



## Music On Hold

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This chapter provides information about the integrated Music On Hold (MOH) feature, which allows users to place on-net and off-net users on hold with music that is streamed from a streaming source.

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## Configure Music On Hold

The integrated Music On Hold (MOH) feature allows users to place on-net and off-net users on hold with music that is streamed from a streaming source. The Music On Hold feature allows two types of hold:

- End-user hold
- Network hold, which includes transfer hold, conference hold, and call park hold

Music On Hold also supports other scenarios where recorded or live audio is needed, such as playing a specific MOH depending on the dialed number, caller ID, or IVR interaction of the incoming SIP call. See topics related to caller-specific MOH for more information.

Perform the following steps to configure music on hold.

### Procedure

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#### Step 1

The Cisco IP Voice Media Streaming application gets installed automatically upon installation of Cisco Unified Communications Manager. To enable a MOH server, you must use the Cisco Unified Serviceability application to activate the Cisco IP Voice Media Streaming application. When a server is added, the Cisco Unified

Communications Manager automatically adds the media termination point, conference bridge, annunciator, and music on hold devices to the database.

**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 this default audio source without any other changes.

**Step 2** Configure the music on hold server.

**Step 3** Add and configure audio source files.

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#### Related Topics

[Caller-Specific Music On Hold](#), on page 10

[Caller-Specific MOH Interactions and Limitations](#), on page 10

[Configure a Music On Hold Server](#), on page 34

[Find a Music On Hold Audio Source](#), on page 25

[Music On Hold Audio Sources](#), on page 12

## Configure Multicast

Perform the following steps to configure the various Cisco Unified Communications Manager services to allow multicasting. You must perform all steps for multicast to be available.

#### Procedure

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**Step 1** Configure a music on hold server to enable multicast audio sources.

**Caution** Cisco strongly recommends incrementing multicast on IP address in firewall situations. This results in each multicast audio source having a unique IP address and helps to avoid network saturation.

**Step 2** Configure an audio source to allow multicasting.

**Note** CTI devices do not support the multicast Music On Hold feature. If a CTI device is configured with a multicast MOH device in the media resource group list of the CTI device, call control issues may result. CTI devices do not support multicast media streaming.

**Note** MTP devices do not support multicast media streaming.

**Step 3** Create a media resource group and configure it to use multicast for MOH audio.

**Step 4** Create a media resource group list with a multicast media resource group as the primary media resource group.

**Step 5** Choose the media resource group list that was created for either a device pool or for specific devices.

**Step 6** If necessary, configure the service parameters that affect multicast MOH.

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#### Related Topics

[Music On Hold Audio Source Configuration Settings](#), on page 27

[Music On Hold Server Configuration](#), on page 35

[Multicast and Unicast Audio Sources](#), on page 13

[Multicast Music On Hold Over H.323 Intercluster Trunks](#), on page 15

# Configure Monitoring Music On Hold Performance

Perform the following steps to monitor music on hold performance.

## Procedure

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|---------------|--|
| <b>Step 1</b> | Use the Cisco Unified Communications Manager Real Time Monitoring Tool (RTMT) to check resource usage and device recovery state. |
| <b>Step 2</b> | Search the event log for Cisco IP Voice Media Streaming application entries.   |
| <b>Step 3</b> | Verify that the Cisco IP Voice Media Streaming application service is running.   |
| <b>Step 4</b> | Verify that the MoH device is registered.  |
| <b>Step 5</b> | Search the Media Application trace (CMS) to see what music on hold-related activity that it detects.                             |
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## Music On Hold Feature

The following sections explain the Music On Hold feature by providing definitions, service characteristics, feature functionality with examples, and supported features.

## Music On Hold Terminology

In the simplest instance, music on hold takes effect when phone A is talking to phone B, and phone A places phone B on hold. If Music On Hold (MOH) resource is available, phone B receives music that is streamed from a music on hold server.

The following definitions provide important information for the discussion that follows:

- MOH server - A software application that provides music on hold audio sources and connects a music on hold audio source to a number of streams.
- Media resource group - A logical grouping of media servers. You may associate a media resource group with a geographical location or a site as desired. You can also form media resource groups to control server usage or desired service type (unicast or multicast).
- Media resource group list - A list that comprises 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.
- Audio source ID - An ID that represents an audio source in the music on hold server. The audio source can compose either a file on a disk or a fixed device from which a source stream music on hold server obtains the streaming data. A MOH server can support up to 51 audio source IDs (1 to 51). Each audio source (represented by an audio source ID) can stream as unicast and multicast mode, if needed.

- **Holding party** - In an active, two-party call, the party that initiates a hold action (either user hold or network hold). Example: If party A is talking to party B, and party A presses the Hold softkey to initiate a hold action, party A represents the holding party.
- **Held party** - In an active, two-party call, the party that does not initiate a hold action but is involved. Example: If party A is talking to party B, and party A presses the Hold softkey to initiate a hold action, party B represents the held party.

The following audio source ID selection rules apply for selecting audio source IDs and media resource group lists:

- The system administrator, not the end user, defines (configures) audio source IDs.
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- Holding parties define which audio source ID applies to held parties.
- Cisco Unified Communications Manager implements four levels of prioritized audio source ID selection with level four as highest priority and level one as lowest priority.
  - The system selects audio source IDs at level four, which is directory/line-based, if defined. (Devices with no line definition, such as gateways, do not have this level.)
  - If no audio source ID is defined in level four, the system searches any selected audio source IDs in level three, which is device based.
  - If no level four nor level three audio source IDs are selected, the system selects audio source IDs that are defined in level two, which is Common Device Configuration-based.
  - If all higher levels have no audio source IDs selected, the system searches level one for audio source IDs, which are clusterwide parameters.

The following media resource group list selection rules apply:

- Held parties determine the media resource group list that a Cisco Unified Communications Manager uses to allocate a music on hold resource.
- Two levels of prioritized media resource group list selection exist:
  - 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 such a 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. Be aware that system default resources are always unicast.

## Music On Hold Characteristics

The integrated Music On Hold feature allows users to place on-net and off-net users on hold with music that is streamed from a streaming source. This source makes music available to any possible on-net or off-net

device that is placed on hold. On-net devices include station devices and applications that are placed on hold, consult hold, or park hold by an interactive voice response (IVR) or call distributor. Off-net users include those who are connected through Media Gateway Control Protocol (MGCP)/skinny gateways, IOS H.323 gateways, and 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 FXS ports on IOS H.323/Media Gateway Control Protocol and for Cisco Media Gateway Control Protocol/skinny gateways.

The integrated Music On Hold feature covers media server, data base administration, call control, media resource manager, and media control functional areas.

The music on hold server provides the music resources/streams. These resources register with the Cisco Unified Communications Manager during the initialization/recovery period.

Database administration provides a user interface to allow the Cisco Unified Communications Manager administrator to configure the Music On Hold feature for the device(s). Database administration also provides Cisco Unified Communications Manager call control with configuration information.

Call control controls the music on hold scenario logic.

The media resource manager processes the registration request from the music on hold server and allocates/deallocates the music on hold resources under the request of call control.

Media control controls the establishment of media stream connections, which can be one-way or two-way connections.

You must ensure that an end device is provisioned with information that is related to music on hold before music on hold functions for that device. Initializing a Cisco Unified Communications Manager creates a media resource manager. The music on hold server(s) registers to the media resource manager with its music on hold resources.

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.

## Music On Hold Functionality

For music on hold to function, you must perform the actions in the following list:

- Configure audio sources. For the examples that follow, configure and provision the following audio sources: (ID#5) Thank you for holding and (ID#1) Pop Music 1.
- Configure music on hold servers.
- Configure audio sources. For the examples that follow, configure and provision the following audio sources: Thank you for holding and Pop Music 1.



**Note** Define audio sources first and then set up the music on hold servers, especially when multicast will be used. The user interface allows either step to take place first.



**Note** If an audio source is configured for multicast, the MoH server always transmits the audio stream, regardless of whether devices are held.

- Configure media resource groups. If multicast is desired, check the Use Multicast for MoH Audio check box.




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**Note** CTI and MTP devices do not support the multicast Music On Hold feature. If a CTI or MTP device is configured 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.

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- Configure media resource group lists.
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- Assign media resource group lists and audio sources to devices (to override assignments made to device pools).
- Assign audio sources to lines (to override device settings).

Using the preceding configuration actions, if you define music on hold functionality as follows, the examples that follow demonstrate music on hold functionality for user hold, transfer hold, and call park.

### Media Resource Groups

MoH designates a music on hold server. MRG designates a media resource group.

- MRG\_D comprises MOH\_D.
- MRG\_S\_D comprises MOH\_S and MOH\_D.

### Media Resource Group Lists

MRGL designates a media resource group list.

- MRGL\_D comprises MRG\_D.
- MRGL\_S\_D comprises MRG\_S\_D and MRG\_D (prioritized order).

### Nodes

- Dallas node comprises phone D and MOH\_D.
- San Jose node comprises phone S and MOH\_S.
- Assign phone D audio source ID 5, Thank you for holding or plain music (for both user and network hold), and MRGL\_D.
- Assign phone S audio source ID 1, Pop Music 1 (for both user and network hold), and MRGL\_S\_D.

## User Hold Example

Phone D calls phone S, and phone S answers. Phone D presses the Hold softkey. Result: Phone S receives Thank you for holding announcement or plain music that is streaming from MOH\_S. (MOH\_S has available streams.) When phone D presses the Resume softkey, phone S disconnects from the music stream and reconnects to phone D.

## Transfer Hold Example

Transfer hold serves as an example of network hold.

Phone D calls phone S, and phone S answers. Phone D presses the Transfer softkey. Phone S receives Thank you for holding announcement or plain music that is streaming from MOH\_D. (MOH\_S has no available streams, but MOH\_D does.) After phone D completes the transfer action, phone S disconnects from the music stream and gets redirected to phone X, the transfer destination.

## Call Park Example

Call park serves as an example of network hold.

Phone D calls phone S, and phone S answers. Phone S presses the CallPark softkey. Phone D receives a beep tone. (MOH\_D has no available streams.) Phone X picks up the parked call. Phone S gets redirected to phone X (phone D and phone X are conversing).

## Supported Music On Hold Features

Music On Hold supports the following features, which are listed by category. Feature categories include internet protocol, music on hold server characteristics, server scalability, server manageability, server redundancy, database scalability, and manageability.

### Internet Protocol

Unicast Music On Hold provided by the Cisco IP Voice Media Streaming Application service supports both IPv4 and IPv6 audio media connections. Unicast Music On Hold is configured automatically in dual mode when the platform is configured for IPv6 and the IPv6 enterprise parameter is enabled. Music On Hold supports only IPv4 for the TCP control channel. Music On Hold supports secure media SRTP connections to both IPv4 and IPv6 addresses.



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**Note** Multicast Music On Hold supports only IPv4.

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### Music On Hold Server Characteristics

- Servers stream music on hold from music on hold data source files that are stored on their disks.
- Servers may stream music on hold from an external audio source (for example, looping tape recorder, radio, or CD).
- Music on hold servers can use a single music on hold data source for all source streams and, hence, all connected streams. When multiple music on hold servers are involved, the local server of each music on hold server always stores the music on hold data source files. Cisco Unified Communications Manager does not support distribution of fixed-device (hardware) audio sources across music on hold servers within a media resource group.
- Music on hold data source files have a common filename across all music on hold servers.
- You must ensure that music on hold data source files are uploaded to each MoH server.
- Each audio source receives a feed from either a designated file or a designated fixed source (for example, radio or CD).

- A designated fixed source comprises a single device, which is either enabled or disabled.
- The audio driver on the local machine makes a single fixed source available to the music on hold server.
- Music on hold servers support the G.711 (a-law and mu-law), G.729a, and wideband codecs.
- Music on hold servers register with one primary Cisco Unified Communications Manager node.

### Server Scalability

- Music on hold supports from 1 to 1000 simplex unicast streams per music on hold server.
- Music on hold supports multiple Cisco-developed media-processing applications, including Interactive Voice Response (IVR) and Auto-Attendant (AA). Cisco Unified Communications Manager facilitates this support.
- Music on hold server simultaneously supports up to 50 music on hold data source files as sources.
- Music on hold server supports one fixed-device stream source in addition to the file stream sources. This source comprises the fixed audio source, which gets configured on the Fixed MoH Audio Source Configuration window. This source requires the additional Cisco USB Music-On-Hold-capable adapter.

### Server Manageability

- 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 node(s) that supply MOH from an external source.
- The administrator can specify the source for each source stream that the server provides.
- Administration of stream sources takes place through a browser.

### Server Redundancy

- Music on hold servers support Cisco Unified Communications Manager lists based on associated Call Manager Group settings. The first entry on the list serves as the primary server, and subsequent Cisco Unified Communications Managers on the list serve as backup Cisco Unified Communications Managers in prioritized order.
- Music on hold servers can maintain a primary and backup connection to Cisco Unified Communications Managers from their Cisco Unified Communications Manager list.
- Music on hold servers can re-home to backup Cisco Unified Communications Managers by following the standard procedures that are used by other servers and phones on the cluster.
- Music on hold servers can re-home to their primary server by following standard procedures for other media servers on the cluster.

### Cisco Unified Communications Manager Database Requirements

- When a Cisco Unified Communications Manager is handling a call and places either endpoint in the call on hold, the Cisco Unified Communications Manager can connect the held endpoint to music on hold.



This feature applies for both network hold and user hold. Network hold includes transfer, conference, call park, and so forth.

- A media resource group for music on hold supports having a single music source stream for all connected streams.
- The system supports having music on hold server(s) at a central site without music on hold server(s) at remote sites. Remote site devices that require music on hold service can obtain service from a media resource group across the WAN when service is not available locally.
- You can distribute music on hold servers to any site within a cluster.
- A music on hold server can use a single music on hold data source for all source streams and, hence, all connected streams. When multiple music on hold servers are involved, the music on hold data source may comprise a file that is stored locally on each server.
- The system can detect when the primary media resource group that supplies music on hold for a device is out of streams and can select a stream from the secondary or tertiary media resource group that is specified for that device.
- When it connects a device to music on hold, the system can insert a transcoder when needed to support low-bandwidth codecs.

### Database Scalability

- Cisco Unified Communications Manager can support from 1 to 500 unicast sessions per music on hold server.
- A cluster can support from 1 to more than 20 music on hold servers.
- A cluster can support from 1 to more than 10,000 simultaneous music on hold streams across the cluster.
- A cluster can support from 1 to 500 or more media resource groups for music on hold.
- A media resource group for music on hold can support from 1 to 20 or more music on hold servers.

### Manageability

- The administrator can select media resource group list per device.
- The administrator can select music on hold source stream per device/DN.
- The administrator can select music on consult (network hold) source stream per device/DN.
- The administrator can configure which music on hold servers are part of a specified media resource group.
- The administrator can designate primary, secondary, and tertiary music on hold/consult servers for each device by configuring media resource groups and media resource group lists.
- The administrator can provision multiple music on hold servers.
- The administrator can provision any device that is registered with the system such that any music on hold server can service it in the system.
- All music on hold configuration and administration take place through a browser.
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- The administrator can designate a music on hold server as either unicast or multicast, provided that resources exist to support multicast.



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**Note** CTI devices do not support the multicast Music On Hold feature. If a CTI device is configured with a multicast MoH device in the media resource group list of the CTI device, call control issues may result. CTI devices do not support multicast media streaming.

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- The administrator can reset all music on hold servers.

## Caller-Specific Music On Hold

Cisco Unified Communications Manager can play a different MOH audio source for SIP calls that a phone receives over the SIP trunk, which are then put on hold.

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 PSTN. After the Unified CVP plays prompts and collects information from the user, the MOH stream IDs for user and network hold are relayed to Cisco Unified Communications Manager over the SIP trunk.

After the signaling that contains the MOH audio source stream IDs is received, the call is routed to an agent on the Cisco Unified Communications Manager cluster. If the agent places the call on hold, the caller is played the appropriate MOH audio source according to the signaling information that has been received. If the agent transfers the call to another agent, the caller-specific MOH information in the SIP header is transferred along with the call. You can transfer calls to an agent on the same cluster or to an agent on a different cluster over an SME using SIP trunks.

## Caller-Specific MOH Interactions and Limitations

If the incoming SIP call contains MOH audio source information in the SIP header, Cisco Unified Communications Manager initiates the following actions:

- The MOH audio source is played for the caller when the SIP call is placed on user hold.
- The MOH audio source is played for the caller when the SIP call is placed on network hold.
- The MOH audio source is played for the caller if the call is transferred to another endpoint on the same cluster and subsequently placed on user or network hold.
- When a call is sent on a SIP trunk to another cluster, the MOH audio source information is sent along with the call.
- When a call is sent on a SIP trunk to another cluster in an SME scenario, the MOH audio source information is sent along with the call.
- When a call is transferred to another cluster over a SIP trunk, the MOH audio source information is sent along with the call.

- When a call is either forwarded or redirected to another cluster over a SIP trunk, the MOH audio source information is sent along with the call.

### Limitations

- If the user and network MOH audio source identifiers are not provisioned, 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.
- 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 0, or the only value is 0, the header in the incoming INVITE is ignored.
- If only one MOH audio source identifier is provided 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 are responsible to maintain consistent caller-specific MOH configurations when multiple Cisco Unified Communications Manager clusters are involved.
- The original incoming caller to the call center cannot change during the course of the entire call.
- The music on hold information is only shared across SIP trunks.
- Caller-specific MOH is not supported when calls are received or transferred over QSIG tunneling-enabled SIP trunks.

## Music On Hold Server

The music on hold server uses the Station Stimulus (Skinny Client) messaging protocol for communication with Cisco Unified Communications Manager. A music on hold server registers with the Cisco Unified Communications Manager as a single device and reports the number of simplex, unicast audio streams that it can support. The music on hold server advertises its media type capabilities to the Cisco Unified Communications Manager as G.711 mu-law and a-law, G.729a, and wideband. Cisco Unified Communications Manager starts and stops music on hold unicast streams by sending skinny client messages to the music on hold server.

A music on hold server handles up to 1000 simplex, unicast audio streams. A media resource group includes one or more music on hold servers. A music on hold server supports 51 audio sources, with one audio source that is sourced from a fixed device that uses the local computer audio driver, and the rest that are sourced from files on the local music on hold server.

You may use a single file for multiple music on hold servers, but the fixed device may be used as a source for only one music on hold server. The music on hold audio source files get stored in the proper format for streaming. Cisco Unified Communications Manager allocates the simplex unicast streams among the music on hold servers within a cluster.

The music on hold server, which is actually a component of the Cisco IP Voice Media Streaming application, supports standard device recovery and database change notification.

Each music on hold server uses the local hard disk to store copies of the Music On Hold audio source files. Each audio source file gets distributed to the node(s) when the file is added through the Cisco Unified Communications Manager Administration interface.

**Note**

The administrator must upload Music On Hold audio source files to each MoH server.

Video on Hold (VoH) can be provided instead of MoH by including a VoH server in the Media Resource Group and Media Resource Group List configuration for the Held party. Only the default video configured for the VoH server will be played if the VoH server is selected.

## Music On Hold Audio Sources

When the administrator imports an audio source file, the Cisco Unified Communications Manager Administration interface processes the file and converts the file to the proper format(s) for use by the music on hold server.

- The recommended format for audio source files includes the following specifications:
- 16-bit PCM wav file
- Stereo or mono
- Sample rates of 48 kHz, 32 kHz, 16 kHz, or 8 kHz

## Create Audio Sources

Most standard wav files serve as valid input audio source files, including the following file types:

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

**Note**

The Music On Hold feature does not support the MP3 format.

In creating an audio source, the following sequence takes place:

- The administrator imports the audio source file into the Cisco Unified Communications Manager music on hold server. This step may take some time to transfer the file and convert the file to the proper format(s) for the music on hold server to use.
- The administrator must import the audio source file to each MoH server in each cluster prior to assigning an audio source number to the audio source file.
- The music on hold server uses the local audio source file(s).
- The music on hold server streams the files to held devices Cisco Unified Communications Manager needs or requests.

## Store Audio Source Files

In previous releases, Cisco Unified Communications Manager did not limit the amount of space that MoH files used. The MoH upload tool does not limit the number of uploaded files or the file size. The modified upload JSP pages check the disk usage of existing MoH files and only permit uploads if sufficient space is found.



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**Note** The smallest node on the cluster controls MOH capacity.

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## Manage Audio Sources

After music on hold audio sources are created, their management occurs entirely through Cisco Unified Communications Manager Administration. Choose **Media Resources > Music On Hold Audio Source** to display the Music On Hold (MOH) Audio Source Configuration window. For a given audio source, use this window to add, update, or delete a music on hold audio source. For each audio source file, assign a music on hold audio source number and music on hold audio source name and decide whether this audio source will play continuously and allow multicasting. For an audio source, this window also displays the music on hold audio source file status. See the [Find a Music On Hold Audio Source, on page 25](#) for details.



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**Note** The Music On Hold Audio Source Configuration window uploads audio source files only to a particular node. The window does not provide for automatic copying of audio source files to any other nodes. You must manually upload audio source files to subscriber nodes by accessing the Cisco Unified Communications Manager application on each node.

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### Uploading a New Audio File and the Old File Still Plays

**Problem** When you upload an audio file with the same name as an existing file that is mapped to an Audio Source ID, your users may hear the existing file still playing back.

**Solution** To ensure that the updated file is played, follow these steps:

1. After you upload the new audio file to replace the old one, find the audio source ID you want to change under the **Music On Hold Audio Source Configuration** window.
2. Select a different audio source file, such as the default **SampleAudioSource** and then click **Save**.
3. Switch the source file back to your file you want to use, and then click **Save**.
4. Reset the Music On Hold server so that the changes take effect.

## Multicast and Unicast Audio Sources

Multicast music on hold conserves system resources. Multicast allows multiple users to use the same audio source stream to provide music on hold. Multicast audio sources associate with an IP address.

Unicast music on hold, the system default, uses a separate stream for each user or connection. Users connect to a specific device or stream.



**Note** 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 will be heard from the beginning. For multicast users this announcement will not be heard.



**Note** The MoH feature causes any party that gets placed on hold to hear the same point of the audio source that is streaming, regardless of when the party is placed on hold.



**Note** If you are using the MoH to deliver a spoken announcement when a party is placed on hold, the standard MoH configuration can create a problem. Users do not hear the announcement from the beginning, except for the first party that gets placed on hold: other parties join the announcement (audio source) in progress.



**Note** Both multicast and unicast configurations present the same audio-source behavior to held parties. Each audio source gets used once, and the stream gets split internally and gets sent to the held parties. The only difference between multicast and unicast, in this case, is how the data itself gets sent over the network.



**Note** A MoH audio source may be configured with a periodic announcement that is inserted in the basic MoH audio on a configurable periodic interval. This announcement is heard by both unicast and multicast users. However, the user may be inserted into the MoH audio stream at a point when this announcement is in the middle of being played. This is dependent on whether other held users are already hearing the MoH audio source.

For administrators, multicast entails managing devices, IP addresses, and ports. In contrast, unicast entails managing devices only.

For multicast, 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.

For multicast, an address comprises a combination of an IP address and a port number. Each audio source for multicast requires a set of addresses: one for each format on each MoH server. When configuring the MoH server for multicast, specify whether addresses should be assigned by incrementing the port or the IP address.



**Caution** Cisco strongly recommends incrementing multicast on IP address instead of port number to avoid network saturation in firewall situations. If you follow this recommendation, each multicast audio source has a unique IP address, and you help to avoid network saturation.

The Max Hops field in the Music On Hold (MoH) Server Configuration window indicates the maximum number of routers that an audio source is allowed to cross. If max hops is set to zero, the audio source must remain in its own subnet. If max hops is set to one, the audio source can cross up to one router to the next subnet. Cisco recommends setting max hops to two.

A standards body reserves IP addresses. Addresses for IP multicast range from 224.0.1.0 to 239.255.255.255. The standards body, however, assigns addresses in the range 224.0.1.0 to 238.255.255.255 for public multicast applications. Cisco strongly discourages using public multicast addresses for music on hold multicast. Instead, Cisco recommends using an IP address in the range that is reserved for administratively controlled applications on private networks (239.0.0.0 to 239.255.255.255).

Valid port numbers for multicast include even numbers that range from 16384 to 32767. (The system reserves odd values.)

Multicast 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. Such servers get labeled as (MOH)[Multicast]. Also, check the Use Multicast for MOH Audio check box when you define a media resource group for multicast.

For media resource group lists, which are associated with device pools and devices, define the media resource group list, so the media resource group that is set up for multicast is the first group in the list. This recommended practice facilitates the device efforts to find the multicast audio source first.

In music on hold processing, the held device (the device placed on hold) determines the media resource to use, but the holding device (the device that initiates the hold action) determines the audio source to use.



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**Note** The following restriction exists for multicast music on hold (MoH) when a media termination point (MTP) is invoked. 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.

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**Note** CTI devices do not support the multicast Music On Hold feature. If a CTI device is configured with a multicast MoH device in the media resource group list of the CTI device, call control issues may result. CTI devices do not support multicast media streaming.

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#### **Multicast MoH Direction Attribute for SIP Service Parameter**

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 loads 8.4 and earlier for Cisco Unified IP Phones 7940 and 7960, or SIP phone loads 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 Music On Hold Over H.323 Intercluster Trunks**

The Multicast Music on Hold (MOH) Over H.323 Intercluster Trunk feature allows multicast MOH to work over H.323 intercluster trunks (ICTs). Prior to the implementation of this feature, multicast MOH used bandwidth for each unicast MOH over the same ICT, which wasted bandwidth.

Prior to the implementation of this feature, the H.323 Open Logical Channel (OLC) ACK message carried the IP address and port for multicast MOH. With the implementation of this feature, the H.323 OLC message now carries the IP address and port for multicast MOH, and Cisco Unified Communications Manager adds the mechanism to handle the information in the H.323 OLC message.

When a call connects over an intercluster trunk and one of the parties presses the Hold key, MOH streams over the intercluster trunk. If multicast MOH is turned on and the holding party and trunk are configured to use the multicast MOH server, MOH streams with multicast. Only one multicast MOH stream streams over the trunk regardless how many calls are put on hold on this trunk.

### Send Multicast MOH in H.245 OLC Message Service Parameter

The service parameter, Send Multicast MOH in H.245 OLC Message, controls the Multicast Music On Hold Over H.323 Intercluster Trunk feature. Both Cisco Unified Communications Manager nodes that are involved in a call must support single-transmitter multicast for the setting of this parameter to have any effect. This service parameter affects only the side of the party that places the call on hold and does not affect how the far end carries the multicast transport address. Even if this parameter is turned off, multicast MOH applies for the held-party side of the call as long as the held party has the capability to support single-transmitter multicast.

If you want to configure this feature via the clusterwide service parameter, Send Multicast MOH in H.245 OLC Message, which supports the Cisco CallManager service, choose **System** > **Service Parameters** in Cisco Unified Communications Manager Administration. Then, choose the server and the Cisco CallManager service. From the Send Multicast MOH in H.245 OLC Message drop-down list box, choose True.

The service parameter governs the multicast MOH behavior on H.323 intercluster trunks and devices. The new service parameter does not control multicast MOH over SIP trunks because multicast MOH over SIP trunks does not constitute a new behavior.

### Cisco Unified Communications Manager Administration Configuration Tips

Calls that connect over Cisco Unified Communications Manager intercluster trunks use this feature for 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.

No additional configuration exists for this new feature in addition to the normal configuration for setting up multicast MOH. This feature only applies 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. Do so to resolve interoperability issues that the feature may cause.



#### Note

Multicast MOH does not support interoperability between H.323 and SIP protocols.

## Secured Music On Hold Through SRTP

Cisco Unified Communications Manager 8.6(1) and later enhances the Cisco IP Voice Media Streaming application service to support Secure Real-Time Protocol (SRTP); therefore, when the Cisco Unified Communications Manager cluster or system is enabled for security, the MOH server registers with the 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 check box, indicating that it is a trusted device.

When the Cisco Unified Communications Manager is configured in a secure deployment environment (the Cluster Security Mode enterprise parameter is set to mixed mode), Cisco Unified IP Phones, voice gateways, and other secure capable endpoints are set to encrypted mode. The media streaming between the devices is done through SRTP. When calls are secure, a locked icon displays on the Cisco Unified IP Phone, indicating that the call is protected for both signaling and media.



**Note** When Cisco Unified Communications Manager interrupts the media of an encrypted call, such as when call features are activated, the locked icon is removed from the Cisco Unified IP Phone. The icon is restored when the phone reconnects with the encrypted media. The duration of the media interruption and restoration is short when encrypted Music On Hold is activated.



**Note** Multicast MoH audio streams are not encrypted and do not support SRTP.

## Enable Security for Music On Hold

Music On Hold devices are automatically enabled for security when the enterprise parameter Cluster Security Mode is set to 1 (mixed mode). To configure the Cluster Security Mode enterprise parameter, see [Find a Music On Hold Audio Source, on page 25](#)

## Secured and Non-Secured Music On Hold

The following examples provide scenarios that describe how the locked icon displays when secured and non-secured MOH is inserted into calls.

When a secured MLPP precedence call is put on hold, Cisco Unified Communications Manager inserts a secured MOH to the held party. The media is encrypted and streamed to the held party through SRTP. The secure locked icon displays on the user's phone.

### Example

The following example shows an encrypted MOH for a precedence call.

1. User 2000 dials 77 1000 to reach user 1000. Cisco Unified Communications Manager configured a translation pattern of 77.XXXX to enable users to dial a prefix of 77 to initiate an MLPP Immediate call.
2. Cisco Unified Communications Manager dials user 1000 and user 1000 answers the call.
3. The media between user 2000 and user 1000 is set up with SRTP; therefore, the secure locked icon displays on both IP phones.
4. User 2000 presses the Hold key and Cisco Unified Communications Manager disconnects the media connection between user 2000 and user 1000 and inserts MOH to the device of user 1000. The encrypted

MOH media streams to user 1000 by using SRTP. The locked icon on the IP phone of user 1000 is maintained while MOH plays.

### Example

The following example shows an encrypted MOH for an unsecured call.

1. User 1000 dials user 2000.
2. User 2000 answers the call.
3. The media streaming between user 1000 and user 2000 is unencrypted because the IP phone of user 1000 is not secure.
4. User 1000 presses the Hold key and Cisco Unified Communications Manager disconnects the media connection between user 1000 and user 2000. Cisco Unified Communications Manager inserts MOH to user 2000. Because both the MOH server and the device of user 2000 are capable of encryption, the MOH media plays to user 2000 by using SRTP.

### Example

The following example describes secured MOH playing unencrypted music on hold to an unsecured device.

If a phone is unsecured, when a call on the device is placed on hold, the MOH that is inserted streams unencrypted media to the phone.

1. User 1000 dials 2000.
2. User 2000 answers the call. User 1000's IP phone is an unsecured device.
3. The media stream between user 2000 and user 1000 is set up with RTP.
4. User 2000 presses the Hold key and Cisco Unified Communications Manager disconnects the media connection between user 2000 and user 1000 and inserts music on hold to user 1000. Although MOH is capable of encryption, the receiving device is not SRTP capable; therefore, MOH streams to user 1000 by using RTP.

### Example

The following example describes an unsecured MOH being inserted into a precedence call when the security of MOH is overridden.

If the advanced service parameter Make MOH Non-secure when Cluster Security is Mixed is set to True, the MOH server does not register with Cisco Unified Communications Manager as an SRTP capable device.

1. User 2000 dials user 1000.
2. User 1000 answers the call.
3. The media stream between user 2000 and user 1000 is set up with sRTP. Both IP phones display the locked icon.
4. User 2000 presses the Hold key and Cisco Unified Communications Manager disconnects the media connection between user 2000 and user 1000 and inserts MOH to user 1000. Because the advanced service parameter Make MOH Non-secure when Cluster Security is Mixed is set to True, MOH is streamed to user 1000 by using RTP.

### Example

The following example describes an encrypted Annunciator being inserted for Tone On Hold (TOH).

In cases when MOH is not available, the Annunciator could be inserted to a held party to play Tone On Hold.

For more information about Annunciator, see **Secured and Non-Secured Music On Hold**

1. User 2000 in the local cluster or system dials 86000 to reach user 6000 in the remote cluster or system via the SIP trunk linking the two clusters systems.
2. User 6000 in the remote cluster or system answers the call.
3. The media connection between user 2000 and user 6000 is set up with SRTP; therefore, both IP phones display the secure locked icon.
4. User 6000 in the remote cluster or system presses the Hold key.
5. Cisco Unified Communications Manager in the remote cluster or system disconnects the media connection between user 2000 and user 6000 and inserts the Annunciator to user 6000 via the SIP trunk.

### Example

The following example describes a consultation transfer of a secured call to an SRTP capable device.

When a secured call is transferred, when the caller transferring the call presses the Transfer key, the call is effectively put on hold; therefore, MOH is inserted into the call until the caller transferring the call presses the Transfer key again to complete the transfer.

If the MOH server is also a secured device, the security status of the caller to which the call is being transferred is not downgraded and the call maintains its security status throughout the transfer process.

1. User 2000 dials user 1000.
2. User 1000 answers the call.
3. The media streaming between user 1000 and user 2000 is encrypted. The IP phones of both users displays the secure locked icon.
4. User 2000 presses the Transfer key.
5. Cisco Unified Communications Manager disconnects the media connection between user 1000 and user 2000 and inserts MOH to user 1000. Because both the MOH server and user 1000's IP phone are capable of encryption, the MOH media plays to user 1000 by using SRTP. The locked icon continues to display on user 1000's phone.
6. User 2000 dials user 3000.
7. User 3000 answers the call.
8. The encrypted media connection is established for the consultation call. The locked icon displays on the phones of both user 2000 and user 3000.
9. User 2000 presses the Transfer key again and Cisco Unified Communications Manager disconnects the media connection between user 2000 and user 3000 and encrypted media is then established between user 3000 and user 1000. the locked icons display on the IP phones of both user 3000 and user 1000.

**Example**

The following example describes a consultation transfer of a secured call to an unsecured device.

1. User 2000 dials user 1000.
2. User 1000 answers the call.
3. The media streaming between user 1000 and user 2000 is encrypted and the locked icon displays on the IP phones of user 1000 and user 2000.
4. User 2000 presses the Transfer key.
5. Cisco Unified Communications Manager disconnects the media connection between user 1000 and user 2000 and inserts MOH to user 1000. Because both the MOH server and the receiving device are capable of encryption, the MOH media plays to user 1000 by using SRTP. The locked icon on user 1000's IP phone is maintained.
6. User 2000 dials user 3000.
7. User 3000 answers the call.
8. Because user 3000 is not capable of SRTP, no secure locked icon displays on the IP phone of user 2000 and user 3000.
9. User 2000 presses the Transfer key again. Cisco Unified Communications Manager disconnects the media between user 2000 and user 3000 and unencrypted media is then established between user 3000 and user 1000. The locked icons on the IP phone of user 1000 disappears.

**Example**

The following example describes a consultation transfer of an unsecured call to an SRTP capable device.

In the example, the secure locked icon displays on the device of the caller to which the call was transferred as soon as the caller who transfers the call presses the Transfer key.

1. User 2000 dials user 1000.
2. User 1000 answers the call.
3. The media streaming between user 1000 and user 2000 is unencrypted because the IP phone of user 2000 is not SRTP capable.
4. User 2000 presses the Transfer key.
5. Cisco Unified Communications Manager disconnects the media connection between user 1000 and user 2000 and inserts MOH to user 1000. Because both the MOH server and the receiving device for user 1000 are capable of encryption, the MOH media plays to user 1000 by using SRTP. The locked icon displays on the IP phone of user 1000.
6. User 2000 dials user 3000.
7. User 3000 answers the call.
8. User 2000 presses the Transfer key again and Cisco Unified Communications Manager disconnects the media connection between user 2000 and user 3000. Encrypted media is then established between user 3000 and user 1000 because both devices are SRTP capable. The locked icon displays on the IP phone for user 1000 and user 3000.

### Example

The following example describes a blind transfer of a secured call to an SRTP capable device.

If the caller who is transferring a call presses the Transfer key immediately after dialing the transfer-to-target numbers, the secured MOH is inserted briefly and then removed while the transfer-to-target is ringing. The caller to which the call is transferred hears a ringback tone. Because no media is connected to the caller to which the call is being transferred, no secure locked icon displays on the IP phone. The locked icon displays only when the call is answered.

1. User 2000 dials user 1000.
2. User 1000 answers the call.
3. The media streaming between user 1000 and user 2000 is encrypted. The locked icon displays on the IP phone of user 1000 and user 2000.
4. User 2000 presses the Transfer key.
5. Cisco Unified Communications Manager disconnects the media connection between user 1000 and user 2000 and inserts MOH to user 1000. Because both the MOH server and the receiving device for user 1000 are capable of encryption, the MOH media plays to user 1000 by using SRTP. The locked icon displays on the IP phone of user 1000.
6. User 2000 dials user 3000 and then presses the Transfer key again.
7. The IP phone for user 3000 rings. Cisco Unified Communications Manager removes the MOH from user 1000 and ringback begins on the IP phone for user 1000 while the IP phone for user 3000 rings. The locked icon is removed from the IP phone for user 1000.
8. User 3000 answers the call.
9. The encrypted media connection is established between the IP phone for user 1000 and user 3000. The locked icon displays on the IP phone for user 1000 and user 3000.

### Example

The following example describes a blind transfer of a secured call in a remote cluster or system.

system. In this example, when user 5000 blind transfers the call to user 6000, Cisco Unified Communications Manager in the remote cluster or system first inserts MOH to user 2000 in the local cluster or system, then removes it and inserts Annunciator to user 2000 to play ringback tones. When user 6000 answers the call, the media between user 2000 and user 6000 connects.

When the Annunciator, MOH, and user 6000 in the remote cluster or system all support SRTP, the locked icon on the IP phone for user 2000 displays throughout the entire blind transfer process.

For more information about Annunciator, see the following figure

1. User 2000 dials 85000 to reach user 5000 in the remote cluster or system.
2. User 2000 in the remote cluster or system answers the call.
3. The encrypted media is established between user 2000 and user 5000 in the remote cluster or system. The locked icon displays on the IP phones for user 2000 and user 5000.
4. User 5000 in the remote cluster or system presses the Transfer key.

5. Cisco Unified Communications Manager in the remote cluster or system disconnects the media between user 5000 and user 2000 in the local cluster or system and inserts MOH to user 2000 in the local cluster or system. Because both the MOH server and the receiving IP phone for user 2000 are capable of encryption, the MOH media plays to user 2000 by using SRTP. The locked icon is maintained on the IP phone for user 2000.
6. User 5000 dials user 6000 and presses the Transfer key again.
7. Cisco Unified Communications Manager in the remote cluster or system dials user 6000.
8. Cisco Unified Communications Manager in the remote cluster or system removes the MOH and inserts Annunciator to user 2000 to play the inband ringback tone. Because both the Annunciator and the IP phone for user 2000 is capable of encryption, the ringback tone plays by using SRTP. The locked icon is maintained on the IP phone for user 2000 while the phone receives the ringback tone.
9. User 6000 in the remote cluster or system answers the call.
10. The encrypted media is established between user 2000 and user 6000 in the remote cluster or system. The locked icon displays on the IP phones for user 2000 and user 6000.

**Note**

Ensure that the SIP trunk is set to encrypted mode and check the SRTP Allowed check box on the SIP trunk page.

## Music On Hold System Requirements and Limits

The following system requirements and limits apply to the Music On Hold feature:

- All audio streaming devices that are using the Music On Hold feature support simplex streams. The music on hold server supports up to 1000 simplex streams.
- The music on hold (MOH) server, a part of the Cisco IP Voice Media Streaming application, gets installed with Unified Communications Manager. Use the Cisco Unified Serviceability application to activate the MOH server. You can activate the Cisco IP Voice Media Streaming application on multiple nodes to provide multiple MOH servers for the cluster.
- For a Unified Communications Manager cluster, you may define up to 50 audio sources. For a Unified Communications Manager system, you may define up to 50 audio sources. A Cisco Unified Communications Manager Administration window supports import, addition, update, and deletion of each audio source. The music on hold server also supports one fixed input source. The system supports the following codecs: G.711 a-law/mu-law, G.729a, and wideband.

**Note**

Because the G.729a codec is designed for human speech, using it with music on hold for music may not provide acceptable audio quality.

- For each cluster, you may define up to 50 audio sources from files as well as one fixed audio source. You may define up to 50 audio sources from files as well as one fixed audio source. A Cisco Unified Communications Manager Administration window supports addition, update, and deletion of each audio

source. All nodes use local copies of the same 50 or fewer files. You must set up the fixed audio source that is configured on each MOH server.

- For each cluster, you may define at most 20 music on hold servers. The Cisco Unified Communications Manager Administration window allows update of music on hold servers. The MOH server automatically gets added when a node gets added. You cannot delete the MOH server unless the server gets deleted. The window allows administrators to specify the following characteristics for each MOH server:
  - Name
  - Node (server host name)
  - Device pool
  - Maximum number of unicast and multicast streams
  - Sources to multicast
  - For each multicast source: IP address, port, and time to live (maximum number of router hops)
- Cisco Unified Communications Manager Administration allows definition of at least 500 media resource groups per cluster. Cisco Unified Communications Manager Administration allows definition of at least 500 media resource groups. Each media resource group may include any combination of at least 20 media resources, including music on hold servers, media termination points, transcoders, and conference devices. Music on hold servers in one cluster support at least 10,000 simultaneous music on hold streams. Music on hold servers support at least 256 simultaneous music on hold streams. See topics related to Media Resource Groups in the *Cisco Unified Communications Manager System Guide* for details of media resource groups.
- Cisco Unified Communications Manager Administration allows definition of media resource group lists. See topics related to Media Resource Group lists in the *Cisco Unified Communications Manager System Guide* for details of media resource group lists.
- Modifications to the Cisco Unified Communications Manager Administration device configuration windows for phones and gateways allow the selection of a media resource group list, hold stream source, and consult stream source as optional parameters for a device.
- Modifications to the Cisco Unified Communications Manager Administration Directory Number configuration windows allow selection of a user hold source and a network hold source.
- Modifications to the Cisco Unified Communications Manager Administration Service Parameters allows entry to a clusterwide, default music on hold stream source (default specifies 1) and default media resource group type (default specifies unicast).
- The following restriction exists for multicast music on hold (MOH) when a media termination point (MTP) is invoked. 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.
- CTI devices do not support the multicast Music On Hold feature. If a CTI device is configured with a multicast MOH device in the media resource group list of the CTI device, call control issues may result. CTI devices do not support multicast media streaming.
- Multicast MOH does not support interoperability between H.323 and SIP protocols.
- Ensure multicast on MOH does not have codec mismatch, as transcoders/MTPs do not support multi-cast streams.

- Codec mismatch results in MOH failure and tone on hold plays based on configuration of the trunk/phone device or by an annunciator.
- 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.
- 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. So, devices with an IP Addressing Mode of IPv6 Only cannot support multicast Music On Hold. Under these circumstances, Unified Communications Manager plays a tone, instead of music, when the phone is on hold. However, devices with an IP Addressing Mode of IPv6 only can stream unicast Music On Hold without Unified Communications Manager inserting an MTP for IPv4 to IPv6 conversion. For more information on IPv6, see the [Internet Protocol Version 6 \(IPv6\)](#).
- The Fixed Music On Hold device cannot specify an audio source that connects through a Universal Serial Bus (USB), because Unified Communications Manager does not support USB when running on VMware. VMware does, however, support internal Music On Hold.
- A 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 node(s) that supply MOH from an external source.

## Music On Hold Failover and Fallback

The music on hold 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 one is available.

Cisco Unified Communications Manager takes no special action when a music on hold server fails during an active music on hold session. The held party receives nothing from this point, but this situation does not affect normal call functions.

## Music On Hold Configuration

This section provides information to configure Music On Hold.



### Tip

Before you configure Music On Hold, review the configuration summary task for this feature and topics related to configuring multicast.

### Related Topics

[Configure Monitoring Music On Hold Performance](#), on page 3

[Configure Multicast](#), on page 2

[Configure Music On Hold](#), on page 1



## Music On Hold Audio Source Configuration

This section provides information to configure Music On Hold audio sources. The integrated Music On Hold feature provides the ability to place on-net and off-net users on hold with music streamed from a streaming source. This feature includes the following actions:

- End user hold
- Network hold, which includes transfer hold, conference hold, and park hold

Music On Hold configuration comprises configuration of Music On Hold audio sources and Music On Hold servers.

### Find a Music On Hold Audio Source

Because you might have multiple Music On Hold audio sources in your network, Cisco Unified Communications Manager lets you search for Music On Hold audio sources on the basis of specified criteria. Follow these steps to search for a specific Music On Hold audio source in the Cisco Unified Communications Manager database.

**Note**

During your work in a browser session, Cisco Unified Communications Manager Administration retains your Music On Hold audio source search preferences. If you navigate to other menu items and return to this menu item, Cisco Unified Communications Manager Administration retains your Music On Hold audio source search preferences until you modify your search or close the browser.

#### Procedure

**Step 1** Choose **Media Resources > Music On Hold Audio Source**.

The Find and List Music On Hold Audio Sources window displays. Records from an active (prior) query may also display in the window.

**Step 2** To filter or search records

- a) From the first drop-down list box, choose a search parameter.
- b) From the second drop-down list box, choose a search pattern.
- c) Specify the appropriate search text, if applicable.

**Note**

To add additional search criteria, click the + button. When you add criteria, the system searches for a record that matches all criteria that you specify. To remove criteria, click the – button to remove the last added criterion or click the **Clear Filter** button to remove all added search criteria.

**Step 3** To find all records in the database, ensure the dialog box is empty, click **Find**.

All matching records display. You can change the number of items that display on each page by choosing a different value from the Rows per Page drop-down list box.

**Note**

You can delete multiple records from the database by checking the check boxes next to the appropriate record and clicking **Delete Selected**. You can delete all configurable records for this selection by clicking **Select All** and then clicking **Delete Selected**.

**Step 4** From the list of records that display, click the link for the record that you want to view.

**Note** To reverse the sort order, click the up or down arrow, if available, in the list header.

The window displays the item that you choose.

## Configure a Music On Hold Audio Source

Perform the following procedure to add or update a Music On Hold audio source. Use this procedure 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, you must perform the update procedure to use the new version.

### Procedure

**Step 1** Choose **Media Resources > Music On Hold Audio Source**.

The Find and List Music On Hold Audio Sources window displays.

**Step 2** Perform one of the following tasks:

a) To add a new Music On Hold audio source, click **Add New**.

The Music On Hold Audio Source Configuration window displays.

b) To update a Music On Hold audio source, locate a specific Music On Hold audio source as described in [Find a Music On Hold Audio Source, on page 25](#).

**Step 3** Enter the appropriate settings as described in [Music On Hold Audio Source Configuration Settings, on page 27](#).

**Step 4** Click **Save**.

If you added a Music On Hold Audio Source, the list box at the bottom of the window now includes the new Music On Hold audio source.

**Note** The MOH Audio Source File Status pane tells you about the MOH audio translation status for the added source.

## Delete a Music On Hold Audio Source

Perform the following procedure to delete an existing Music On Hold audio source.



**Note** Deletion does not remove the Music On Hold audio source files. Deletion only removes the association with the MOH Audio Stream number.

## Procedure

- 
- Step 1** Choose **Media Resources > Music On Hold Audio Source**.
- The Find and List Music On Hold Audio Sources window displays.
- Step 2** To locate a specific Music On Hold audio source, enter search criteria and click **Find**.
- A list of Music On Hold audio sources that match the search criteria displays.
- Step 3** Perform one of the following actions:
- a) Check the check boxes next to the Music On Hold audio sources that you want to delete and click **Delete Selected**.
  - b) Delete all Music On Hold audio sources in the window by clicking **Select All** and then clicking **Delete Selected**.
  - c) From the list, choose the name of the Music On Hold audio source that you want to delete and click **Delete**.  
A confirmation dialog displays.
- Step 4** Click **OK**.
- The association of the chosen Music On Hold audio source with an audio stream number gets deleted.
- 

## Music On Hold Audio Source Configuration Settings

The following table describes the configuration settings that are used for configuring Music On Hold audio sources.

**Table 1: Music On Hold Audio Source Configuration Settings**

Field	Description
Music On Hold Audio Source Information	
MOH Audio Stream Number	Choose the stream number for this MOH audio source. To do so, click the drop-down arrow and choose a value from the list that displays. For existing MOH audio sources, this value displays in the MOH Audio Source title.
MOH Audio Source File	Choose the file for this MOH audio source. To do so, click the drop-down arrow and choose a value from the list that displays.
MOH Audio Source Name	Enter a unique name in this field for the MOH audio source. This name can comprise up to 50 characters. Valid characters include letters, numbers, spaces, dashes, dots (periods), and underscores.
Allow Multi-casting	Check this check box to specify that this MOH audio source allows multicasting.

Field	Description
MOH Audio Source File Status	<p>This pane displays information about the source file for a chosen MOH audio source. For an MOH audio source, the following attributes display:</p> <ul style="list-style-type: none"> <li>• InputFileName</li> <li>• ErrorCode</li> <li>• ErrorText</li> <li>• DurationSeconds</li> <li>• DiskSpaceKB</li> <li>• LowDateTime</li> <li>• HighDateTime</li> <li>• OutputFileList <ul style="list-style-type: none"> <li>• ULAW wav file name and status</li> <li>• ALAW wav file name and status</li> <li>• G.729 wav file name and status</li> <li>• Wideband wav file name and status</li> </ul> </li> <li>• Date MOH Audio Translation completed</li> </ul>
<b>Announcement Settings</b>	
Initial Announcement	<p>Choose an initial announcement from the drop-down list.</p> <p><b>Note</b> To select MoH with no initial announcement, choose the <b>Not Selected</b> option.</p> <p>Click the <b>View Details</b> link to view the following Initial Announcement information:</p> <ul style="list-style-type: none"> <li>• Announcement Identifier</li> <li>• Description</li> <li>• Default Announcement</li> </ul> <p><b>Note</b></p> <ul style="list-style-type: none"> <li>• Played by MOH server only when the Audio Source has “Allow Multi-casting” unchecked and “Initial Announcement Played” set to 'Only for queued calls'.</li> <li>• Played by ANN if “Allow Multi-casting” is checked or if “Initial Announcement Played” is set to 'Always.'</li> </ul>

Field	Description
Initial Announcement Played	<p>Choose one of the following to determine when the initial announcement is played:</p> <ul style="list-style-type: none"> <li>• Always- for all calls (default)</li> <li>• Only for queued calls - in situations when no agents are available</li> </ul>
Periodic Announcement	<p>Choose a periodic announcement from the drop-down list box.</p> <p><b>Note</b> To select MoH with no periodic announcement, choose the default option: “Not Selected”.</p> <p>Select View Details to view the following Periodic Announcement information:</p> <ul style="list-style-type: none"> <li>• Announcement Identifier</li> <li>• Description</li> <li>• Default Announcement</li> </ul> <p><b>Note</b> MOH server always plays the periodic announcement regardless of other settings.</p> <p><b>Note</b> Initial announcements are always simulcast to each new caller. Periodic announcements are multicast to queued callers at the specified time interval. Callers who join the queue after the periodic announcement has begun to play may only hear a portion of the announcement.</p>
Periodic Announcement Interval	<p>Enter a value (in seconds) that specifies the periodic announcement interval. Valid values specify 10 to 300. The default value is 30.</p>
Locale Announcement	<p>Locale Announcement depends upon the locale installation package that has been installed.</p> <p><b>Note</b></p> <ul style="list-style-type: none"> <li>• Prompts played by MOH will use the setting for Locale Announcement.</li> <li>• Prompts played by ANN will use the User Locale of the calling party.</li> </ul>
<b>MoH Audio Sources</b>	
(list of MoH audio sources)	<p>For each MoH audio source that has been added, the MoH audio source name displays in this list box. Click the audio stream number of an MoH audio source to configure that MoH audio source.</p> <p><b>Note</b> If &lt;None&gt; is selected, the system default MoH audio source service parameter (Default Network Hold MoH Audio Source ID) is used for the MoH audio source.</p>

Field	Description
Upload File	<p>To upload an MOH audio source file that does not display in the drop-down list box, click the Upload File button. In the Upload File popup window that displays, enter the path to a file that specifies an audio source file. If you do not know the path and file name, search for the file by clicking the Browse... button to the right of the Upload File field. 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 tells you the result of the upload. Click Close to close this window.</p> <p><b>Note</b> Uploading a file uploads the file to the 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.</p> <p>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 Unified Communications Manager on each server. MOH audio source files do not automatically propagate to other MOH servers in a cluster.</p> <p>To upload an MOH audio source file that does not appear in the drop-down list, click <b>Upload File</b>. In the <b>Upload File</b> window, either enter the path of an audio source file or navigate to the file by clicking <b>Browse</b>. After you locate the audio source file, click the <b>Upload File</b> button to complete the upload. After the audio file gets uploaded, the Upload Result window displays the result of the upload. Click <b>Close</b> to close this window.</p> <p><b>Note</b> When you upload a file, the file is uploaded to the 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.</p> <p>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 Unified Communications Manager on each server. MOH audio source files do not automatically propagate to other MOH servers in a cluster.</p>

## Fixed Music On Hold Audio Source Configuration

This section provides information to configure the 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 gets configured in the Fixed MOH Audio Source Configuration window. The fixed audio source gets sourced 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. To do so, connect a Cisco USB MOH sound adapter, which must be ordered separately, into the USB port for each MOH server in the cluster that you want to provide the fixed audio source.



**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, however, is supported on VMware.

## Configure the Fixed Music On Hold Audio Source

Perform the following procedure to configure the fixed music on hold audio source.

### Procedure

- 
- Step 1** Choose **Media Resources > Fixed MOH Audio Source**.  
The Fixed MOH Audio Source Configuration window displays.
- Step 2** To configure and enable a fixed music on hold (MOH) audio source, enter the appropriate settings as described in [Fixed Music On Hold Audio Source Configuration, on page 31](#).
- Step 3** Click **Save**.  
The Fixed MOH Audio Source Configuration window displays an Update Successful status message.
- 

## Delete a Fixed Music On Hold Audio Source

Perform the following procedure to delete an existing fixed music on hold audio source.

### Procedure

- 
- Step 1** Choose **Media Resources > Fixed MOH Audio Source**.  
The Fixed MOH Audio Source Configuration window displays.
- Step 2** If the fixed MOH audio source that displays is enabled (that is, the Enable check box has been checked), you can delete this fixed MOH audio source.  
To delete this fixed MOH audio source, click **Delete**.  
A confirmation dialog box displays.
- Step 3** Click **OK**.  
The chosen fixed music on hold audio source gets deleted from the database.
- 

## Fixed Music On Hold Audio Source Configuration

The following table describes the configuration settings that are used for configuring the fixed music on hold (MOH) audio source.

Table 2: Fixed Music On Hold (MOH) Audio Source Configuration Settings

Field	Description
Fixed MOH Audio Source Information	
Source ID	Displays the stream number for this fixed MOH audio source.
Name	<p>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.</p> <p><b>Note</b> For virtual servers, the Fixed Music On Hold device cannot specify an audio source that connects through a Universal Serial Bus (USB), because Unified Communications Manager does not support USB when running on VMware. Internal Music On Hold, however, is supported on VMware.</p>
Allow Multicasting	Check this check box to specify that this fixed MOH audio source allows multicasting.
Enable (If checked, Name is required.)	Check this check box to enable this fixed MOH audio source.
Announcement Settings	
Initial Announcement	<p>Choose an initial announcement from the drop-down list.</p> <p><b>Note</b> To select MoH with no initial announcement choose the default option: "Not Selected".</p> <p>Select View Details to view the following Initial Announcement information:</p> <ul style="list-style-type: none"> <li>• Announcement Identifier</li> <li>• Description</li> <li>• Default Announcement</li> </ul> <p><b>Note</b> To disable Initial Announcement completely, set Initial Announcement to "Not Selected" <b>AND</b> set Initial Announcement Played to "Only for Queued Calls".</p>
Initial Announcement Played	<p>Choose one of the following to determine when the initial announcement is played:</p> <ul style="list-style-type: none"> <li>• Always- for all calls (default)</li> <li>• Only for queued calls - in situations when no agents are available</li> </ul> <p><b>Note</b> To disable Initial Announcement completely, set Initial Announcement to "Not Selected" <b>AND</b> set Initial Announcement Played to "Only for Queued Calls".</p>



Field	Description
Periodic Announcement	<p>Choose a periodic announcement from the drop-down list box.</p> <p><b>Note</b> To select MoH with no periodic announcement, choose the default option: “Not Selected”.</p> <p>Select View Details to view the following Periodic Announcement information:</p> <ul style="list-style-type: none"> <li>• Announcement Identifier</li> <li>• Description</li> <li>• Default Announcement</li> </ul>
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.

## Music On Hold Server Configuration

This section provides information to configure servers for music on hold for a media resource group.

For any music on hold server that you configure, you may trace the configuration of that server. See the *Cisco Unified Serviceability Administration Guide* for more information.

### Find a Music On Hold Server

Because you might have several music on hold servers in your network, Cisco Unified Communications Manager lets you locate specific music on hold servers on the basis of specific criteria. Use the following procedure to locate music on hold servers.

#### Procedure

**Step 1** Choose **Media Resources > Music On Hold Server**.

The Find and List Music On Hold Servers window displays. Records from an active (prior) query may also display in the window.

**Step 2** To filter or search records

- From the first drop-down list box, choose a search parameter.
- From the second drop-down list box, choose a search pattern.
- Specify the appropriate search text, if applicable.

**Note** To add additional search criteria, click the + button. When you add criteria, the system searches for a record that matches all criteria that you specify. To remove criteria, click the – button to remove the last added criterion or click the **Clear Filter** button to remove all added search criteria.

**Step 3** To find all records in the database, ensure the dialog box is empty, click **Find**.

All matching records display. You can change the number of items that display on each page by choosing a different value from the Rows per Page drop-down list box.

**Note** You can delete multiple records from the database by checking the check boxes next to the appropriate record and clicking **Delete Selected**. You can delete all configurable records for this selection by clicking **Select All** and then clicking **Delete Selected**.

**Step 4** From the list of records that display, click the link for the record that you want to view.

**Note** To reverse the sort order, click the up or down arrow, if available, in the list header.

The window displays the item that you choose.

## Configure a Music On Hold Server

Perform the following procedure to update a music on hold server.



**Note** You cannot add nor delete a music on hold server.

### Procedure

**Step 1** Choose **Media Resources > Music On Hold Server**.

The Find and List Music On Hold Servers window displays. Use the two drop-down list boxes to search for a music on hold server.

**Step 2** To update a music on hold server, click the music on hold server that you want to update. The Music On Hold (MOH) Server Configuration window displays.

**Step 3** Enter or update the appropriate settings as described in [Music On Hold Server Configuration, on page 35](#).

**Step 4** To update this music on hold server, click **Save**.

The music on hold server gets updated in the database.

## Reset or Restart a Music On Hold Server

Perform the following procedure to reset an existing music on hold server.

### Procedure

**Step 1** Locate the music on hold server by using the procedure in the [Find a Music On Hold Server, on page 33](#).

**Step 2** Click the music on hold server that you want to reset.

**Step 3** Click the **Reset** button.

A popup window displays an information message.

**Step 4** After reading the message, click **Restart** to restart the music on hold server or click **Reset** to reset the music on hold server.

**Step 5** To close the popup window, click **Close**.

---

## Synchronize a Music On Hold Server

To synchronize a Music on Hold Server with the most recent configuration changes, perform the following procedure, which will apply any outstanding configuration settings in the least-intrusive manner possible. (For example, a reset/restart may not be required on some affected devices.)

### Procedure

---

**Step 1** Choose **Media Resources > Music on Hold Server**.

The Find and List Music on Hold Servers window displays.

**Step 2** Choose the search criteria to use.

**Step 3** Click **Find**.

The window displays a list of Music on Hold Servers that match the search criteria.

**Step 4** Check the check boxes next to the Music on Hold Servers that you want to synchronize. To choose all Music on Hold Servers in the window, check the check box in the matching records title bar.

**Step 5** Click **Apply Config to Selected**.

The Apply Configuration Information dialog displays.

**Step 6** Click **OK**.

---

## Music On Hold Server Configuration

The following table describes the configuration settings that are used for configuring music on hold servers.

**Table 3: Music On Hold Server Configuration Settings**

Field	Description
Device Information	
Registration	Registration details for the server.
IPv4 Address	IPv4 address for the server.
IPv6 Address	IPv6 address for the server.
Host Server	For existing music on hold servers, this field serves for display only.

Field	Description
Music On Hold Server Name	Enter a unique name for the music on hold server in this required field. This name can comprise up to 15 characters. Valid characters include letters, numbers, spaces, dashes, dots (periods), and underscores.
Description	Enter a description for the music on hold server. This description can comprise up to 50 characters. Ensure Description does not contain ampersand (&), double quotes ("), brackets ([]), less than (<), greater than (>), or the percent sign (%).
Device Pool	Use this required field to choose a device pool for the music on hold server. To do so, click the drop-down arrow and choose a device pool from the list that displays.
Location	<p>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.</p> <p>From the drop-down list, choose the appropriate location for this MOH server.</p> <p>A location setting of Hub_None means that the locations feature does not keep track of the bandwidth that this MOH server consumes. A location setting of Phantom specifies a location that enables successful CAC across intercluster trunks that use H.323 or SIP protocol.</p> <p>To configure a new location, use the System &gt; Location menu option.</p> <p>For more details about locations, see the <a href="#">Administration Guide for Cisco Unified Communications Manager</a>. For an explanation of location-based CAC across intercluster trunks, see the <a href="#">System Configuration Guide for Cisco Unified Communications Manager</a>.</p>
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 Multicast 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	<p>From the drop-down list box, enable or disable whether Unified Communications Manager inserts a trusted relay point (TRP) device with this media endpoint. Choose one of the following values:</p> <ul style="list-style-type: none"> <li>• Off - Choose this value to disable the use of a TRP with this device.</li> <li>• On - Choose this value to enable the use of a TRP with this device.</li> </ul> <p>A Trusted Relay Point (TRP) device designates an MTP or transcoder device that is labeled as Trusted Relay Point.</p> <p>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).</p> <p>If both TRP and MTP are required for the endpoint, TRP gets used as the required MTP. See the <a href="#">System Configuration Guide for Cisco Unified Communications Manager</a> for details of call behavior.</p> <p>If both TRP and RSVPAgent are needed for the endpoint, Unified Communications Manager first tries to find an RSVPAgent that can also be used as a TRP.</p> <p>If both TRP and transcoder are needed for the endpoint, Unified Communications Manager first tries to find a transcoder that is also designated as a TRP.</p> <p>See the <a href="#">System Configuration Guide for Cisco Unified Communications Manager</a> for a complete discussion of network virtualization and trusted relay points.</p>
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.
Multicast Audio Source Information	
Enable Multicast Audio Sources on this MOH Server	<p>Check or uncheck this check box to enable or disable multicast of audio sources for this music on hold server.</p> <p><b>Note</b> 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 group(s) either by removing this MOH server or by changing the multicast setting of each listed group.</p>
Base Multicast IP Address	<p>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.</p> <p><b>Note</b> 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. Cisco strongly recommends using IP addresses in the range that is reserved for administratively controlled applications on private networks (239.0.0.0 - 239.255.255.255).</p>

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. <b>Note</b> 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.
Selected Multicast Audio Sources	
	Only audio sources for which the Allow Multicasting check box was checked display in this listing. If no such audio sources exist, the following message displays:  There are no Music On Hold Audio Sources selected for Multicasting. Click <b>Configure Audio Sources</b> in the top right corner of the page to select Multicast Audio Sources.  From the Related Links drop-down list box, choose <b>Configure Audio Sources</b> and click <b>Go</b> .
No.	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 display.
Audio Source Name	Designates name of audio source that is defined as allowing 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. <b>Note</b> Using high values can lead to network saturation. This field also gets identified as Time to Live.

## Music On Hold Audio File Management Configuration

This section provides information to manage the music on hold audio source audio files. You can manage the audio files that the Music On Hold feature uses as audio sources. The **Media Resources > MOH Audio File Management** menu option allows the administrator to perform the following functions:

- Display a list of the MOH audio files that are stored on the system.
- Upload new MOH audio files.
- Delete MOH audio files.

### Display Music On Hold Audio Files

Use the following procedure to display a list of music on hold audio files that are stored on the system.

## Procedure

---

In Cisco Unified Communications Manager Administration, choose **Media Resources > MOH Audio File Management**.

The Music On Hold Audio File Management window displays.

For each entry in the list of records, the following information displays:

- Check box - If the audio file can be deleted, a check box displays in the first column of the display.
  - 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 the file status, including the following values:
    - Translation Complete - Files with this status uploaded successfully and are available for use as audio files for a music on hold audio source.
    - In Use - After you add a music on hold audio source that uses this audio file as its MOH audio source file, the file status for this audio file changes to In Use. You cannot delete files with this file status.
- 

## Upload a Music On Hold Audio File

Perform the following procedure to upload a music on hold audio file. Uploading the audio file makes it 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 box.

## Procedure

---

**Step 1** Choose **Media Resources > MOH Audio File Management**.

The Music On Hold Audio File Management window displays.

**Step 2** Click the **Upload File** button.

The Upload File popup window displays.

**Step 3** Choose one of the following options:

- a) If you know the path to a file that specifies an audio file, enter the path in the File field.
- b) If you do not know the path and file name, search for the audio file by clicking the **Browse...** button 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 displays in the File field of the Upload File popup window.

**Step 4** To upload the specified audio file, click **Upload**.

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

**Note** Uploading a file 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** To close the Upload Result window, click **Close**.

The newly uploaded audio file gets added to the list of audio files in the MOH Audio File Management window.

## Delete a Music On Hold Audio File

Perform the following procedure to delete an existing music on hold audio file.



**Note** You cannot delete MOH audio files that specify the In Use state. To delete such files, first use the **Media Resources > Music On Hold Audio Source** menu option to find MOH audio sources that use this audio file. Either delete those MOH audio sources or modify them, so they use a different audio file.

### Procedure

**Step 1** Choose **Media Resources > MOH Audio File Management**.

The Music On Hold Audio File Management window displays.

**Step 2** Click the check box to the left of a music on hold audio file that you want to delete.

**Note** You can click several audio files to delete multiple audio files at once. You can also click the **Select All** button to select all audio files for deletion. Use the **Clear All** button to deselect audio files that you have selected.

**Step 3** Click the **Delete Selected** button.

A popup window warns that this file will be deleted permanently.

**Step 4** To complete the deletion, click **OK**.

The audio file gets deleted from the list of music on hold audio files.

## View Music On Hold Server Performance

To view music on hold server performance counters, use the Cisco Unified Real Time Monitoring Tool (RTMT).

The following table details the performance monitoring counters that display in the Cisco Unified Real Time Monitoring Tool Performance window.



Table 4: Music On Hold Performance Counters

Performance Counter Name	Description
MOHConnectionState	Indicates primary and secondary Cisco Unified Communications Manager: <ul style="list-style-type: none"><li>• 1 = Primary</li><li>• 2 = Secondary</li><li>• 0 = Not connected</li></ul>
MOHAudioSourcesActive	Specifies total number of active audio sources, including each supported codec type. If audio Source 1 has mu-law and G.729 enabled, count for this audio source may show 2.
MOHStreamsActive	Specifies total number of active streams. Two potential overhead streams exist for each audio source/codec type: one for actual audio source, another for multicast.
MOHStreamsAvailable	Specifies total number of available simplex streams. Total represents total number of streams that are available in device driver for all devices.
MOHConnectionsLost	Specifies number of times that connection has been lost for the corresponding Cisco Unified Communications Manager.
MOHStreamsTotal	Specifies total number of streams that are processed.

## Check Service States

To check whether the music on hold service is running, use Performance Management.

