# Configure Enhanced Locations Call Admission Control

## Enhanced Locations Call Admission Control Overview

Enhanced locations call admission control (CAC) provides control over WAN bandwidth in complex WAN topologies as well as distributed deployments, where multiple clusters manage devices in the same physical sites using the same uplinks. Enhanced locations CAC also allows you to control call admissions for immersive video calls, such as TelePresence separately from other video calls.

You can effectively share locations between clusters by enabling the clusters to communicate with one another to reserve, release, and adjust allocated bandwidth for the same locations across clusters.[1]

## Network Modeling

To define how your system handles media, you structure your network model around the concepts of locations and links.

A location represents a local area network (LAN). It could contain endpoints or simply serve as a transit location between links for wide area network (WAN) network modeling.

Links interconnect locations and are used to define bandwidth available between locations. Links represent the WAN link.

Weights are measurements of bandwidth pathways. These are used on links to provide a cost to the effective path. Weights are provided when there is more than one path between any two locations.

Your system calculates shortest paths (least cost) from all locations to all locations and builds effective paths. These have the least overall weight and are the most efficient pathways.

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[1] Locations Media Resource Audio Bit Rate Policy service parameter determines the bit rate value to deduct from the audio bandwidth pools within and between the locations of the parties for an audio-only call when a media resource such as a transcoder is inserted into the media path and for more complex scenarios. This service parameter does not have any impact if there is no media in one of the call legs. In such cases, location bandwidth manager deducts the maximum hop bandwidth that is configured for the source destination from the available bandwidth of that location.

Your system tracks bandwidth across any link that the network model indicates from originating location to terminating location.

# Location Bandwidth Manager

The location bandwidth manager (LBM) service computes the effective path from source location to destination location. It provides useful functions behind the scenes, such as handling bandwidth requests from Unified Communications Manager call control and replicating bandwidth information within the cluster and between clusters. You can find the configured and realtime information this function provides in Serviceability Administration.

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**Note**  Do not change the Location Bandwidth Manager bandwidth or link configurations during production hours as that could unnecessarily spike CPU utilization on the server.

# Intercluster Enhanced Locations Call Admission Control

The intercluster function extends enhanced locations CAC network modeling across multiple clusters. Each cluster manages its own network topology. They then propogate their topologies to other clusters that are configured In the LBM intercluster replication network.

A shared location is a location that is configured with the same name on clusters participating in a the LBM replication network.

This type of location serves the following purposes:

- Enables clusters to share their respective configured topologies with one another

- Lets multiple clusters perform CAC on the same locations

# Enhanced Locations Call Admission Control Prerequisites

- Unified Communications Manager and location bandwidth manager (LBM) manage bandwidth for all types of devices, including IP phones, gateways, and H.323 and SIP trunk destinations. However, intercluster enhanced locations CAC requires SIP intercluster trunks that are assigned to the system shadow location, which is a special location that has no links to other locations and no bandwidth allocations. All other types of devices are supported only when assigned to ordinary (fixed) locations.

- Unified Communications Manager and LBM do not manage bandwidth for media resources. For cases in which media resources change the bandwidth requirement for a call, you can change a global parameter setting that determines whether the minimum or maximum bandwidth is reserved.

# Enhanced Locations Call Admission Control Task Flow

**Procedure**

|  | Command or Action | Purpose |
|---|---|---|
| **Step 1** | Activate the LBM Service, on page 4 | Verify whether the Cisco Location Bandwidth Manager service is activated. For a new system install, you must manually enable the service on the desired nodes. For enhanced locations CAC to work properly, one instance of this service must run on each cluster. |
| **Step 2** | Create an LBM Group, on page 4 | If LBM is not running on the same node, configure an LBM group and assign the LBM group to the server. The LBM group lets you optimize network delay and performance. Each server must communicate with an LBM service to determine the available bandwidth for each call and to deduct bandwidth for the duration of each call. |
| **Step 3** | Configure Locations and Location Links, on page 5 | Configure locations to implement call admission control in a centralized call-processing system. A location represents a local area network (LAN), and can contain endpoints or simply serve as a transit location between links for wide area network (WAN) network modeling. Locations provide bandwidth accounting within a location as well as in or out of a location. Links provide bandwidth accounting between locations and interconnect locations. |
| **Step 4** | (Optional) Assign Intra-Location Bandwidth, on page 5 | Assign intra-location bandwidth to the location, if you do not want to use the default of unlimited bandwidth. By default, when you create a new location, a link from the newly added location to the Hub_None is added as well, with unlimited audio bandwidth, 384 kbps video bandwidth and 384 kbps immersive video bandwidth. You can adjust this allotment to match your network model. |
| **Step 5** | Establish External Communication, on page 6 | Configure the LBM hub group to allow the LBM servers acting as hubs to find LBM servers in remote clusters. This step establishes external communication with those clusters. An LBM service becomes a hub when an LBM hub group is assigned to it. Any LBM servers that are assigned an LBM hub group establish |

| | Command or Action | Purpose |
|---|---|---|
| | | communication with all other LBM servers that are assigned the same or an overlapping LBM hub group. |
| **Step 6** | Configure the SIP Intercluster Trunk for Enhanced Location Call Admission Control, on page 6 | Assign a SIP intercluster trunk (ICT) to the shadow location to establish proper intercluster operation. SIP trunks that are linked to devices with a specific location, such as SIP gateways, can be assigned to ordinary locations. A shadow location is a special location that contains no links to other locations and no bandwidth allocations. |
| **Step 7** | (Optional) Deduct Audio Bandwidth from Audio Pool for Video Calls, on page 7 | Use this procedure if you want to split the audio and video bandwidth deductions into separate pools for video calls. By default, the system deducts the bandwidth requirement for both the audio stream and video stream from the video pool for video calls. |

# Activate the LBM Service

Verify whether the Cisco Location Bandwidth Manager service is activated. For a new system install, you must manually enable the service on the desired nodes. For enhanced locations CAC to work properly, one instance of this service must run on each cluster.

**Procedure**

**Step 1**  From Cisco Unified Serviceability, choose **Tools** > **Service Activation**.

**Step 2**  From the **Server** drop-down list, choose a server, and then click **Go**.

**Step 3**  If needed, check the **Cisco Location Bandwidth Manager** check box.

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

# Create an LBM Group

If LBM is not running on the same node, configure an LBM group and assign the LBM group to the server. The LBM group lets you optimize network delay and performance. Each server must communicate with an LBM service to determine the available bandwidth for each call and to deduct bandwidth for the duration of each call.

**Procedure**

**Step 1**  From Cisco Unified CM Administration, choose **System** > **Location Info** > **Location Bandwidth Manager Group**.

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

- Click **Find** and then choose an existing LBM group from the resulting list to modify the settings for an existing LBM group.
- Click **Add New** ro add a new LBM group.

**Step 3**    Configure the fields on the **Location Bandwidth Manager Group Configuration** window. For more information on the fields and their configuration options, see the system Online Help.

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

# Configure Locations and Location Links

Configure locations to implement call admission control in a centralized call-processing system. A location represents a local area network (LAN), and can contain endpoints or simply serve as a transit location between links for wide area network (WAN) network modeling. Locations provide bandwidth accounting within a location as well as in or out of a location. Links provide bandwidth accounting between locations and interconnect locations.

### Procedure

**Step 1**    From Cisco Unified CM Administration, choose **System** > **Location Info** > **Location**.

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

- Click **Find** and then choose an existing location from the resulting list, to modify the settings for an existing location.
- Click **Add New** to add a new location.

**Step 3**    Configure the fields on the **Location Configuration** window. For more information on the fields and their configuration options, see the system Online Help.

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

# Assign Intra-Location Bandwidth

Assign intra-location bandwidth to the location, if you do not want to use the default of unlimited bandwidth. By default, when you create a new location, a link from the newly added location to the Hub_None is added as well, with unlimited audio bandwidth, 384 kbps video bandwidth and 384 kbps immersive video bandwidth. You can adjust this allotment to match your network model.

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**Tip**    If the audio quality is poor or choppy, lower the bandwidth setting. For example, for ISDN use multiples of 56 kbps or 64 kbps.

**Procedure**

| | |
|---|---|
| **Step 1** | From Cisco Unified CM Administration, choose **System** > **Location Info** > **Location**. |
| **Step 2** | Enter search criteria, click **Find**, and then choose a location from the resulting list. |
| **Step 3** | Click **Show Advanced** to show the intra-location bandwidth fields. |
| **Step 4** | If required, choose the **kbps** radio button for **Audio Bandwidth**, and then enter a bandwidth value in the text box. |
| **Step 5** | If required, choose the **kbps** radio button for **Video Bandwidth**, and then enter a bandwidth value in the text box. |
| **Step 6** | If required, choose the **kbps** radio button for **Immersive Video Bandwidth**, and then enter a bandwidth value in the text box. |
| **Step 7** | Click **Save**. |

# Establish External Communication

Configure the LBM hub group to allow the LBM servers acting as hubs to find LBM servers in remote clusters. This step establishes external communication with those clusters. An LBM service becomes a hub when an LBM hub group is assigned to it. Any LBM servers that are assigned an LBM hub group establish communication with all other LBM servers that are assigned the same or an overlapping LBM hub group.

**Procedure**

| | |
|---|---|
| **Step 1** | From Cisco Unified CM Administration, choose **System** > **Location Info** > **Location Bandwidth Manager (LBM) Intercluster Replication Group**. |
| **Step 2** | Perform one of the following tasks:<br>• Click **Find** to modify the settings for an LBM intercluster replication group, and choose an existing LBM intercluster replication group from the resulting list.<br>• Click **Add New** to add a new LBM intercluster replication group. |
| **Step 3** | Configure the fields on the **Location Bandwidth Manager Intercluster Replication Group Configuration** window. For more information on the fields and their configuration options, see the system Online Help. |
| **Step 4** | Click **Save**. |

# Configure the SIP Intercluster Trunk for Enhanced Location Call Admission Control

Assign a SIP intercluster trunk (ICT) to the shadow location to establish proper intercluster operation. SIP trunks that are linked to devices with a specific location, such as SIP gateways, can be assigned to ordinary locations. A shadow location is a special location that contains no links to other locations and no bandwidth allocations.

**Before you begin**

- A configured SIP intercluster trunk. See for more information.

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**Procedure**

**Step 1**   From Cisco Unified CM Administration, choose **Device** > **Trunk**.

**Step 2**   Enter search criteria, click **Find**, and then choose an existing SIP intercluster trunk from the resulting list.

**Step 3**   From the **Location** drop-down list, choose **Shadow**.

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

# Deduct Audio Bandwidth from Audio Pool for Video Calls

Use this procedure if you want to split the audio and video bandwidth deductions into separate pools for video calls. By default, the system deducts the bandwidth requirement for both the audio stream and video stream from the video pool for video calls.

**Note**   When you enable this feature, CAC includes the bandwidth required for the IP/UDP network overhead in the audio bandwidth deduction. This audio bandwidth deduction equates to the audio bit rate plus the IP/UDP network overhead bandwidth requirement. The video bandwidth deduction is the video bit rate only.

**Procedure**

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

**Step 2**   From the **Server** drop-down list, choose the publisher node.

**Step 3**   From the **Service** drop-down list, choose **Cisco CallManager**.

**Step 4**   From the **Clusterwide Parameters (Call Admission Control)** area, set the value of the **Deduct Audio Bandwidth Portion from Audio Pool for a Video Call** service parameter to **True**.

**Note**   When you configure the **Deduct Audio Bandwidth Portion from Audio Pool for a Video Call** service parameter to **True**, the video and immersive video parameters are considered as media level and not as session level. Hence, for a video call, you can allocate audio and video bandwidths from audio and video pools respectively for each region and location. The video and immersive video bandwidth limits apply only to the video media stream; not to the combination of the audio and video media streams.

**Step 5**   Click **Save**.

# Enhanced Locations Call Admission Control Interactions and Restrictions

## Enhanced Locations Call Admission Control Interactions

*Table 1: Enhanced Locations Call Admission Control Interactions*

| Feature | Interaction |
|---|---|
| Bandwidth | If there is a conflict in bandwidth capacity or weight assignment on the common links or locations, the local cluster uses the minimum of the assigned values. |
| Device support | Your system and LBM manage bandwidth for all types of devices, including IP phones, gateways, and H.323 and SIP trunk destinations. However, intercluster enhanced locations CAC requires SIP ICTs assigned to the system shadow location. All other types of devices are supported only when assigned to ordinary (fixed) locations. |

## Enhanced Locations Call Admission Control Restrictions

*Table 2: Enhanced Locations Call Admission Control Restrictions*

| Restriction | Description |
|---|---|
| Bandwidth Reservation Path | During network failure conditions, the bandwidth reservation path calculated by Unified Communications Manager might not accurately reflect network conditions. There is no satisfactory way to allow for this scenario in the model. |
| Bandwidth and Video Capabilities | If video capabilities are enabled, then bandwidth for audio will be allocated from video. |
| Synchronization | The model created by the system is not perfectly synchronized at all times. Use conservative bandwidth allocations to accommodate this restriction. |