations to 6000, which allows the MOH device to make these reservations. It may also require that you do not activate the Self Provisioning IVR service on the same server with Cisco IP Voice Media Streaming application.

If configuration settings of the media devices exceed the capacity of the media device driver, the media devices that register with the device driver first will be able to reserve their required stream resources. The media devices that register later are restricted to fewer than requested stream resources. The later registered media

devices result in logging some alarm messages and automatically reducing the call count for the restricted media device.

Note A media kernel driver with a capacity of 6000 streams might not support that many simultaneous media device connections.

Interwork External Multicast MOH to Unicast MOH

With this release, you can configure a Cisco Unified Survivable Remote Site Telephony (SRST) router as an audio source. This router provides multicast MOH audio for devices that are capable of multicast reception. In this approach, devices act as if Cisco Unified Communications Manager is sending the multicast MOH audio. However, devices that are capable of only the unicast reception cannot hear the MOH audio that an external MOH source (for example, Cisco Unified SRST router) sends. Examples of devices that are capable of unicast reception only can be public switched telephone network (PSTN) phones, destination to session border controllers (SBC), and Session Initiation Protocol (SIP) trunks.

In this release of Cisco Unified Communications Manager, this feature is enhanced to receive multicast MOH audio from an external audio source and send it as unicast MOH audio. Cisco Unified Communications Manager uses this feature to play multicast MOH audio as unicast MOH for the devices that are capable of unicast MOH reception only. Examples of an external MOH audio source can be a Cisco Unified SRST router or software that can send multicast MOH audio.

An administrator configures the fields for this feature from Cisco Unified CM Administration **Music On Hold Audio Source Configuration** window.

Note

- This feature has no impact on existing functionality of playing multicast MOH audio using an external audio source for the devices that are capable of multicast reception.
- For the unicast media connection, Cisco Unified Communications Manager MOH Server plays the initial announcement and periodic announcement even if you configure the MOH audio source with external multicast source.

Configuration Tips for the Codec-Specific Inbound Audio Stream

Configure an external multicast audio source, such as Cisco Unified SRST router, to MOH server for streaming the required audio feed.

To configure an external multicast audio source, such as a Cisco Unified SRST router, configure the **Source IPv4 Multicast Address** and **Source Port Number** fields in the **MOH Audio Source Configuration** window.

- Cisco Unified Communications Manager listens to multicast G.711 mu-law stream on external multicast IP address and port that you configured on the **MOH Audio Source configuration** window. An MOH server can transcode between the G.711 mu-law or a-law or L16 256K wideband MOH codecs. The external multicast RTP stream uses G.711 mu-law codec for MOH as a source for G.711 mu-law or a-law or L16 256K wideband MOH codecs. For G.711 a-law and wideband calls, Cisco Unified Communications Manager MOH server transcodes the inbound G.711 mu-law stream to outbound G.711 a-law or wideband stream before sending it to the device.

- Cisco Unified Communications Manager listens to multicast G.729 stream on external multicast IP and port value added with four that is configured on the **MOH audio source configuration** window. For example, if you configure an MOH audio Source with 239.1.1.1:16384, Cisco Unified Communications Manager listens to G.711 mu-law stream on 239.1.1.1:16384 and G.729 stream on 239.1.1.1:16388 (port value added with four). An MOH server cannot transcode for G.729 codecs. Callers who are using MOH G.729 codec require an external multicast RTP stream using G.729 or G.729a codec.

Music On Hold Prerequisites

- A Cisco Unified Communications Manager system that is configured to use the Music On Hold (MOH) streams that the MOH server provides when a call is placed on hold.
- Before you configure multicast, ensure that you configure MOH server and audio sources. If you want to use fixed audio source, configure it before you configure multicast.

Music On Hold Configuration Task Flow

Before you begin

- Review Music On Hold Prerequisites, on page 6

Procedure

	Command or Action	Purpose
Step 1	Enable Music On Hold. See Enable Music on Hold, on page 8.	Enable the Music On Hold service.
Step 2	Configure Music On Hold server. See Configure Music On Hold Server, on page 8.	Stream Music on Hold from Music On Hold data source files that are stored on their disks or external audio source.
Step 3	Configure MOH audio. See Music On Hold Audio Source Configuration, on page 12, and perform the following subtasks: • Upload an MOH audio file. See Upload Music On Hold Audio File, on page 12. • Convert MOH Files. See Convert Music On Hold Files, on page 13. • Configure MOH audio source. See Configure Music On Hold Audio Source, on page 14.	• Upload a Music On Hold audio file to make it available for use as a Music on Hold audio source. • Convert the Music On Hold file to the appropriate formats for use by the Music On Hold server. • To place on-net and off-net users on hold (end user hold or network hold) with music streamed from a streaming source.
Step 4	(Optional) Configure fixed MOH audio source. See Configure Fixed Music On Hold Audio Source, on page 19.	Configure the fixed MOH audio source in addition to the file stream sources.

	Command or Action	Purpose
Step 5	Configure Media Resource Group. See Configure Media Resource Group, on page 21.	Define logical groupings of media servers.
Step 6	Configure Media Resource Group list. See Configure Media Resource Group List, on page 22.	Specify a list of prioritized media resource groups.
Step 7	View MOH audio file. See View Music on Hold Audio File, on page 23.	View a list of Music On Hold audio files that are stored on the system.
Step 8	Enable security for MOH. See Enable Security for Music On Hold, on page 24.	Enable security for Music On Hold devices through the **Cluster Security Mode** enterprise parameter.
Step 9	(Optional) Enable secured MOH through SRTP. See Enable Secured Music On Hold through SRTP, on page 25.	When you enable the Cisco Unified Communications Manager cluster or system for security, the MOH server registers with the Cisco Unified Communications Manager as an SRTP-capable device.
Step 10	Configure multicast by performing the following subtasks: • Plan MOH Server capacity. See Plan Music On Hold Server Capacity, on page 27. • Verify Music On Hold service parameters. See Verify Music On Hold Service Parameters, on page 28. • Configure multicast Music On Hold audio sources or fixed MOH audio source. See Configure Multicast Music On Hold Audio Sources/Fixed MOH Audio Source, on page 28. • Configure multicast Music On Hold server. See Configure Multicast Music On Hold Server, on page 29. • Configure a multicast-enabled media resource group. See Configure a Multicast-Enabled Media Resource Group, on page 30. • Configure multicast Music On Hold over H.323 intercluster trunks. See Configure Multicast Music On Hold over H.323 Intercluster Trunks, on page 31.	Configure the various Cisco Unified Communications Manager services to allow multicasting. For details on unicast and multicast audio sources, see Unicast and Multicast Audio Sources, on page 26.
Step 11	(Optional) Reset or restart a Music On Hold server. See Reset or Restart a Music On Hold Server, on page 31.	Reset or restart a music on hold server for changes to take effect, if required.

	Command or Action	Purpose
Step 12	(Optional) Synchronize Music On Hold server. See Synchronize Music On Hold Server, on page 32.	Apply configuration to the selected music on hold servers.

Enable Music on Hold

When you install Cisco Unified Communications Manager, the Cisco IP Voice Media Streaming application is installed automatically. However, you need to enable the Music On Hold feature to use it.

Note During installation, Cisco Unified Communications Manager installs and configures a default Music On Hold audio source. Music On Hold functionality can proceed by using the default audio source.

Procedure

Step 1 In Cisco Unified Serviceability, choose **Application** > **Serviceability Webpage**, and enter a valid username and password.

Step 2 Choose **Tools** > **Service Activation**.
The **Service Activation** window appears.

Step 3 Choose a server from the **Server** drop-down list.

Step 4 From the CM Services section, check the **Cisco IP Voice Media Streaming App** check box.
The Music On Hold service is enabled.

What to do next

Configure Music On Hold Server, on page 8

Configure Music On Hold Server

Before you begin

- Enable Music on Hold, on page 8.
- Make sure one or multiple Music On Hold (MOH) servers are available.

Note The Cisco Unified Communications Manager MOH server is automatically added when the Cisco IP Voice Media Streaming Application service is activated.

Procedure

Step 1 In the Cisco Unified CM Administration, choose **Media Resources** > **Music On Hold Server**.
The **Find and List Music On Hold Servers** window appears.

Step 2 Choose the two drop-down list boxes to search for a music on hold server.

Step 3 Choose the Music On Hold server that you want to update.
The **Music On Hold (MOH) Server Configuration** window appears.

Step 4 Configure the fields from the **Music On Hold (MOH) Server Configuration** window. See the Related Topics section for more information about the fields and their configuration options.

Step 5 Click **Save**.
The Music On Hold server is updated in the database. When a server is updated, Cisco Unified Communications Manager adds the media termination point, conference bridge, annunciator, and Music On Hold devices to the database.

What to do next

Configure Music On Hold Audio. Perform the following procedures:

- Upload Music On Hold Audio File, on page 12
- Convert Music On Hold Files, on page 13
- Configure Music On Hold Audio Source, on page 14

Related Topics

Music On Hold Server Fields for Music On Hold, on page 9

Music On Hold Server Fields for Music On Hold

Table 3: Device Information

Field	Description
Registration	Displays the registration information of the device.
IPv4 Address	Displays the IPv4 address.
IPv6 Address	Displays the IPv6 address.
Device is trusted	If the device is trusted, a green checkmark appears.
Host Server	Displays the IP address of the existing host server.
Music On Hold Server Name	Enter a unique name for the MOH server. The name can comprise up to 15 characters. You can form the name by using letters, numbers, spaces, dashes, dots (periods), and underscores.
Description	Enter a description for the MOH server. The description can include up to 50 characters. Ensure that this field does not contain ampersand (&), double quotes (“), brackets ([]), less than (<), greater than (>), or the percentage (%).

Field	Description
Device Pool	Choose a device pool for the Music On Hold server from the drop-down arrow and choose a device pool from the list that appears.
Location	Use locations to implement call admission control (CAC) in a centralized call-processing system. CAC enables you to regulate audio quality and video availability by limiting the amount of bandwidth that is available for audio and video calls over links between locations. The location specifies the total bandwidth that is available for calls to and from this location. From the drop-down list, choose the appropriate location for this MOH server. The **Hub_None** location field indicates that the locations feature does not keep track of the bandwidth that this MOH server consumes. The **Phantom** location field indicates a location that enables successful CAC across intercluster trunks that use H.323 or SIP protocol. To configure a new location, use the **System** > **Location** menu option.
Maximum Half Duplex Streams	Enter a number in this required field for the maximum number of unicast Music On Hold streams that this Music On Hold server supports. This value determines the maximum number of devices that can be on unicast Music On Hold that is streamed from this Music On Hold server at any given time. Valid values range from 0 to 1000.
Maximum Multi-cast Connections	Enter a number in this required field for the maximum number of multicast Music On Hold streams that this Music On Hold server supports. This value determines the maximum number of devices that can be on multicast music on hold that is streamed from this Music On Hold server at any given time. Valid values range from 1 to 999999.
Fixed Audio Source Device	Enter the device name of the fixed audio source device. This device serves as the per-server override that is used if the server has a special sound device installed.

Field	Description
Use Trusted Relay Point	From the drop-down list, enable or disable whether Cisco Unified Communications Manager inserts a trusted relay point (TRP) device with this media endpoint. Choose one of the following values: • **Off**—Disables the use of a TRP with this device. • **On**—Enables the use of a TRP with this device. A trusted relay point (TRP) device designates an Media Transfer Protocol (MTP) or transcoder device that is labeled as Trusted Relay Point. Cisco Unified Communications Manager places the TRP closest to the associated endpoint device if more than one resource is needed for the endpoint (for example, a transcoder or RSVPAgent). If both TRP and MTP are required for the endpoint, TRP is used as the required MTP. If both TRP and RSVPAgent are needed for the endpoint, Cisco Unified Communications Manager first tries to find an RSVPAgent that can also be used as a TRP. If both TRP and transcoder are needed for the endpoint, Cisco Unified Communications Manager first tries to find a transcoder that is also designated as a TRP.
Run Flag	Use this required field to choose a run flag for the Music On Hold server. To do so, click the drop-down arrow and choose Yes or No. Choosing No disables the music on hold server.

Table 4: Multicast Audio Source Information

Field	Description
Enable Multicast Audio Sources on this MOH Server	Check or uncheck this check box to enable or disable the multicast of audio sources for this Music On Hold server. **Note** If this MOH server belongs to a multicast media resource group, a message asks you to enable multicast on this MOH server or to update the specified media resource groups either by removing this MOH server or by changing the multicast field of each listed group.
Base Multicast IP Address	If multicast support is needed, enter the base multicast IP address in this field. Valid IP addresses for multicast range from 224.0.1.0 to 239.255.255.255. **Note** IP addresses between 224.0.1.0 and 238.255.255.255 are in the reserved range of IP multicast addresses for public multicast applications. Use of these addresses may interfere with existing multicast applications on the Internet. We strongly recommend using IP addresses that are in the range that is reserved for administratively controlled applications on private networks (239.0.0.0 – 239.255.255.255).

Field	Description
Base Multicast Port Number	If multicast support is needed, enter the base multicast port number in this field. Valid multicast port numbers include even numbers that range from 16384 to 32766.
Increment Multicast on	Click **Port Number** to increment multicast on port number. Click **IP Address** to increment multicast on IP address. **Note** Use multicast by incrementing IP address as the preferred method in firewall situations. This results in a unique IP address for each multicast audio source and helps to avoid network saturation.

Table 5: Selected Multicast Audio Sources

Field	Description
No.	This field designates Music On Hold audio stream number that is associated with a particular multicast audio source. Only audio sources that are defined as allowing multicasting appear.
Audio Source Name	This field designates the name of the audio source that is defined to allow multicasting.
Max Hops	For each multicast audio source, enter the maximum number of router hops through which multicast packets should pass. Valid values range from 1 to 127. **Note** Using high values can lead to network saturation. This field also gets identified as Time to Live.

Music On Hold Audio Source Configuration

Upload Music On Hold Audio File

When you upload an audio file, it is available for use as a Music On Hold audio source. If you use the **Media Resources** > **Music On Hold Audio Source** menu option to add a new audio source, the addition makes the newly uploaded audio file available in the MOH Audio Source File drop-down list.

Note You must upload Music On Hold audio source files to each MOH server.

Before you begin

Configure Music On Hold Server, on page 8

Procedure

Step 1 In the Cisco Unified CM Administration, choose **Media Resources** > **MOH Audio File Management**.

The Music On Hold Audio File Management window appears.

Step 2 Click **Upload File**.

The Upload File popup window appears.

Step 3 If you know the path to a file that specifies an audio file, enter the path in the **File** field. If you do not know the path and file name, search for the audio file by clicking **Browse** to the right of the File field. After you find the audio file, click the desired audio file and click **Open**.
The path to the chosen audio file appears in the **File** field of the **Upload File** popup window.

Step 4 Click **Upload** to upload the specified audio file.

After the audio file gets uploaded, the Upload Result window shows the result of the upload.

Note The uploading procedure uploads the file to the Cisco Unified Communications Manager server and performs audio conversions to create codec-specific audio files for MOH. Depending on the size of the original file, processing may take several minutes to complete.

Note Uploading an audio source file to an MOH server uploads the file only to one MOH server. You must upload an audio source file to each MOH server or each server in a cluster by using Cisco Unified Communications Manager Administration on each server. MOH audio source files do not automatically propagate to other MOH servers in a cluster.

Step 5 (Optional) Click **Close** to close the **Upload Result** window.

What to do next

- Convert Music On Hold Files, on page 13
- Configure Music On Hold Audio Source, on page 14

Convert Music On Hold Files

When you import an audio source file, Cisco Unified Communications Manager processes the file and converts the file to the proper formats for use by the Music On Hold server.

These are some examples of a valid input audio source files:

- 16-bit PCM .wav file
- Stereo or mono
- Sample rates of 48 kHz, 44.1 kHz, 32 kHz, 16 kHz, or 8 kHz

Before you begin

Upload Music On Hold Audio File, on page 12

What to do next

- Configure Music On Hold Audio Source, on page 14

Configure Music On Hold Audio Source

Perform the following procedure to add or update a Music On Hold audio source, to associate an existing audio source with an audio stream number, or to upload a new custom audio source.

Note If a new version of an audio source file is available, perform the update procedure to use the new version.

Procedure

Step 1 From Cisco Unified CM Administration, choose **Media Resources** > **Music On Hold Audio Source**.

The **Find and List Music On Hold Audio Sources** window appears.

Step 2 Enter search criteria to update an existing audio source. To list all records in the database, ensure that the dialog box is empty. Click **Find**.

Step 3 Click **Add New** to add a new Music On Hold audio source.

Step 4 Configure the fields in the **Music On Hold Audio Source Configuration** window.

Note

- For the Audio Stream Number, choose from a list of available MOH source numbers that are not already provisioned. You can provision Audio source number 51 in the MOH Fixed Audio Source menu.
- The MOH Audio Source File drop-down list displays all the MOH source files that have been uploaded and are available for assignment to an MOH Audio Stream Number.
- The MOH Audio Source Name is available to provide a description for this MOH Audio Source Number.
- The Initial Announcement is optional and the drop-down list shows the available announcements. You can use the Announcements menu to add new custom greeting announcements or change the audio .wav file that is associated with an announcement.
- If you have to use the MOH Audio Source with the Native Call Queuing feature, the Initial Announcement may be configured to be played before routing to a hunt member. Use the **Played before routing to Hunt Member** option in the Native Call Queuing feature by using an Annunciator. If you select the **Play when call is queued** option for configuring the Initial Announcement or if you are not using the MOH Audio Source with Native Call Queuing, the initial announcement is played to the queued or held caller by the MOH device when the caller is queued or placed on hold.
- Use the **Periodic Announcement** option to choose an announcement to be played on a periodic basis while callers are listening to the MOH Audio Source File.
- Use the **Locale Announcement** configuration to choose which language to be used for the announcements if you have provisioned multiple language announcements. A MOH Audio Source supports only one language (locale).

Step 5 Click **Save**.
The list box at the bottom of the window shows the new Music On Hold audio source. The MOH Audio Source File Status pane shows the MOH audio translation status for the added source.

Audio Source Fields for Music On Hold

Table 6: Music On Hold Audio Source Information

Field	Description
MOH Audio Stream Number	Use this field to choose the stream number for this MOH audio source. Click the drop-down arrow and choose a value from the list. For existing MOH audio sources, the value appears in the MOH Audio Source title.
MOH Audio Source File	Use this field to choose the file for this MOH audio source. Click the drop-down arrow and choose a value from the list.
MOH Audio Source Name	Enter a unique name in this field for the MOH audio source. This name includes up to 50 valid characters, such as letters, numbers, spaces, dashes, dots (periods), and underscores.
Allow Multicasting	Check this check box to specify that the selected MOH audio source allows multicasting.

Field	Description
MOH Audio Source File Status	This pane displays the following information about the source file for the selected MOH audio source: • InputFileName • ErrorCode • ErrorText • DurationSeconds • DiskSpaceKB • LowDateTime • HighDateTime • OutputFileList • MOH Audio Translation completion date **Note** OutputFileList includes information on ULAW, ALAW, G.729, and Wideband wav files and status options.

Table 7: Announcement Settings

Field	Description
Initial Announcement	Choose an initial announcement from the drop-down list. **Note** To select MoH with no initial announcement, choose the **Not Selected** option. Click the **View Details** link to view the following Initial Announcement information: • Announcement Identifier • Description • Default Announcement **Note** • Played by MOH server only when the Audio Source has “Allow Multi-casting” unchecked and “Initial Announcement Played” set to 'Only for queued calls'. • Played by ANN if “Allow Multi-casting” is checked or if “Initial Announcement Played” is set to 'Always.'

Field	Description
Initial Announcement Played	Choose one of the following to determine when to play the initial announcement: • Play announcement before routing to Hunt Member • Play announcement if call is queued
Periodic Announcement	Choose a periodic announcement from the drop-down list. **Note** To select MoH with no periodic announcement, choose the **Not Selected** option. Click the **View Details** link to view the following Periodic Announcement information: • Announcement Identifier • Description • Default Announcement **Note** The MOH server always plays the periodic announcement regardless of other settings.
Periodic Announcement Interval	Enter a value (in seconds) that specifies the periodic announcement interval. Valid values are 10 to 300. The default value is 30.
Locale Announcement	Locale Announcement depends upon the locale installation package that has been installed. **Note** • Prompts played by MOH will use the setting for Locale Announcement. • Prompts played by ANN will use the User Locale of the calling party.

Table 8: Music On Hold Audio Sources

Field	Description
(list of MoH audio sources)	This list box shows the MOH audio source that you add. Select the audio stream number of an MOH audio source to configure that MoH audio source. Audio source ID is an ID that represents an audio source in the Music On Hold server. The audio source can include either a file on a disk or a fixed device from which a source stream Music On Hold server obtains the streaming data. An MOH server can support up to 51 audio source IDs. Each audio source, represented by an audio source ID, can stream as unicast and multicast mode, if needed. **Note** If you select **<None>** , the system default MoH audio source service parameter (**Default Network Hold MoH Audio Source ID**) is used for the MoH audio source.
Upload File	To upload an MOH audio source file that does not appear in the drop-down list, click **Upload File**. In the **Upload File** window, either enter the path of an audio source file or navigate to the file by clicking **Browse**. After you locate the audio source file, click the **Upload File** button to complete the upload. After the audio file gets uploaded, the Upload Result window displays the result of the upload. Click **Close** to close this window. **Note** When you upload a file, the file is uploaded to the Cisco Unified Communications Manager server and performs audio conversions to create codec-specific audio files for MOH. Depending on the size of the original file, processing may take several minutes to complete. **Note** Uploading an audio source file to an MOH server uploads the file only to one MOH server. You must upload an audio source file to each MOH server in a cluster by using Cisco Unified Communications Manager Administration on each server. MOH audio source files do not automatically propagate to other MOH servers in a cluster.

Configure Fixed Music On Hold Audio Source

The Music On Hold server supports one fixed-device stream source in addition to the file stream sources. This source represents the fixed audio source, which you configure in the **Fixed MOH Audio Source Configuration** window. The fixed audio source originates from a fixed device that uses the local computer audio driver.

For each cluster, you may define one fixed audio source. You must set up the fixed audio source that is configured per cluster on each MOH server.

Before you begin

Configure Music On Hold Audio. Perform the following procedures:

- Upload Music On Hold Audio File, on page 12
- Convert Music On Hold Files, on page 13
- Configure Music On Hold Audio Source, on page 14

Procedure

Step 1 In the Cisco Unified Communications Manager Administration, choose **Media Resources** > **Fixed MOH Audio Source**.

The **Fixed MOH Audio Source Configuration** window appears.

Step 2 Configure the fields in the **Fixed MOH Audio Source Configuration** window. See the Related Topics section for more information about the fields and their configuration options.

Step 3 Click **Save**.

What to do next

Configure Media Resource Group, on page 21

Related Topics

Fixed Music on Hold Audio Source Fields for Music On Hold, on page 19

Fixed Music on Hold Audio Source Fields for Music On Hold

Table 9: Fixed MOH Audio Source Information

Field	Description
Source ID	This field displays the stream number for this fixed MOH audio source.

Field	Description
Name	Enter a unique name in this field for the fixed MOH audio source. This name can comprise up to 50 characters. Valid characters include letters, numbers, spaces, dashes, dots (periods), and underscores. **Note** For virtual servers, the fixed Music On Hold device cannot specify an audio source that connects through a Universal Serial Bus (USB), because Cisco Unified Communications Manager does not support USB when running on VMware. Internal Music On Hold is supported on VMware.
Allow Multi-casting	Check this check box to specify that this fixed MOH audio source allows multicasting.
Enable (If checked, Name is required.)	To enable this fixed MOH audio source, check this check box.

Table 10: Announcement Settings for Held and Hunt Pilot Calls

Field	Description
Initial Announcement	Choose an initial announcement from the drop-down list box. **Note** To select MOH with no initial announcement, choose the default option, which is **`Not Selected`**. Select **View Details** to view the following Initial Announcement information: • Announcement Identifier • Description • Default Announcement **Note** To disable Initial Announcement completely, set Initial Announcement to **`Not Selected`** and set Initial Announcement Played to **`Only for Queued Calls`**.
Initial Announcement for queuing-enabled Hunt Pilot calls	Choose one of the following options from the drop-down list: • Play announcement before routing to Hunt Member • Play announcement if call is queued

Field	Description
Periodic Announcement	Choose a periodic announcement from the drop-down list: **Note** To select MOH with no periodic announcement, choose the default option, which is **`Not Selected`**. Click the **View Details** link to view the following Periodic Announcement information: • Announcement Identifier • Description • Default Announcement
Periodic Announcement Interval	Enter a value (in seconds) that specifies the periodic announcement interval. Valid values specify 10 to 300. The default value is 30.
Locale Announcement	Locale Announcement depends upon the locale installation package that has been installed.

Configure Media Resource Group

Media Resource Group is a logical grouping of media servers. You may associate a media resource group with a geographical location or a site, as required. You can also form media resource groups to control server usage, or unicast or multicast service type.

Before you begin

Configure Music On Hold Audio. Perform the following procedures:

- Upload Music On Hold Audio File, on page 12
- Convert Music On Hold Files, on page 13
- Configure Music On Hold Audio Source, on page 14

(Optional) Configure Fixed Music On Hold Audio Source, on page 19

Procedure

Step 1 In the Cisco Unified CM Administration, choose **Media Resources** > **Media Resource Group**.

Step 2 Click **Add New** if you have to configure a new Media Resource Group.
The **Media Resource Group Configuration** window appears.

Step 3 Enter search parameters to find a Media Resource Group if you have to configure an existing Media Resource Group.

The system displays the records that match all the criteria in the **Media Resource Group Configuration** window.

Step 4 Configure the following fields in the **Media Resource Group Configuration** window:

- **Name**—Enter a name for the media resource group.
- **Available Media Resources**—From this list, select one or multiple media resources.
- **Selected Media Resources**—Using the arrow key, select one or multiple media resources to use for multicasting.

Step 5 Click **Save**.
This media resource group is then configured to be a member of a Media Resource Group List (MRGL). The MRGL is associated with devices, such as phones.

What to do next

Configure Media Resource Group List, on page 22

Configure Media Resource Group List

Media Resource Group List lists the prioritized media resource groups. An application can select required media resources from among ones that are available according to the priority order that is defined in a media resource group list.

- Held parties determine the media resource group list that a Cisco Unified Communications Manager uses to allocate a Music On Hold resource.
- Following are the two levels of prioritized media resource group list selection:
  - Level two media resource group list—Provides the higher priority level, which is device based. Cisco Unified Communications Manager uses the media resource group list at the device level if this media resource group list is defined.
  - Level one media resource group list—Provides the lower priority level, which is an optional DevicePool parameter. Cisco Unified Communications Manager uses the DevicePool level media resource group list only if no media resource group list is defined in the device level for that device.
- If no media resource group lists are defined, Cisco Unified Communications Manager uses the system default resources. System default resources comprise resources that are not assigned to any existing media resource group. Ensure that system default resources are unicast.

Before you begin

Configure Media Resource Group, on page 21

Procedure

Step 1 In Cisco Unified CM Administration, choose **Media Resources** > **Media Resource Group List**.

Step 2 Click **Add New** if you have to configure a new Media Resource Group List.

The **Media Resource Group List Configuration** window appears.

Step 3 Enter search parameters to find a Media Resource Group List if you have to configure an existing Media Resource Group List.
The system displays the records that match all the criteria.

Step 4 Configure the following fields in the **Media Resource Group List Configuration** window:

- **Name**—Enter a name for the media resource group list.
- **Available Media Resource Groups**—From this list, select one or multiple media resource groups.
- **Selected Media Resource Groups**—Using the arrow key, select one or multiple media resource groups.

Step 5 Click **Save**.

What to do next

View Music on Hold Audio File, on page 23

View Music on Hold Audio File

Perform the following procedure to view music on hold audio files that are stored on the system.

Before you begin

Configure Media Resource Group List, on page 22

Procedure

Step 1 In Cisco Unified CM Administration, choose **Media Resources** > **MOH Audio File Management**.
The **Music On Hold Audio File Management** window appears.

Step 2 View the following information for each record:

- **Check box**—If the audio file can be deleted, a check box appears before the **File Name** column.
- **File Name**—This column displays the audio file name.
- **Length**—This column displays the audio file length in minutes and seconds.
- **File Status**—This column displays one of the following statuses of an audio file:
  - **Translation Complete**—This status appears after a file is uploaded successfully and is available for use as audio files for a music on hold audio source.
  - **In Use**—This status appears after you add a Music On Hold audio source that uses this audio file as its MOH audio source file.

    Note You cannot a delete a file with **In Use** status.

What to do next

Enable Security for Music On Hold, on page 24

Enable Security for Music On Hold

You can enable the security mode of an MOH server in a cluster. Select a value in the **Cluster Security Mode** enterprise parameter so that the Music On Hold devices are automatically enabled for security. Enter one of the following values for this parameter:

- **0**—Implies Non Secure, which means that the cluster allows the phones to register with no security.
- **1**—Implies Mixed, which means that the cluster allows the registration of both secure devices and non-secure devices.

Note The **Cluster Security Mode** enterprise parameter is a noneditable parameter. To change the cluster security mode, you must run the Certificate Trust List (CTL) Client plugin. Then, you must restart Cisco Unified Communications Manager for the parameter change to take effect.

Before you begin

View Music on Hold Audio File, on page 23

Procedure

Step 1 In Cisco Unified CM Administration, choose **System** > **Enterprise Parameters**.

Step 2 In the **Security Parameters** section, set the **Cluster Security Mode** option to **1**.

What to do next

(Optional) Enable Secured Music On Hold through SRTP, on page 25

Configure multicast by performing the following subtasks:

- Plan Music On Hold Server Capacity, on page 27
- Verify Music On Hold Service Parameters, on page 28
- Configure Multicast Music On Hold Audio Sources/Fixed MOH Audio Source, on page 28
- Configure Multicast Music On Hold Server, on page 29
- Configure a Multicast-Enabled Media Resource Group, on page 30
- Configure Multicast Music On Hold over H.323 Intercluster Trunks, on page 31

Enable Secured Music On Hold through SRTP

Cisco Unified Communications Manager enhances the Cisco IP Voice Media Streaming application service to support Secure Real-Time Protocol (SRTP). Hence, when you enable the Cisco Unified Communications Manager cluster or system for security, the MOH server registers with Cisco Unified Communications Manager as an SRTP capable device. If the receiving device is also SRTP-capable, the music media is encrypted before streaming to the receiving device.

Note In a secure mode, the Cisco Unified Communications Manager Administration device page for Music On Hold displays a **Device is trusted** message with a green check box, indicating that it is a trusted device.

Before you begin

Enable Security for Music On Hold, on page 24

Procedure

Step 1 In the Cisco Unified CM Administration, choose **System** > **Enterprise Parameters**.

Step 2 In **Enterprise Parameters** window, set the **Cluster Security Mode** parameter to **Mixed Mode**.

Note The media streaming between the devices is done through SRTP. When calls are secure, an icon with a secured lock appears on the Cisco Unified IP Phone, indicating that the call is protected for both signaling and media.

This parameter indicates the security mode of the cluster. A value of `0` indicates Non Secure (phones register in nonsecure mode); `1` indicates Mixed (the cluster allows the registration of both secure devices and nonsecure devices). Because this parameter is read-only, to change the cluster security mode, you must run the CTL Client plugin.

Step 3 Click **Save**, and restart Cisco Unified Communications Manager for the parameter change to take effect.

What to do next

Configure multicast by performing the following subtasks:

- Plan Music On Hold Server Capacity, on page 27
- Verify Music On Hold Service Parameters, on page 28
- Configure Multicast Music On Hold Audio Sources/Fixed MOH Audio Source, on page 28
- Configure Multicast Music On Hold Server, on page 29
- Configure a Multicast-Enabled Media Resource Group, on page 30
- Configure Multicast Music On Hold over H.323 Intercluster Trunks, on page 31

Unicast and Multicast Audio Sources

Unicast Music On Hold is the system default option. However, you need to configure for multicast, if required. Both multicast and unicast configurations present the same audio-source behavior to held parties. Each audio source is used once, and the stream is split internally and is sent to the held parties. The only difference between multicast and unicast, in this case, is how the data is sent over the network.

Table 11: Differences Between Unicast and Multicast Audio Sources

Unicast Audio Source	Multicast Audio Source
Consists of streams that are sent directly from the MOH server to the endpoint that requests an MOH audio stream.	Consists of streams that are sent from the MOH server to a multicast group IP address. Endpoints that request an MOH audio stream can join multicast MOH, as needed.
A unicast MOH stream is a point-to-point, one-way audio RTP stream between the server and the endpoint device.	A multicast MOH stream is a point-to-multipoint, one-way audio RTP stream between the MOH server and the multicast group IP address.
Unicast MOH uses a separate source stream for each user or connection. As more endpoint devices go on hold through a user or network event, the number of MOH streams increases.	Enables multiple users to use the same audio source stream to provide MOH.
An MOH audio source may be configured with an initial (greeting) announcement, which will be played to unicast held parties. For unicast MOH users, this announcement is heard from the beginning.	For multicast users, this announcement is not heard.
The additional MOH streams can have a negative effect on network throughput and bandwidth.	Multicast MOH conserves system resources and bandwidth.
Extremely useful in networks in which multicast is not enabled or devices are incapable of multicast.	Can be problematic in situations in which a network is not enabled for multicast or the endpoint devices are incapable of processing multicast.
Includes managing devices only.	Includes managing devices, IP addresses, and ports.
No requirement to define the Music On Hold server.	Administrators must define at least one audio source to allow multicasting. To define Music On Hold servers for multicast, first define the server to allow multicasting.
Functions without configuring MOH audio source, MOH server, or media resource group list.	Functions only if both media resource groups and media resource group lists are defined to include a multicast Music On Hold server. For media resource groups, you must include a Music On Hold server that is set up for multicast. These servers are labeled as (MOH) [Multicast]. Also, check the **Use Multicast for MOH Audio** check box when you define a media resource group for multicast.

Note The Multicast MOH Direction Attribute for SIP service parameter determines whether Cisco Unified Communications Manager sets the direction attribute of the Session Description Protocol (SDP) in its multicast Music On Hold (MOH) INVITE message to sendOnly or recvOnly.

If your deployment uses SIP phone uses Release 8.4 and earlier for Cisco Unified IP Phones 7940 and 7960, or SIP phone uses Release 8.1(x) and earlier for Cisco Unified IP Phones 7906, 7911, 7941, 7961, 7970, and 7971, set this parameter to **sendOnly**. Otherwise, leave this parameter set to the default value, **recvOnly**.

Multicast Configuration

Plan Music On Hold Server Capacity

It is crucial to plan the capacity of the deployed and configured hardware and to ensure the support it can provide for the anticipated call volume of the network. You need to know the hardware capacity for MOH resources and consider the implications of multicast and unicast MOH in relation to this capacity. Ensure that network call volumes do not exceed these limits. When MOH sessions reach these limits, an additional load can result in poor MOH quality, erratic MOH operation, or loss of MOH functionality.

Before you begin

- Enable Security for Music On Hold, on page 24
- (Optional) Enable Secured Music On Hold through SRTP, on page 25

Procedure

Step 1 In Cisco Unified CM Administration, choose **Media Resources** > **Music on Hold Server**.

Step 2 In the **Find and List Music On Hold Servers** window, enter the search parameters and click **Find**.
The system displays the records that match all the criteria.

Step 3 Check the check box of the MOH Server for which you want to plan the capacity.
The **Music On Hold (MOH) Server Configuration** window appears.

Step 4 Configure the following fields in the **Music On Hold (MOH) Server Configuration** window:

- **Maximum Half Duplex Streams**—This parameter determines the number of devices that you can place on unicast MOH. By default, this value is set to 250. Set this parameter to the value that is derived from the following formula:

  ```
  (Server and deployment capacity) - ([Number of multicast MOH sources] * [Number of
  enabled MOH codecs])
  ```

  The value of this parameter should be set according to the platform and deployment type (coresident or standalone).

  Note Regarding the maximum suggested number of MOH streams (250 MOH streams on Cisco MCS 7815 and 7825 Series and 500 MOH streams on Cisco MCS 7835 and 7845 Series) – Count each multicast audio source as two MOH streams. For example, for Cisco MCS 7835 and 7845 Series, if three multicast MOH audio sources and four codecs are enabled, no more than 476 unicast MOH streams should be generated at the same time (2 * 3 * 4 + 476 = 500).

- **Maximum Multi-cast Connections**—This parameter determines the number of devices that you can place on multicast MOH. By default, this value is set to 30,000. Set this parameter to a value that ensures that all devices can be placed on multicast MOH, if necessary. Although the MOH server can generate only a finite number of multicast streams (a maximum of 204), many held devices can join each multicast stream. This parameter should be set to a number that is greater than or equal to the number of devices that might be placed on multicast MOH at any given time.

Step 5 Click **Save**.
The changes take place when the streaming to the device is idle.

What to do next

Verify Music On Hold Service Parameters, on page 28

Verify Music On Hold Service Parameters

Perform the following procedure to verify the Music On Hold server and its service parameters:

Before you begin

Plan Music On Hold Server Capacity, on page 27

Procedure

Step 1 In Cisco Unified CM Administration, choose **System** > **Service Parameters**.
The **Service Parameter Configuration** window appears.

Step 2 Select a server from the **Server** drop-down list.
After you select a server, the **Service** field appears.

Step 3 Select a service from the **Service** drop-down list.
The server and service parameters appear in the **Service Parameter Configuration** window.

Step 4 Verify the server and service parameters.

Note All the parameters apply only to the current server except the parameters that are in the cluster-wide groups.

Step 5 Click **Save**.

What to do next

Configure Multicast Music On Hold Audio Sources/Fixed MOH Audio Source, on page 28

Configure Multicast Music On Hold Audio Sources/Fixed MOH Audio Source

For multicast to be available, configure the Cisco Unified Communications Manager services to allow multicasting on MOH audio sources or fixed MOH audio source.

Before you begin

Verify Music On Hold Service Parameters, on page 28

Procedure

Step 1 In Cisco Unified CM Administration, choose **Media Resources** > **Music On Hold Audio Source**.

Step 2 Enter search parameters to find a Music On Hold audio source.
The system displays the records that match all the criteria.

Step 3 In the **Music On Hold Audio Source Configuration** window, check the **Allow Multi-casting** checkbox to allow multicasting.

Step 4 Click **Save**.

What to do next

Configure Multicast Music On Hold Server, on page 29

Configure Multicast Music On Hold Server

After you allow multicast Music On Hold (MOH) on audio sources, you must enable the MOH server for multicast Music on Hold.

When you use multicast MOH and when the devices that listen to multicast MOH streams are not in the same IP network, you must enable multicast routing in the IP network. Take care when you enable the multicast routing to avoid the potential flooding of parts of the network with wrongly sent multicast packets (specially, across WAN links). Disable multicasts on interfaces on which the multicast MOH packets are not required and use the **Max Hops** parameter.

Note To use multicast MOH when you use Media Resource Group and Media Resource Group Lists to implement media-resources access control and when you assign a multicast MOH server to a Media Resource Group, you must also enable multicast MOH for the Media Resource Group.

Before you begin

Configure Multicast Music On Hold Audio Sources/Fixed MOH Audio Source, on page 28

Procedure

Step 1 In Cisco Unified CM Administration, choose **Media Resources** > **Music On Hold Server**.

Step 2 Enter search parameters to find a Music On Hold server.
The system displays the records that match all the criteria.

Step 3 In the **Music On Hold (MOH) Server Configuration** window, check the **Enable Multi-cast Audio Sources on this MOH Server** checkbox.
The **Base Multi-cast IP Address**, **Base Multi-cast Port Number**, and **Increment Multi-cast On** fields are populated automatically. You can modify these values as desired.

Step 4 (Optional) Configure the following fields in the **Music On Hold (MOH) Server Configuration** window:

- **Base Multi-cast IP Address**—Enter the multicast IP addresses that range from 224.0.1.0 to 239.255.255.255.

  Note IP addresses between 224.0.1.0 and 238.255.255.255 fall in the reserved range of IP multicast addresses for public multicast applications. Use of such addresses may interfere with existing multicast applications on the Internet. Use IP addresses in the range that is reserved for administratively controlled applications on private networks (239.0.0.0 - 239.255.255.255).

- **Base Multi-cast Port Number**—Enter the multicast port numbers that include even numbers and range from 16384 to 32766.

  Note Increment multicast on IP address instead of on port number. Doing so results in each multicast audio source to have a unique IP address and helps to avoid network saturation in firewall situations.

- **Increment Multi-cast On**—Click `Port Number` to increment multicast on port number or click **IP Address** to increment multicast on IP address.

Note All MOH audio sources that you configure to allow multicasting are listed in the **Selected Multicast Audio Sources** section of the **Music On Hold (MOH) Server Configuration** window.

Step 5 Click **Save**.

What to do next

Configure a Multicast-Enabled Media Resource Group, on page 30

Configure a Multicast-Enabled Media Resource Group

Multicast Music On Hold (MOH) works only if you assign the Multicast-enabled MOH server to a Multicast-enabled Media Resource Group. Configure this Media Resource Group to be a member of a Media Resource Group List. Then, you can associate the Media Resource Group List with devices, such as phones.

Before you begin

- Assign a multicast-enabled MOH server to a multicast-enabled Media Resource Group for the multicast MOH to work.
- Configure Multicast Music On Hold Server, on page 29

Procedure

Step 1 In Cisco Unified CM Administration, choose **Media Resources** > **Media Resource Group**.

Step 2 Enter search parameters to find a Media Resource Group.
The system displays the records that match all the criteria.

Step 3 Configure the following fields in the **Media Resource Group Configuration** window:

- **Name**—Enter a name for the media resource group

- **Available Media Resources**—From this list, select one or multiple media resources.
- **Selected Media Resources**—Using the arrow key, select one or multiple media resources to use for multicasting.

Step 4 Check the **Use Multi-cast for MOH Audio** check box, if at least one multicast resource is available.

Step 5 Click **Save**.
This media resource group is then configured to be a member of a Media Resource Group List (MRGL). The MRGL is associated with devices, such as phones.

What to do next

Configure Multicast Music On Hold over H.323 Intercluster Trunks, on page 31

Configure Multicast Music On Hold over H.323 Intercluster Trunks

Using the multicast MOH over H.323 intercluster trunk feature, you can multicast MOH to work over H.323 intercluster trunks (ICT).

Consider these guidelines for configuring multicast MOH:

- This feature does not work if any middle box between Cisco Unified Communications Managers does not pass the new fields in Terminal Capability Set (TCS) and OLC message.
- This feature requires no additional configuration for field up multicast MOH, and applies only between Cisco Unified Communications Managers that support single-transmitter multicast.
- The feature remains active by default. To turn off the feature, set the value of the **Send Multicast MOH in H.245 OLC Message** service parameter to **False**. Setting this value can resolve interoperability issues that the feature might cause.

Procedure

Step 1 In Cisco Unified CM Administration, choose **System** > **Service Parameters**.

Step 2 In the **Service Parameter Configuration** window, select a server and the CallManager service.

Step 3 In the **Clusterwide Parameters (Service)** section, set the value of **Send Multicast MOH in H.245 OLC Message** service parameter to **True**.

Step 4 Click **Save**.

Reset or Restart a Music On Hold Server

Perform the following procedure to reset or restart an existing Music On Hold server.

Before you begin

Configure multicast by performing the following subtasks:

- Plan Music On Hold Server Capacity, on page 27
- Verify Music On Hold Service Parameters, on page 28

- Configure Multicast Music On Hold Audio Sources/Fixed MOH Audio Source, on page 28
- Configure Multicast Music On Hold Server, on page 29
- Configure a Multicast-Enabled Media Resource Group, on page 30
- Configure Multicast Music On Hold over H.323 Intercluster Trunks, on page 31

Procedure

Step 1 In Cisco Unified CM Administration, choose **Media Resources** > **Music On Hold Server**.

Step 2 Check the check box for the Music On Hold server that you want to reset, and click **Reset**.
A popup window shows an information message.

Step 3 Click **Restart** to restart the Music On Hold server, or click **Reset** to reset the Music On Hold server.

What to do next

(Optional) Synchronize Music On Hold Server, on page 32

Synchronize Music On Hold Server

To synchronize a Music on Hold Server with the most recent configuration changes, perform the following procedure. After you perform this procedure any outstanding configuration is applied in the least-intrusive manner possible. For example, a reset or restart may not be required on few affected devices.

Procedure

Step 1 In Cisco Unified CM Administration, choose **Media Resources** > **Music On Hold Server**.

Step 2 Enter search parameters to find a Music On Hold server, and click **Find**.
The system displays the search results for the records that match all the criteria.

Step 3 Check the check boxes next to the Music On Hold servers that you want to synchronize. To select all MOH servers in the window, check the check box in the matching records title bar.

Step 4 Click **Apply Config to Selected**.

Step 5 Click **OK**.

Music On Hold Interactions and Restrictions

Music On Hold Interactions

Feature	Interaction
Multicast Music On Hold over H.323 Intercluster Trunks	Using the multicast MOH over H.323 intercluster trunk feature, you can multicast MOH to work over H.323 intercluster trunks (ICT). When a call connects over an intercluster trunk and one of the parties presses the Hold key, MOH streams over the intercluster trunk. If you have turned on the multicast MOH and have configured the holding party and trunk to use the multicast MOH server, MOH streams with multicast. Only one multicast MOH stream streams over the trunk regardless of the number of calls that are put on hold on this trunk.
Music On Hold Failover and Fallback	The MOH server supports Cisco Unified Communications Manager lists and failover as implemented by the software conference bridge and media termination point. Upon failover, the system maintains connections to a backup Cisco Unified Communications Manager, if available. When a Music On Hold server fails during an active Music On Hold session, the held party hears no music from this point. However, this situation does not affect normal call functions.
Call Park and Directed Call Park	Music On Hold allows users to place calls on hold with music that a streaming source provides. Music On Hold allows two types of hold: • User hold—The system invokes this type of hold when a user presses the Hold button or Hold softkey. • Network hold—This type of hold takes place when a user activates the Transfer, Conference, or Call Park feature, and the hold automatically gets invoked. This hold type applies to directed call park because directed call park is a transfer function. However, Directed Call Park uses the Cisco Call Manager service parameter, Default Network Hold MOH Audio Source, for the audio source.
Extension Mobility Cross Cluster—Media resources for the visiting phone	Examples include RSVP Agent, TRP, Music On Hold (MOH), MTP, transcoder, and conference bridge. Media resources are local to the visiting phone (other than RSVP Agents).
Hold Reversion	Cisco Unified Communications Manager supports MOH on a reverted call if MOH is configured for a normal held call.

Music On Hold Restrictions

Restriction	Description
Multicast Music On Hold Support	Computer Telephony Integration (CTI) and media termination point (MTP) devices do not support the multicast Music On Hold feature. If you configure CTI or MTP devices with a multicast MoH device in the media resource group list of the CTI device, call control issues may result. CTI and MTP devices do not support multicast media streaming.
Internet Protocol Support	Multicast Music On Hold supports only IPv4. The Cisco IP Voice Media Streaming Application, which is a component of Music On Hold, supports both IPv4 and IPv6 audio media connections for unicast Music On Hold. Multicast Music On Hold supports IPv4 only. Devices with an IP addressing mode of IPv6 only cannot support multicast.
Distribution of fixed-device audio sources	Cisco Unified Communications Manager does not support distribution of fixed-device (hardware) audio sources across Music On Hold servers within a media resource group.
Unacceptable Audio Quality with G.729a codec	Because the G.729a codec is designed for human speech, if you use it with Music On Hold for music, it may not provide acceptable audio quality.
Cisco Unified Communications Manager System Support	A Cisco Unified Communications Manager cluster or system supports only virtualized deployments on Cisco Unified Computing System (UCS) servers or other Cisco-approved third-party server configurations. You cannot use the Music On Hold feature with an external source (USB audio dongle) for the nodes that provide MOH from an external source.
Multicast Support	The administrator can designate a Music On Hold server as either unicast or multicast, provided that resources exist to support multicast.
Caller-specific MOH Support	Caller-specific MOH is not supported when calls are received or transferred over QSIG tunneling-enabled SIP trunks.
MP3 Format Support	The Music On Hold feature does not support the MP3 format.
Interoperability between H.323 and SIP Protocols	Multicast MOH does not support interoperability between H.323 and SIP protocols.
SRTP Support	Multicast MoH audio streams are not encrypted and do not support SRTP.
Multicast Streams	MTPs do not support multicast streams.
Encryption of Multicast Music On Hold RTP Streams	Cisco Unified Communications Manager does not support encryption of multicast Music On Hold RTP streams. For secure MOH audio, you should not configure multicast audio sources.
Fixed Music On Hold Device	The fixed Music On Hold device cannot specify an audio source that connects through a USB, because Cisco Unified Communications Manager does not support USB when running on VMware. However, VMware supports internal Music On Hold.

Restriction	Description
MOH Server Failure	Cisco Unified Communications Manager takes no action when a Music On Hold server fails during an active Music On Hold session.
Multicast MOH	When an MTP resource gets invoked in a call leg at a site that is using multicast MOH, Cisco Unified Communications Manager falls back to unicast MOH instead of multicast MOH.
Provisioning	If you do not provision the user and network MOH audio source identifiers, or if one or both values are invalid, the caller-specific MOH information in the SIP header is ignored. The call reverts to tone on hold and an invalid MOH audio source alarm is raised.
Header Values	• When both the user and network MOH audio source identifiers are present in the header, any invalid value is replaced by the default value (0). • If both values are zero, or the only value is zero, the header in the incoming INVITE is ignored.
MOH Audio Source Identifier	• If you provide only one MOH audio source identifier in the SIP header, including if a comma appears before or after the MOH audio source identifier value, the same MOH ID is used for both user and network MOH. The SIP trunk populates both the user and the network MOH audio source identifiers in the SIP header so that Call Control always receive both values. • If there are more than two MOH audio source identifier values separated by a comma in the header, then the first two values are used. Subsequent values are ignored.
Administrators for Consistent Caller-specific MOH Configurations	Administrators are responsible to maintain consistent caller-specific MOH configurations when multiple Cisco Unified Communications Manager clusters are involved.
Original Incoming Caller	The original incoming caller to the call center cannot change during the course of the entire call.
MOH Information	The Music On Hold information is shared only across SIP trunks.

Music On Hold Troubleshooting

Music On Hold Does Not Play on Phone

Phone user cannot hear Music On Hold.

- G.729a codec is used with MOH for music, which may not provide acceptable audio quality.
- An MTP resource is invoked in a call leg at a site that is using multicast MoH.

- Verify the IP addressing mode of the device where Music On Hold is played. If the IP addressing mode for the device is IPv6 Only and if Music On Hold is configured for unicast Music On Hold, ensure that a dual-stack MTP is configured and available for media translation.
- When an MTP resource gets invoked in a call leg at a site that is using multicast MoH, the caller receives silence instead of Music On Hold. To avoid this scenario, configure unicast MoH or Tone on Hold instead of multicast MoH.