Configure Enhanced Locations Call Admission Control

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Enhanced Locations Call Admission Control Overview

Enhanced Locations Call Admission Control (CAC) lets you regulate audio quality and video availability over complex WAN topologies and intercluster networks. This includes multi-tier and multi-hop networks.

You can create a model of the complete network topology, indicating the different Locations (LANs) and WAN links that connect those locations. For each location and WAN link, assign bandwidth limits that represent the total bandwidth that is available for all calls over that link at one time. If bandwidth is not available for a particular call, the call is rejected with a busy signal. This prevents audio and video quality from degrading as a result of a WAN link becoming oversubscribed.

The intercluster replication functionality of the Location Bandwidth Manger (LBM) Replication Group lets you replicate your location configuration across an intercluster network, thereby making it easier to manage in large intercluster networks.

Enhanced Locations CAC Components

This feature uses the following components:

- Locations—A Location represents a LAN. It could contain endpoints or simply serve as a transit location between links for WAN network modeling. Cisco Unified Communications Manager supports up to 2000 locations.
- Links—The connection between two locations. When configuring this feature, you assign bandwidth allocations and weights for each link.
- Weight—The relative priority of the link in forming the effective path between any pairs of locations. Weights are used only when multiple paths exist between two locations. Weights are used to calculate the effective path (the path with the least cumulative weight).

- Bandwidth Allocations—The total bandwidth allocated for a particular type of traffic (audio, desktop video, immersive video) over a specific link. Bandwidth can also be allocated for intralocation calls (the default setting is Unlimited).
- Location Bandwidth Manager (LBM)—A feature service that must be activated in Cisco Unified Serviceability for Enhanced Locations CAC to work. This service assembles the network model and computes the effective path between locations by adding the weight of all links and locations between the source and destination, and choosing the path with the least cumulative weight.

Locations Relationship to Regions

The Locations configuration of Enhanced Locations Call Admission Control works with Regions to manage bandwidth for calls:

- The bandwidth allocations within the Region Configuration assigns the total amount of bandwidth that the endpoints in a call between two regions can use.
- The bandwidth allocations within Locations Configuration assigns the total amount of bandwidth that all calls between those locations can use. For an individual call, the bandwidth within the Regions Configuration is deducted from the amount of bandwidth that the location configuration makes available. For example, if the Locations configuration specifies that 160 kb/s of bandwidth is available over a particular link, that link can support two G.711 calls at 80 kb/s each simultaneously.

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

Cisco Unified Communications Manger supports up to 2,000 locations and 2,000 regions per cluster.

Intercluster LBM Replication

The Intercluster Replication capability of the Location Bandwidth Manager Hub Group lets you replicate your locations and link assignments across the larger intercluster network. You can assign LBMs to the LBM Hub role, which lets them actively replicate locations and link information across a meshed intercluter network. LBM hubs discover each other through their common connections and form a fully-meshed replication network. LBMs that are assigned a spoke role participate indirectly in intercluster replication through the LBM hubs in their cluster.

Intercluster Topology Management

There are multiple ways to configure and manage your intercluster network. The following table summarizes two approaches for configuring and managing the intercluster topology:

Design Approach	Description
Location and Link Management	Use a single cluster to configure and manage bandwidth allocations for all links across the intercluster network. This approach simplifies the configuration overhead, particularly in deployments with many common locations. The intercluster configuration approach is as follows: In the management cluster, configure all locations and links (including bandwidth allocations and weights) for the entire topology. This information will be replicated to the intercluster network. For the other clusters in the topology: • Configure locations for the local cluster only. This is solely to associate devices to a location. • Do not configure link information. • Leave all bandwidth allocations in the local cluster as **Unlimited**. If the management cluster replicates bandwidth allocations that are less than the local cluster, the more restrictive configuration will be applied.
Intercluster Enhanced Locations CAC	With this approach: • Within each cluster, configure the local locations and link information to the neighboring cluster only. • Assign link information, including weighth and bandwidth allocation, to neighboring clusters only. The rest of the topology gets replicated by the • The Hub_None location must be renamed in each cluster or it will be a common location across clusters. • Each cluster requires a unique Cluster ID. **Note** It;s critical for replication to name clusters consistenly across all clusters.

Enhanced Locations CAC Prerequisites

Make sure that you understand your LAN and WAN network topology before you attempt to configure this feature. This is required in order to allocate bandwidth for locations and links.

Enhanced Locations CAC Task Flow

Complete these tasks to configure Enhanced Locations Call Admission Control on your system.

Procedure

	Command or Action	Purpose
Step 1	Activate Location Bandwidth Manager, on page 4	The Cisco Location Bandwidth Manager feature service must be running on at least one cluster node.
Step 2	Configure LBM Group, on page 5	By default, the Cisco CallManager service communicates with the local LBM service. However, LBM groups can be used to manage this communication, providing an active and standby LBM for redundancy.
Step 3	Configure Locations and Links, on page 5	Create the locations (LANs) for your network and assign bandwidth allocations for the WAN links that connect those locations.
Step 4	Configure LBM Intercluster Replication Group, on page 6	Create an intercluster replication group that replicates configured CAC information to other clusters.
Step 5	Configure SIP Intercluster Trunks, on page 6	Assign the **Shadow** location to the SIP intercluster trunks in your network.
Step 6	Configure Call Admission Control Service Parameters, on page 7	Optional. Configure service parameter settings for Call Admission Control. The default settings may be sufficient for many deployments.

Activate Location Bandwidth Manager

For Enhanced Locations Call Admission Control, you must activate the Cisco Location Bandwidth Manager feature service on at least one node in the cluster. This service is off by default.

Procedure

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

Step 2 From the **Server** drop-down, select the cluster node on which you want the service to run and click Go.

Step 3 Under **CM Services**, check the **Cisco Location Bandwidth Manager** service

Step 4 Click **Save**.

Step 5 Repeat this task if you want to start the service on addiitonal nodes.

Note
Cisco recommends running the Cisco Location Bandwidth Manager service on each subscriber node in the cluster that is also running the Cisco CallManager service.

Configure LBM Group

Use this procedure to configure an LBM Group. By default the Cisco CallManager service communicates with the local LBM service. However, LBM groups can be used to manage this communication, providing an active and standby LBM for redundancy.

Note The order in which the Cisco CallManager service uses the LBM is as follows:

- LBM Group designation
- Local LBM (co-resident)

Procedure

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

Step 2 Click **Add New**.

Step 3 Assign a **Name** to the group.

Step 4 From the **Active Member** drop-down, select the active member of this group.

Step 5 From the **Standby Member** drop-down, select a desired standby to be used when the active member is unavailable.

Step 6 Click **Save**.

Configure Locations and Links

Use this procedure to create the locations (LANs) in your network. Assign total bandwidth and weights for the calls that use the WAN links between those locations. Refer to the online help for help with the fields and their settings.

Procedure

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

Step 2 Click **Add New** to create a new location.

Step 3 Assign a **Name** for the location.

Step 4 In the **Links - Bandwidth Between This Location and Adjacent Locations** area, configure settings for WAN links to a another location:

a) Select a second location from the **Location** list box.
b) Configure the **Weight** that reflects the relative priority of this link in forming the effective path.
c) Configure total bandwidth for audio, video, and immersive video (TelePresence) calls.
d) Repeat these substeps to configure links to any additional locations.

Step 5 Optional. Expand the **Intra-location - Bandwidth for Devices Within This Location** area and configure total bandwidth allocations for intralocation calls for the newly created location. The default setting for all media types for these calls is **Unlimited**.

Step 6 In the **Modify Settings to Other Locations** area, configure RSVP settings to other locations:

a) In the **Location** column select the other location.
b) Select the **RSVP Setting** for calls between these locations.
c) Repeat these substeps to add RSVP settings for calls with additional locations.

Step 7 Click **Save**.

Step 8 Repeat this procedure to create additional locations and to configure links to and from those new locations.

Configure LBM Intercluster Replication Group

Use this procedure to configure an LBM Intercluster Replication Group. This is required to replicate Enhanced Locations Call Admissions Control bandwidth information across the intercluster network.

Procedure

Step 1 From Cisco Unified CM Administration, choose **System** > **Location Info** > **Location Bandwidth Manager (LBM) Intercluster Replication Group**.

Step 2 Click **Add New**.

Step 3 Enter a **Name** for the group.

Step 4 In the **Bootstrap Servers** area, assign one or more LBM servers to be responsible for replicating connectivity information to other hubs.

Step 5 In the **Role Assignments** area, use the up and down arrows to select the local LBM servers that will act as hubs, and the LBM servers that will remain as spokes.

Step 6 Click **Save**.

Configure SIP Intercluster Trunks

With Enhanced Locations Call Admission Control, you must assign the Shadow location to the SIP intercluster trunks in your intercluster network.

Procedure

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

Step 2 Click **Find** and select the appropriate intercluster trunk.

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

Step 4 Complete any other fields that you want in the **Trunk Confiiguration** window. For help with the fields and their settings, see the online help.

Step 5 Click **Save**.

Step 6 Repeat this task for any other intercluster trunks that will replicate information for Enhanced Locations Call Admission Control.

Configure Call Admission Control Service Parameters

Use this procedure to configure optional Service Parameters for Enhanced Locations Call Admission Control.

Procedure

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

Step 2 From the **Server** drop-down, select a cluster node.

Step 3 Configure service parameters for the **Cisco CallManager** service:

a) From the **Service** drop-down, select **Cisco CallManager**.
b) In the **Clusterwide Parameters (Call Admission Control)** area, configure any service parameters. For parameter help descriptions, click the name of the parameter in the GUI.
c) Click **Save**.

Step 4 Configure settings for the **Cisco Location Bandwidth Manager** service:

a) From the **Service** drop-down, select **Cisco Location Bandwidth Manager**.
b) Configure any service parameters that you want. For parameter help descriptions, click the name of the parameter in the GUI.
c) Click **Save**.

Enhanced Locations CAC Interactions Restrictions

The following table displays feature interactions and restrictions for Enhanced Locations Call Admission Control.

Feature	Interactions and Restrictions
LBM Security Mode	By default, the LBM Security Mode is Insecure. You can reconfigure this setting with the **LBM Security Mode** enterprise parameter. This parameter can be set to **Secure**, **Insecure** or **Mixed**. The **Mixed** setting can be used temporarily to maintain communication while you are securing all of your clusters, following which you can change the setting to **Secure**. After changing this parameter, you must reset all Cisco LBM Service Hubs in the cluster for this to take effect.

Feature	Interactions and Restrictions
Audio Bandwidth Deduction in Video Calls	By default, bandwidth for the audio portion of a video call is deducted from the video pool. You can reconfigure the system so that the audio portion of a video call is deducted from the audio pool by setting the **Deduct Audio Portion from Audio Pool for Video Calls** service parameter to **True** (the default setting is **False**).
Video Call Classification	Cisco TelePresence endpoints have a nonconfigurable video call classification of **Immersive**. Other endpoints have a nonconfigurable video call classification of **Desktop**. For SIP trunks, you can set the video classification (Desktop, Immersive or Mixed) by configuring the **Video Call Traffic Class** within the associated SIP Profile.
Media Resources	Bandwidth for media resources is not allocated via Call Admissions Control.
Locations Serviceability	The Cisco Unified Serviceability interface contains additional tools for managing and monitoring the Locations topology. For details, see the "Locations" topics in the *Cisco Unified Serviceability Administration Guide*.
Session Bandwidth Modifiers	You can assign which Session Bandwidth Modifiers are used by SIP endpoints within the SIP Profile Configuration window.
Bandwidth Allocation Conflicts	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.
Network Failures	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.
Synchronization Issues	The model created by the system is not perfectly synchronized at all times. Use conservative bandwidth allocations to accommodate this restriction.
Clustering over the WAN	For deployments with clustering over the WAN and local failover, intracluster LBM traffic is already calculated into the WAN bandwidth calculations.

Feature	Interactions and Restrictions
Flexible DSCP Marking	For additional QoS, you can use DSCP marking to assign markings that prioritize certain types of call flows over others. For example, you can prioritize audio over video so that even if the network is congested, blocking video media, basic communication can continue via audio. You can configure DSCP marking in two ways: • Service Parameters—Configure clusterwide DSCP defaults within the **Service Parameter Configuration** window's **Clusterwide Parameters (System - QoS)** section. • SIP Profile—Configure customized DSCP settings in a SIP Profile and apply them to certain groups of SIP devices. This setting overrides the clusterwide default.
APIC-EM Controller	You can use an APIC_EM Controller to manage SIP media flows for external QoS management. For details, refer to the *Feature Configuration Guide for Cisco Unified Communications Manager*.