



Media Resource Management

Cisco IP telephony functionality requires the use of media resources. Media resources provide services such as annunciator, transcoding, conferencing, music on hold, and media termination. In previous releases, only the local Cisco CallManager with which the media resources registered could access these resources that are but not available to all Cisco CallManagers within the cluster. The media resource manager allows all Cisco CallManagers within the cluster to share these media resources.

The media resource manager enhances Cisco CallManager features by making Cisco CallManager more readily able to deploy annunciator, media termination point, transcoding, conferencing, and music on hold services. Distribution throughout the cluster uses resources to their full potential, which makes them more efficient and more economical.

This chapter covers the following topics:

- [Understanding Media Resources, page 22-1](#)
- [Media Resource Groups, page 22-3](#)
- [Media Resource Group Lists, page 22-4](#)
- [Dependency Records, page 22-6](#)
- [Media Resource Group and Media Resource Group List Configuration Checklist, page 22-6](#)
- [Where to Find More Information, page 22-6](#)

Understanding Media Resources

Media resource management provides access to media resources for all Cisco CallManagers in a cluster. Every Cisco CallManager contains a software component called a media resource manager. The media resource manager locates the media resource that is necessary to connect media streams to complete a feature.

The media resource manager manages the following media resource types:

- Music On Hold (MOH) server
- Unicast conference bridge (CFB)
- Media termination point (MTP)
- Transcoder (XCODE)
- Annunciator (ANN)

The following reasons explain why resources are shared:

- To allow both hardware and software devices to coexist within a Cisco CallManager
- To enable Cisco CallManager to share and access resources that are available in the cluster
- To enable Cisco CallManager to do load distribution within a group of similar resources
- To enable Cisco CallManager to allocate resources on the basis of user preferences

Initialization of the Cisco CallManager creates a media resource manager. Each media termination point, music on hold, transcoder, conference bridge, and annunciator device that is defined in the database registers with the media resource manager. The media resource manager obtains a list of provisioned devices from the database and constructs and maintains a table to track these resources. The media resource manager uses this table to validate registered devices. The media resource manager keeps track of the total devices that are available in the system, while also tracking the devices that have available resources.

When a media device registers, Cisco CallManager creates a controller to control this device. After the device is validated, the system advertises its resources throughout the cluster. This mechanism allows the resource to be shared throughout the cluster.

Resource reservation takes place based on search criteria. The given criteria provide the resource type and the media resource group list. When the Cisco CallManager no longer needs the resource, resource deallocation occurs. Cisco CallManager updates and synchronizes the resource table after each allocation and deallocation.

The media resource manager interfaces with the following major components:

- Call control
- Media control
- Media termination point control
- Unicast bridge control
- Music on hold control
- Annunciator control

Call Control

Call control software component performs call processing, including setup and tear down of connections. Call control interacts with the feature layer to provide services like transfer, hold, conference, and so forth. Call control interfaces with the media resource manager when it needs to locate a resource to set up conference call and music on hold features.

Media Control

Media control software component manages the creation and teardown of media streams for the endpoint. Whenever a request for media to be connected between devices is received, depending on the type of endpoint, media control sets up the proper interface to establish a stream.

The media layer interfaces with the media resource manager when it needs to locate a resource to set up a media termination point or transcoding.

Media Termination Point Control

Media termination point (MTP) provides the capability to bridge an incoming H.245 stream to an outgoing H.245 stream. Media termination point maintains an H.245 session with an H.323 endpoint when the streaming from its connected endpoint stops. Media termination point currently supports only codec G.711. Media termination point can also transcode G.711 a-law to mu-law.

The Media Resource Manager (MRM) provides resource reservation of transcoders within a Cisco CallManager cluster. Cisco CallManager supports simultaneous registration of both the MTP and transcoder and concurrent MTP and transcoder functionality within a single call. A transcoder takes the stream of one codec and transcodes (converts) it from one compression type to another compression type. For example, it could take a stream from a G.711 codec and transcode (convert) it in real time to a G.729 stream. In addition, a transcoder provides MTP capabilities and may be used to enable supplementary services for H.323 endpoints when required.

For each media termination point device and each transcoder that is registered with Cisco CallManager, Cisco CallManager creates a media termination point control process. This media termination point control process registers with the device manager when it initializes. The device manager advertises the availability of the media termination point control processes throughout the cluster.

Annunciator Control

An annunciator enables Cisco CallManager to play pre-recorded announcements (.wav files) and tones to Cisco IP Phones, gateways, and other configurable devices. The annunciator, which works with Cisco CallManager Multilevel Precedence Preemption, enables Cisco CallManager to alert callers as to why the call fails. Annunciator can also play tones for some transferred calls and some conferences.

For each annunciator device that is registered with Cisco CallManager, Cisco CallManager creates an annunciator control process. This annunciator control process registers with the device manager when it initializes. The device manager advertises the availability of the annunciator control process throughout the cluster.

Unicast Bridge Control

A unicast bridge (CFB) provides the capability to mix a set of incoming unicast streams into a set of composite output streams. Unicast bridge provides resources to implement ad hoc and meet-me conferencing in the Cisco CallManager.

For each unicast bridge device that is registered with Cisco CallManager, Cisco CallManager creates a unicast control process. This unicast control process registers with the device manager when it initializes. The device manager advertises the availability of unicast stream resources throughout the cluster.

Music On Hold Control

Music on hold (MOH) provides the capability to redirect a party on hold to an audio server. For each music on hold server device that is registered with Cisco CallManager, Cisco CallManager creates a music on hold control process. This music on hold control process registers with the device manager when it initializes. The device manager advertises the availability of music on hold resources throughout the cluster. Music on hold supports both unicast and multicast audio sources.

Media Resource Groups

Cisco CallManager media resource groups and media resource group lists provide a way to manage resources within a cluster. Use these resources for conferencing, transcoding, media termination, and music on hold (MOH).

Media resource groups define logical groupings of media servers. You can associate a media resource group with a geographical location or a site as desired. You can also form media resource groups to control the usage of servers or the type of service (unicast or multicast) that is desired.

After media resources are configured, if no media resource groups are defined, all media resources belong to the default group, and, as such, all media resources are available to all Cisco CallManagers within a given cluster.

**Tip**

Deactivating the Cisco IP Voice Media Streaming Application deletes associated devices (Annunciator, Conference Bridge, Music-on-Hold, and Media Termination Point) from media resource groups. If the deletion results in an empty media resource group, you cannot deactivate the service; in this case, you must delete the media resource group before deactivating the service.

The following rules govern selection of a resource from a media resource group in a media resource group list:

- Search the first media resource group in a media resource group list to find the requested resource. If located, return the resource ID.
- If the requested resource is not found, search the next media resource group in the media resource group list. Return the resource ID if a match is found.
- If no resource of the requested type is available in any media resource group in a media resource group list, the resource manager attempts to use the resource in the default group.

Example

The default media resource group for a Cisco CallManager comprises the following media resources: MOH1, MTP1, XCODE1, XCODE2, XCODE3. For calls that require a transcoder, this Cisco CallManager distributes the load evenly among the transcoders in its default media resource group. The following allocation order occurs for incoming calls that require transcoders:

```
Call 1 - XCODE1
Call 2 - XCODE2
Call 3 - XCODE3
Call 4 - XCODE1
Call 5 - XCODE2
Call 6 - XCODE3
Call 7 - XCODE1
```

Media Resource Group Lists

Media resource group lists specify a list of prioritized media resource groups. An application can select required media resources from among the available resources according to the priority order that is defined in the media resource group list. Media resource group lists, which are associated with devices, provide media resource group redundancy.

The following rules govern selection of media resource group lists:

- A media resource group list, which is configured in the Media Resource Group List Configuration window, gets assigned to either a device or to a device pool.
- Call processing uses a media resource group list in the device level if the media resource group list is selected. If a resource is not found, call processing may retrieve it from the default allocation.
- Call processing uses media resource group list in the device pool only if no media resource group list is selected in the device level. If a resource is not found, call processing may retrieve it from the default allocation.

Example of Using Media Resource Group List to Group Resources by Type

Assign all resources to three media resource groups as listed:

- SoftwareGroup media resource group: MTP1, MTP2, SW-CONF1, SWCONF2
- HardwareGroup media resource group: XCODE1, XCODE2, HW-CONF1, HW-CONF2
- MusicGroup media resource group: MOH1, MOH2

Create a media resource group list called RESOURCE_LIST and assign the media resource groups in this order: SoftwareGroup, HardwareGroup, MusicGroup.

Result: With this arrangement, when a conference is needed, Cisco CallManager allocates the software conference resource first; the hardware conference does not get used until all software conference resources are exhausted.

Example of Using Media Resource Group List to Group Resources by Location

Assign resources to four media resource groups as listed:

- DallasSoftware: MTP1, MOH1, SW-CONF1
- SanJoseSoftware: MTP2, MOH2, SW-CONF2
- DallasHardware: XCODE1, HW-CONF1
- SanJoseHardware: XCODE2, HW-CONF2

CM1 and CM2 designate Cisco CallManagers.

Create a DALLAS_LIST media resource group list and assign media resource groups in this order: DallasSoftware, DallasHardware, SanJoseSoftware, SanJoseHardware

Create a SANJOSE_LIST media resource group list and assign media resource groups in this order: SanJoseSoftware, SanJoseHardware, DallasSoftware, DallasHardware.

Assign a phone in Dallas CM1 to use DALLAS_LIST and a phone in San Jose CM2 to use SANJOSE_LIST.

Result: With this arrangement, phones in CM1 use the DALLAS_LIST resources before using the SANJOSE_LIST resources.

Example of Using Media Resource Group List to Restrict Access to Conference Resources

Assign all resources to four groups as listed, leaving no resources in the default group:

- MtpGroup: MTP1, MTP2
- ConfGroup: SW-CONF1, SW-CONF2, HW-CONF1, HW-CONF2
- MusicGroup: MOH1, MOH2
- XcodeGroup: XCODE1, XCODE2

Create a media resource group list that is called NO_CONF_LIST and assign media resource groups in this order: MtpGroup, XcodeGroup, MusicGroup.

In the device configuration, assign the NO_CONF_LIST as the device media resource group list.

Result: The device cannot use conference resources. This means that only media termination point, transcoder, annunciator, and music resources are available to the device.

Dependency Records

To find out which media resource group lists are associated the media resource groups, click the Dependency Records link that displays in the Cisco CallManager Administration Media Resource Group Configuration window. To find out more information about the media resource group list, click the record type, and the Dependency Records Details window displays.

To find out which phones or trunks are associated with media resource group lists, click the Dependency Records link that displays in the Cisco CallManager Administration Media Resource Group List Configuration window.

If the dependency records are not enabled for the system, the dependency records summary window displays a message.

For more information about Dependency Records, refer to [Dependency Records](#) in the *Cisco CallManager Administration Guide*.

Media Resource Group and Media Resource Group List Configuration Checklist

[Table 22-1](#) provides a checklist to configure media resource groups and media resource group lists.

Table 22-1 Media Resource Group/Media Resource Group List Configuration Checklist

Configuration Steps		Procedures and Related Topics
Step 1	Create a media resource group.	Media Resource Group Configuration , <i>Cisco CallManager Administration Guide</i>
Step 2	Assign device to the media resource group. (Order has no significance.)	Media Resource Group Configuration , <i>Cisco CallManager Administration Guide</i>
Step 3	Create a media resource group list. (Order has significance.)	Media Resource Group List Configuration , <i>Cisco CallManager Administration Guide</i>
Step 4	Assign a media resource group to a media resource group list.	Media Resource Group List Configuration , <i>Cisco CallManager Administration Guide</i>
Step 5	Assign a media resource group list to a device or device pool.	Device Defaults Configuration , <i>Cisco CallManager Administration Guide</i> Device Pool Configuration , <i>Cisco CallManager Administration Guide</i>

Where to Find More Information

Additional Cisco Documentation

- [Media Resource Group Configuration](#), *Cisco CallManager Administration Guide*
- [Media Resource Group List Configuration](#), *Cisco CallManager Administration Guide*
- [Music On Hold Audio Source Configuration](#), *Cisco CallManager Features and Services Guide*
- [Music On Hold Server Configuration](#), *Cisco CallManager Features and Services Guide*

- [Accessing Dependency Records](#), *Cisco CallManager Administration Guide*
- [Media Termination Points](#), page 27-1
- [Annunciator](#), page 23-1
- [Conference Bridges](#), page 24-1
- [Transcoders](#), page 25-1

