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Unified CM Enhanced Locations CAC Design Session and Deployment

BRKUCC-2667

TOMORROW starts here.

Agenda

- Enhanced Locations CAC (E-LCAC) Architecture – Concepts and Components
  - Network Modeling using Locations, Links, Weights, Effective Path
  - Locations Bandwidth Manager (LBM)
  - Inter-Cluster E-LCAC with LBM
- Design and Deployment
  - Upgrade and Migration
  - Sizing and Performance
  - Telepresence and UC Video Interoperability

Objectives

After Completing This Session You Will Be Able To:

- Understand the purpose Enhanced Location CAC (E-LCAC), and Telepresence Call Admission Control (TP-CAC) features, what problems they solve and how they function
- Understand the Configuration Aspects of the Features and How They Apply
- Design and Deploy Enhanced Locations CAC Solutions using the Best Practices, Recommendations and Guidelines

Architecture:
Concepts and Components

LCAC Limitations

Limited WAN Topology Support:

- Locations supported simple hub and spoke topologies and could not model real customer WAN networks (multi-tier, multi-hop)
- Bridge the gap between RSVP and Locations CAC

Multi Cluster Support:

- Multiple Clusters that managed endpoints in same branch sites could only inefficiently subdivide inter-branch bandwidth to avoid quality degradation (Ships in the night CAC)

TelePresence Support:

- No CAC Support
- Telepresence and UC or 3rd party video on a single cluster
- Limited CAC support for TelePresence video interoperability (P2P calls without an MCU)

E-LCAC Solutions

Network Modeling:

- Convert UCM locations to a model capable of supporting real network topologies

Inter-Cluster (Inter-cluster) CAC:

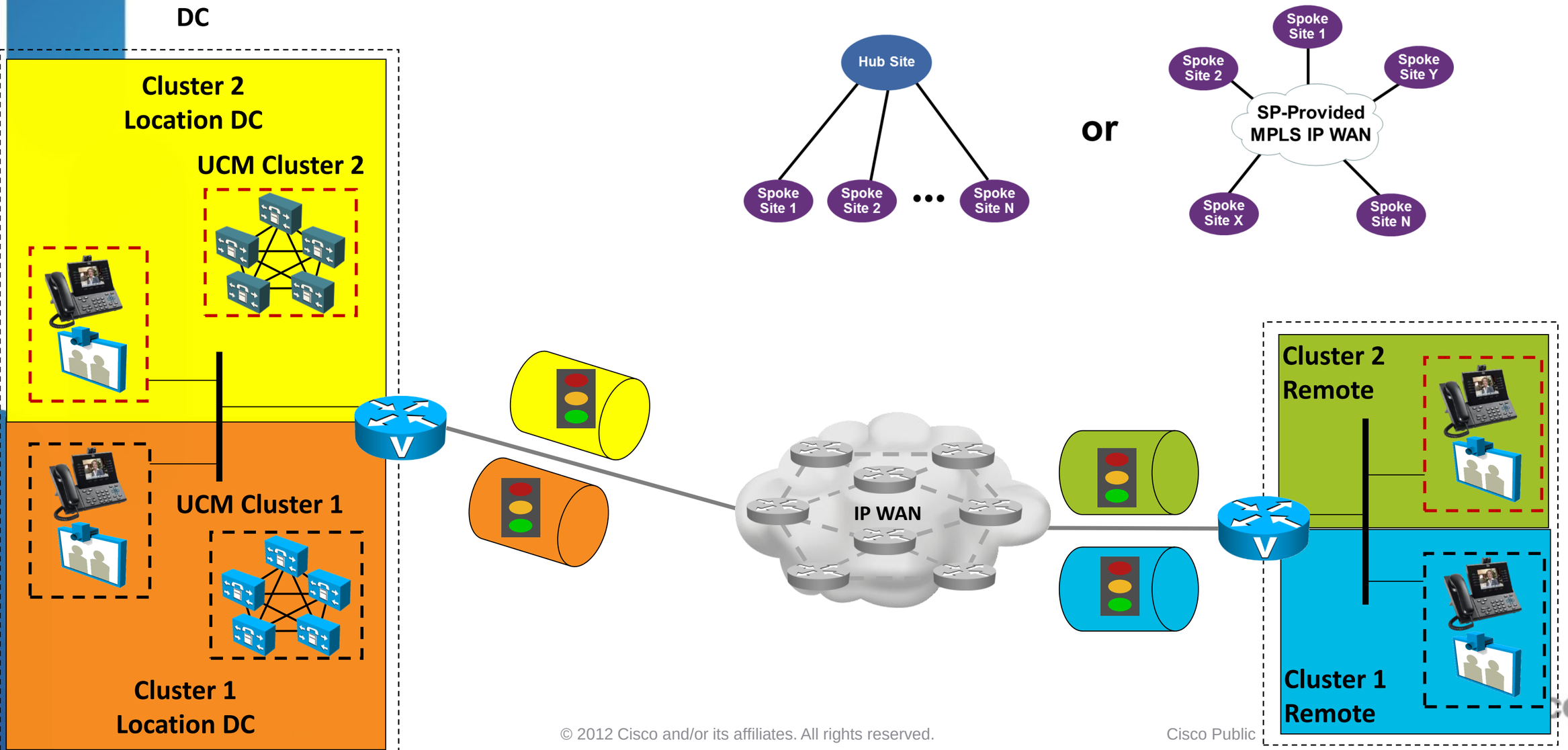
- Implement a bandwidth-accounting scheme that works between multiple Unified CM clusters and dynamically learns the topology from one another

Immersive Bandwidth Allocations:

- Implement an immersive BW pool in locations CAC
- Provide better CAC support for POINT-TO-POINT interop calls

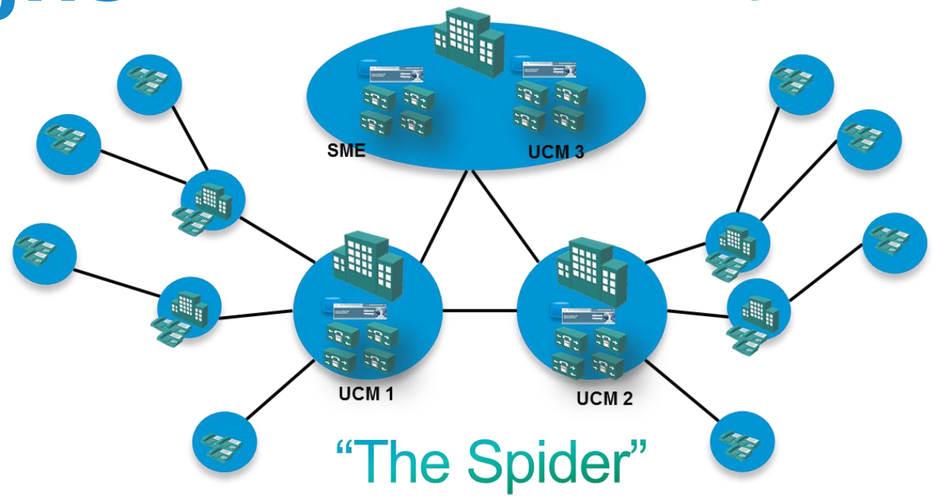
High Level Overview of Locations CAC Pre-9.0

Pre-9.0 Locations CAC Supported WAN Designs

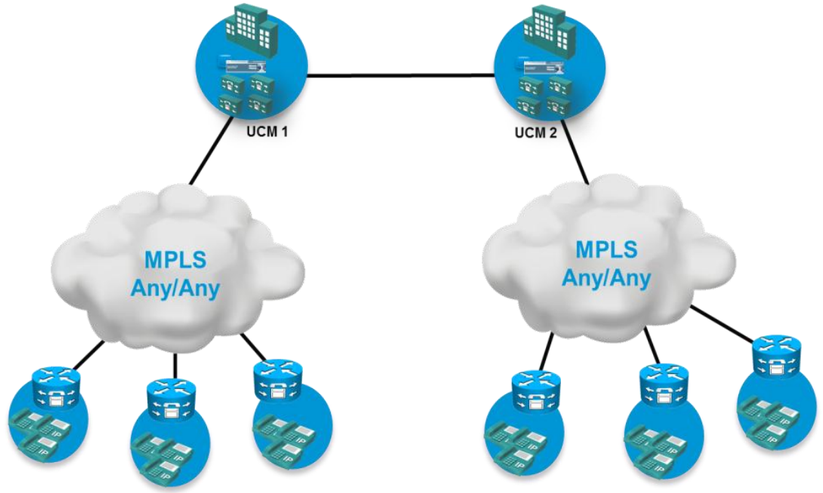


Unified CM 9.0 Supports "More Flexible" WAN Designs

Multi-Cluster SME Design



Dual DC / Dual MPLS Cloud



DC

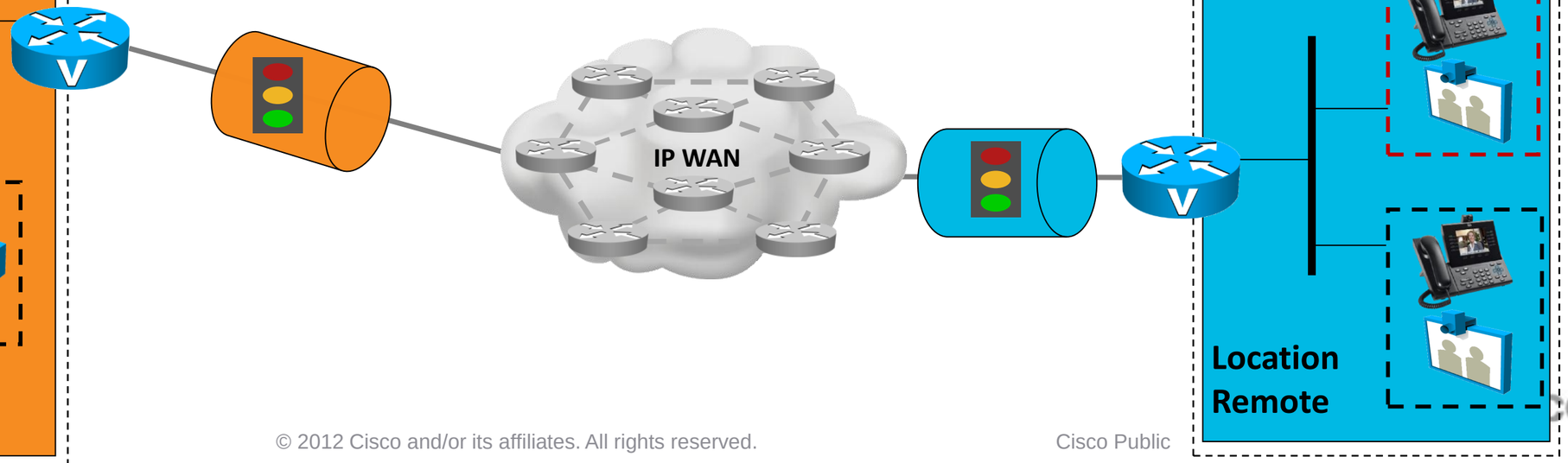
Location DC

UCM Cluster 2

UCM Cluster 1

Shared Locations Across Clusters

TelePresence CAC



Comparison Chart

Bridging the Gap Between Locations CAC and RSVP

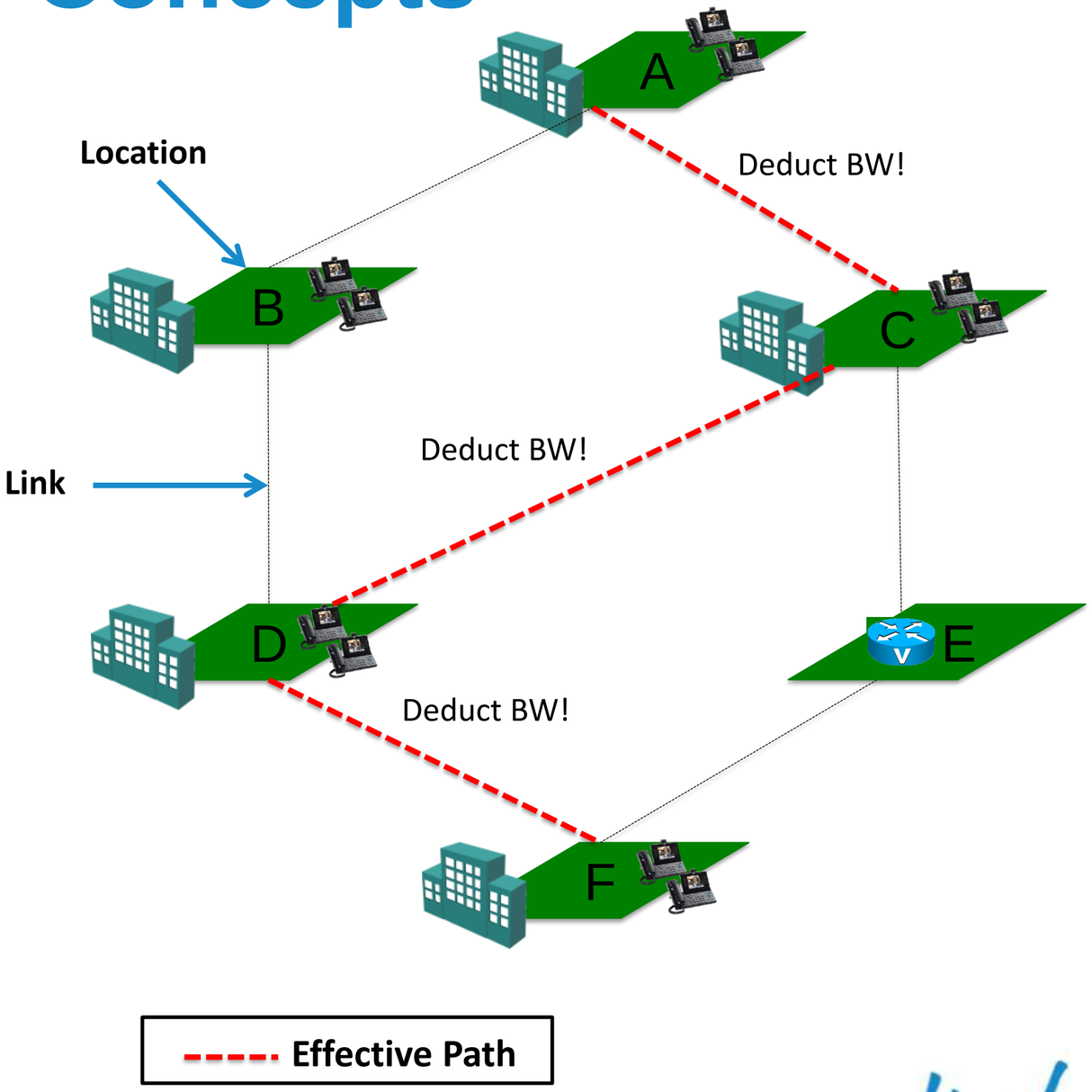
CAC Features *	LCAC	Gatekeeper	E-LCAC	RSVP
Audio/Video Differentiation	✓	✗	✓	✓
Priority and Preemption	✓	✗	✓	✓
Video vs Immersive Video Differentiation	✗	✗	✓	✗
Supports Inter-Cluster Deployments	✗	✓	✓	✓
Supports Multi-Hop WAN topologies	✗	✓	✓	✓
Topology Aware (Support Dynamic Network Changes – Network Failures, Brownouts, etc…)	✗	✗	✗	✓
Supports Dual/Multi Homed WAN Branches	✗	✗	✗	✓
Supports Multiple Routed Media Paths to the Same Destination (Load Balanced, Unequal Backup Links, etc…)	✗	✗	✗	✓
TelePresence and UC Video Mixed Inter-Cluster support	✗	✗	✓	✗

* The basic function of CAC is implied

Network Modeling

Network Modeling - Concepts

- Administrator builds a Network Model using locations and links
- A **Location** represents a LAN. It could contain endpoints or simply serve as a transit location between links for WAN network modeling
- **Links** interconnect locations and are used to define bandwidth available **between** locations. Links logically represent the WAN link
- **Weights** are used on links to provide a “cost” to the “effective path”. Weights are pertinent only when there is more than 1 path between any 2 locations
- UCM calculates shortest paths (least cost) from all locations to all locations and builds the effective paths
- The **Effective paths** are the paths with the “least cumulative weight”
- UCM tracks bandwidth across any link that the network model indicates from originating Location to terminating location.



Network Modeling – Locations and Links

Location A

BW	Allocated
Audio	Unlimited
Video	100MB
Immersive	250MB

WITHIN

Locations Provide Bandwidth Accounting WITHIN the Location as well as IN or OUT of the Location

IN/OUT

BETWEEN

Link A < > B

BW	Allocated
Audio	1500k
Video	3000k
Immersive	5000k

Links Provide Bandwidth Accounting Between Locations

And Interconnect Locations

Linking Locations

Location B

BW	Allocated
Audio	Unlimited
Video	Unlimited
Immersive	Unlimited

Telepresence

IN/OUT

WITHIN

Telepresence and UC Video Endpoints Can Reside in the Same Location*

Network Modeling – Locations and Links

Intra-Location Bandwidth Allocation – TelePresence Immersive

- Links Interconnect Locations to Build the Topology. Bandwidth Values and Weight are Assigned to Links
- Intra-location Bandwidth Limits are Assigned to a Location to CAC ALL calls made **TO/FROM/WITHIN** the Location. Intra-location Bandwidth Values are Unlimited by Default.

Location Information

Name* PDX

Links - Bandwidth Between PDX and Adjacent Locations

Locations *(1 - 4 of 4)* **Rows per Page** 50

Find Locations where name begins with Find Clear Filter

Location	Weight	Audio Bandwidth	Video Bandwidth	Immersive Bandwidth
BLD	50	80	384	UNLIMITED
EUG	50	80	384	UNLIMITED
SEA	50	80	384	UNLIMITED
YVR	50	80	384	UNLIMITED

Add Select All Clear All Delete Selected

Hide Advanced

Intra-location - Bandwidth for Devices WITHIN This Location

Audio Bandwidth	Unlimited	kbps	
Video Bandwidth	Unlimited	kbps	None
Immersive Video Bandwidth	Unlimited	kbps	None

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

Links - Bandwidth Between PDX and Adjacent Locations

Location SEA

Weight* 50

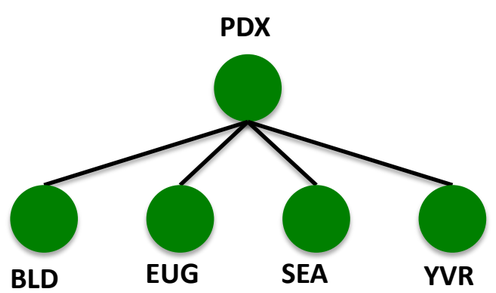
Audio Bandwidth: Unlimited / 80 kbps

Video Bandwidth: None / 384 kbps / Unlimited

Immersive Video Bandwidth: None / kbps / Unlimited

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

Save Close

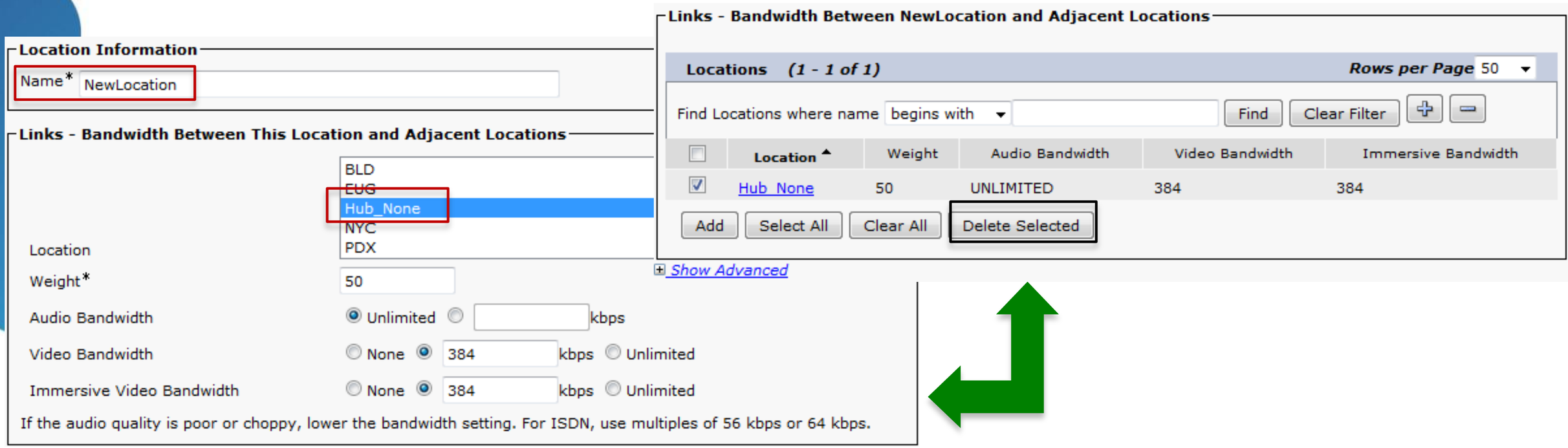


As Viewed From The Perspective of The PDX Location. Serviceability Provides More Tools for Topo Visibility

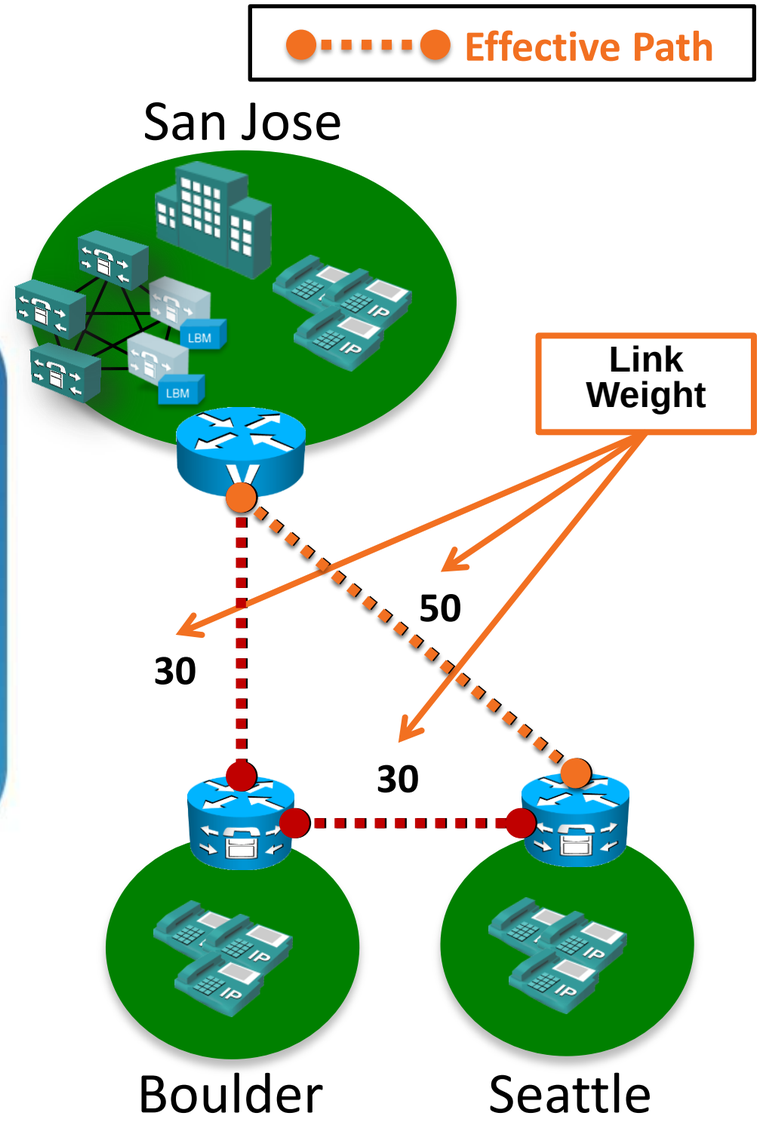
Network Modeling – Locations and Links

The Location Admin Page Has Been Updated To Configure Location Links

- By default when a new location is created a link to Hub. None will be added with unlimited audio bandwidth, 384 kb of both video and immersive bandwidth
- RECOMMENDATION: DELETE the link when it's not needed



Network Modeling in Locations CAC Links, Weights and "Effective Path"



- Weight provides the ability to force a specific path choice when multiple paths between 2 locations are available
- When Multiple Paths are configured yet only 1 will be selected based on "Weight". This path is the "**Effective Path**"
- Weight is used to determine path cost, lowest weight path from source to destination is selected
- Weight is static and does not change with regards to the "effective path" from one location to another

EFFECTIVE PATH

Path 1:

San Jose > Seattle (Weight = 50 = 50)

Path 2:

San Jose > Boulder > Seattle (Weight = 30 + 30 = 60)

Network Modeling in Locations CAC Links, Weights and "Effective Path"

- The Locations Bandwidth Manager (LBM) service computes the effective path from source location to destination location:
  - Sum weight of links across each possible path from source to destination
  - The least cost value of the path's weight determines the "Effective Path"
  - A tie break of equally weighted paths is determined by LBM based on location name
  - Once the effective path is determined, all subsequent calls that have the same source and destination locations will use the same "Effective Path"

Serviceability > Tools > Locations > Effective Path: Provides the Ability to Ascertain the "Effective Paths" Configured in the Topology

Detailed Path View

Location Name	Weight (1-100)	Audio Bandwidth (kbps)	Video Bandwidth (kbps)	Immersive Bandwidth (kbps)
PDX		Configured: Unlimited Available: Unlimited	Configured: Unlimited Available: Unlimited	Configured: **Unlimited** Available: **Unlimited**
▼	50	Configured: **160** Available: **160**	Configured: **2048** Available: **2048**	Configured: **Unlimited** Available: **Unlimited**
BLD		Configured: Unlimited Available: Unlimited	Configured: Unlimited Available: Unlimited	Configured: **Unlimited** Available: **Unlimited**
▼	50	Configured: **160** Available: **160**	Configured: **2048** Available: **2048**	Configured: **Unlimited** Available: **Unlimited**
NYC		Configured: Unlimited Available: Unlimited	Configured: Unlimited Available: Unlimited	Configured: **Unlimited** Available: **Unlimited**

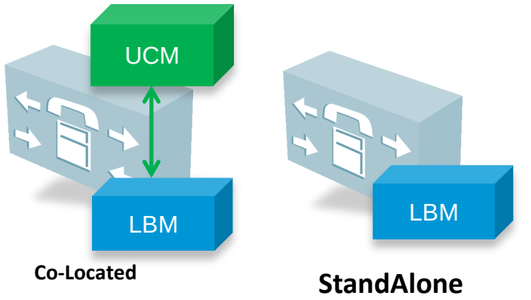
Network Modeling

Key Takeaways

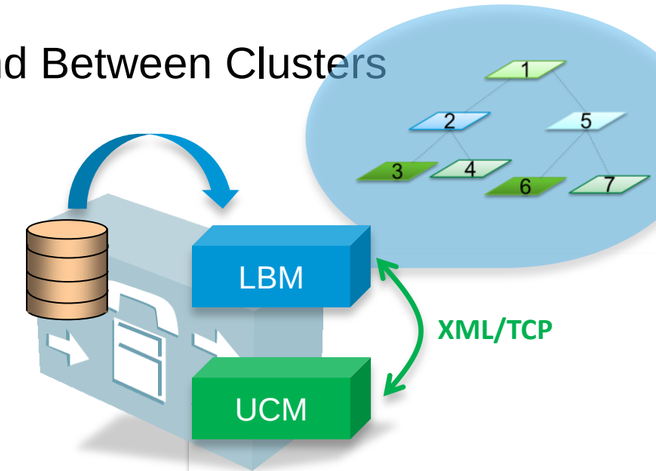
- Enhanced Locations CAC is a Model-Based Static CAC Mechanism
- E-LCAC is a Model of the “Routed Network” Attempting to Represent How The WAN Network Topology Routes Media
- Unified CM GUI Provides Configuration and Serviceability Interfaces to Model The Network
- Network Modeling is NOT Dynamic like RSVP. The Available Bandwidth as well as the Media Path may be Incorrectly Modeled During Network Failures
- The Model Needs to be Updated When the Network Topology Changes
- E-LAC is Call-Based and No Asymmetric or Unidirectional Bandwidth Deductions
- Intra-location bandwidth assignment and deduction. The default is set to unlimited

Locations Bandwidth Manager

Location Bandwidth Manager (LBM)



- LBM is a New Unified CM Feature Service Managed from the Serviceability Pages
- LBM Can Run on Any UCM Subscriber or Standalone on a Dedicated UCM Server
- A Minimum of One Instance of LBM Must Run In Each Cluster To Enable E-LCAC
- Main Functions of LBM:
  - Path Assembly and Calculation
  - Servicing Bandwidth Requests from Unified CM Call Control (XML/TCP)
  - Replication of Bandwidth Information to Other LBMs Within the Cluster and Between Clusters (Inter-Cluster Locations CAC)
  - Provides Configured and Dynamic information to Serviceability
  - Updates Location RTMT counters



Location Bandwidth Manager (LBM)

Enabling LBM Service

- LBM Service is Enabled by Default When Upgraded from a Pre-9.0 Installation
- For Fresh Installs The LBM Service Needs to be Manually Activated (like CCM service)

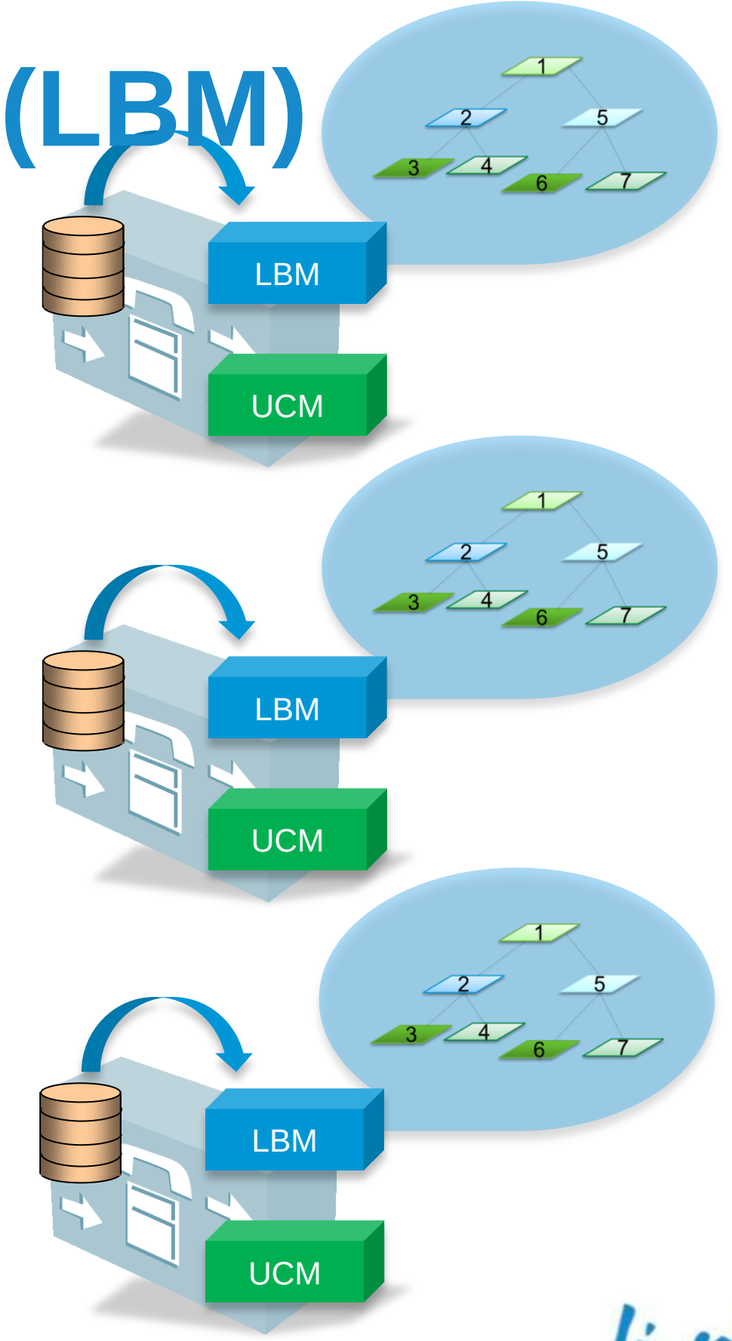
CM Services

	Service Name	Status:	Activation Status	Start Time	Up Time
○	Cisco CallManager	Started	Activated	Wed May 9 06:49:12 2012	5 days 02:24:42
○	Cisco Messaging Interface	Not Running	Deactivated		
○	Cisco Unified Mobile Voice Access Service	Not Running	Deactivated		
○	Cisco IP Voice Media Streaming App	Not Running	Deactivated		
○	Cisco CTIManager	Started	Activated	Wed May 9 06:50:01 2012	5 days 02:23:53
○	Cisco Extension Mobility	Not Running	Deactivated		
○	Cisco DHCP Monitor Service	Not Running	Deactivated		
○	Cisco Intercluster Lookup Service	Started	Activated	Mon Apr 2 07:34:00 2012	42 days 01:39:54
○	Cisco Location Bandwidth Manager	Started	Activated	Mon Apr 2 07:33:54 2012	42 days 01:40:00
○	Cisco Dialed Number Analyzer Server	Not Running	Deactivated		
○	Cisco Dialed Number Analyzer	Not Running	Deactivated		
○	Cisco Tftp	Started	Activated	Mon Apr 2 07:34:01 2012	42 days 01:39:53

Location Bandwidth Manager (LBM)

- LBM During at Initialisation
  - LBM reads Local Locations Info from DB
    - Locations: audio, video, immersive bandwidth values (intra-location data)
    - Location to Location “Link” data: audio, video, immersive bandwidth values and weight (inter-location data)
  - Using the link data each LBM in a cluster creates a local assembly of the “paths” from one location to every other location (Assembled Topology)
  - In a cluster each LBM accesses the same data and thus creates the same local topology during initialisation
- LBM at Runtime
  - LBM applies reservations along the computed paths in the local assembly and replicates the reservation to other LBMs in the cluster

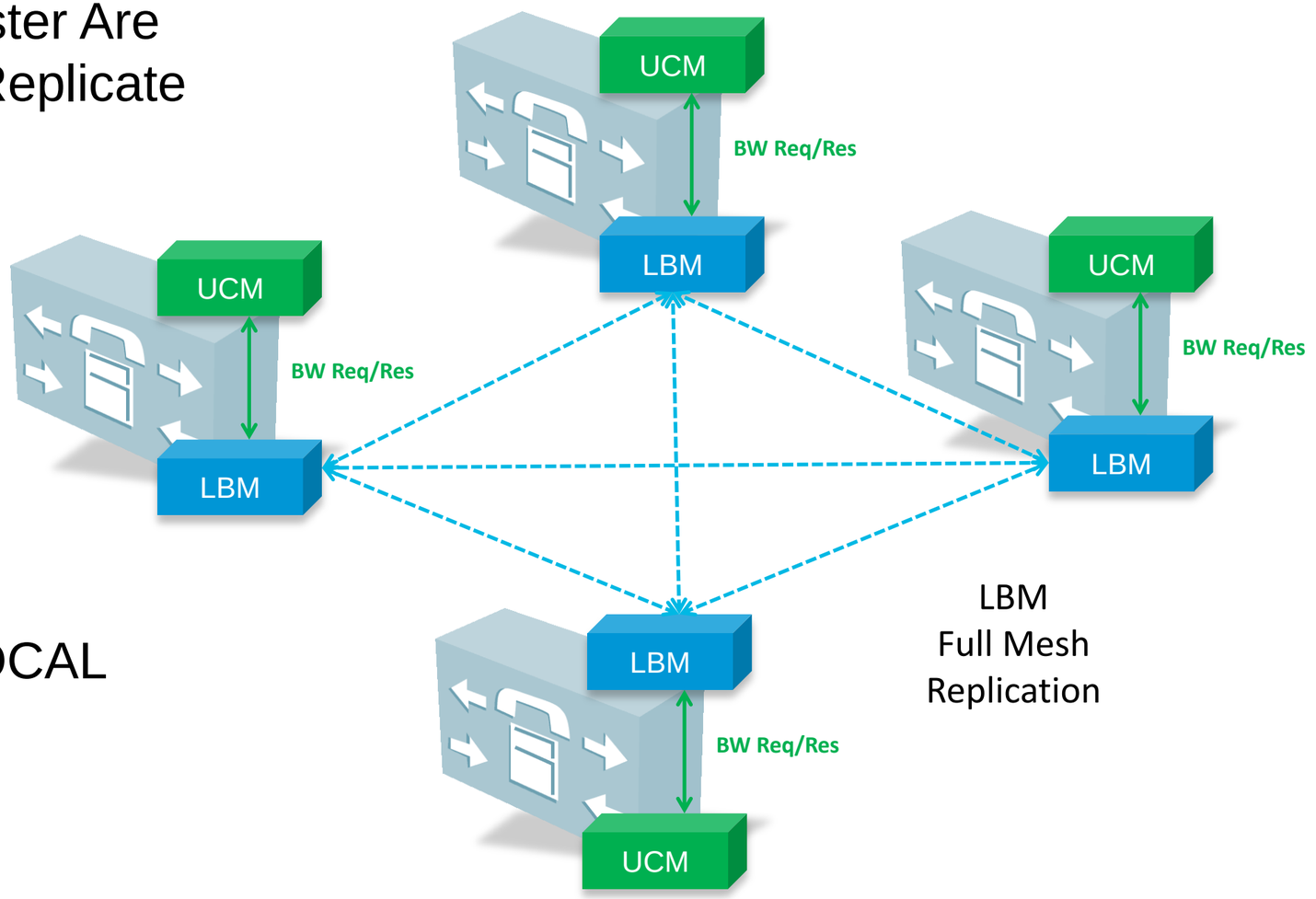
If Inter-Cluster E-LCAC is configured and activated, LBM Replicates Assembled Topology (More detailed discussion in the Inter-Cluster Locations CAC section later in the presentation)



Unified CM Communication to LBM and LBM Replication

BW Request / Response →
BW Replication ⇢

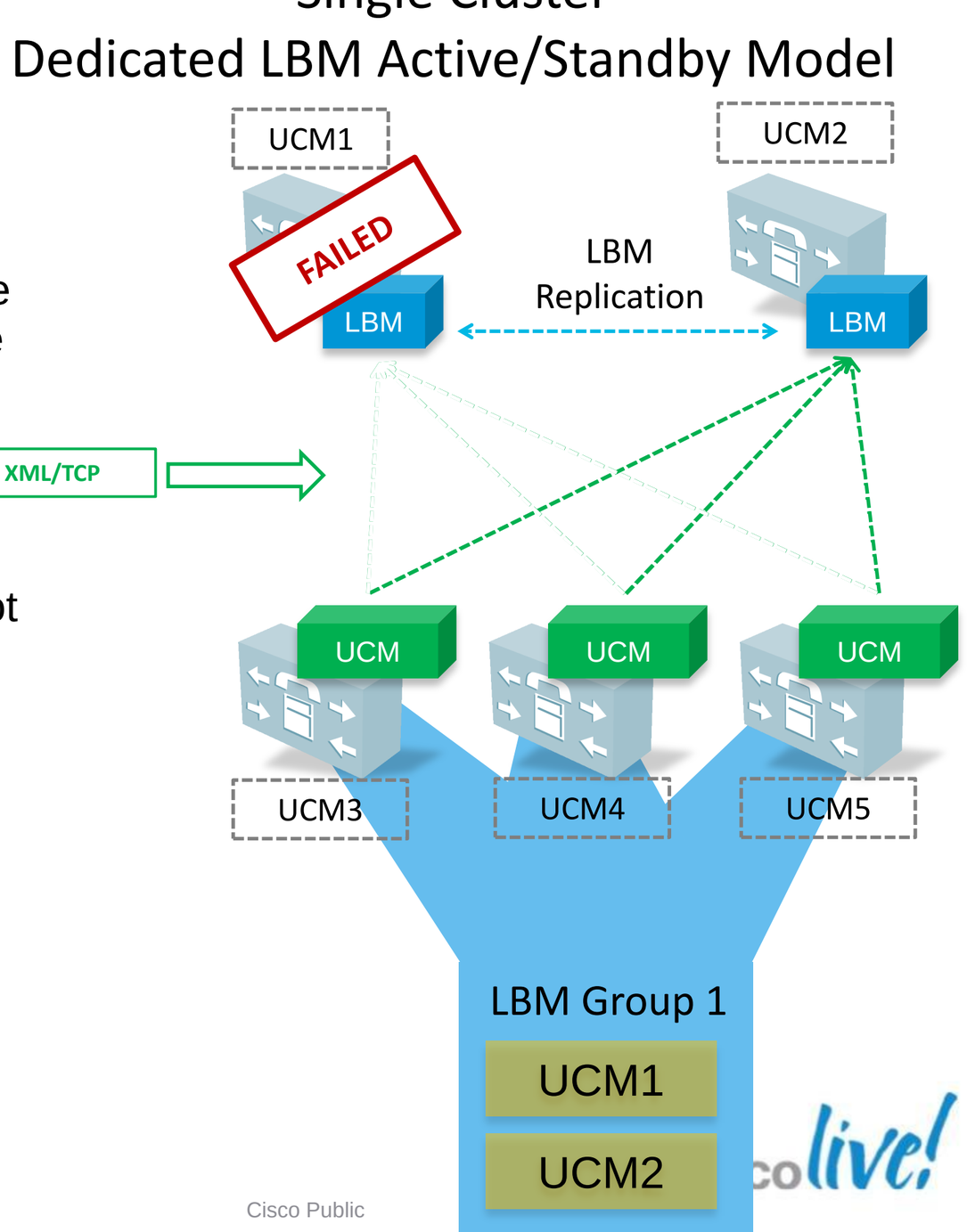
- LBM Services Within a Cluster Are Always Fully Meshed and Replicate Bandwidth Allocations



- The CallManager Service Communicates with The LOCAL LBM Service (Default)

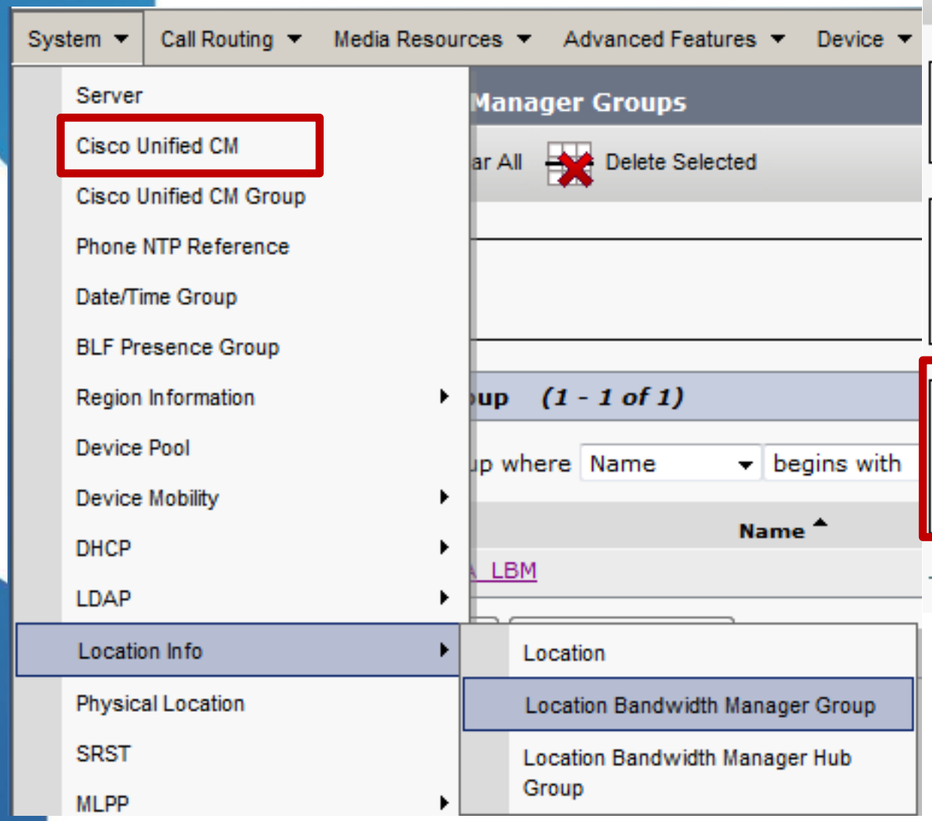
LBM Redundancy

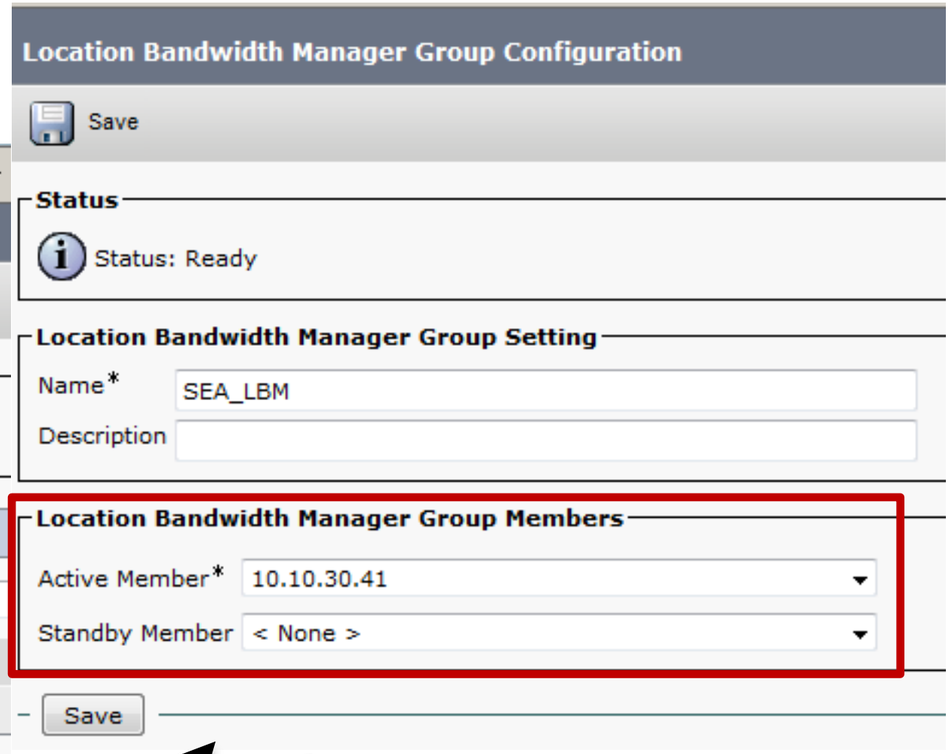
- LBM Group allows control of Active and Standby LBMs
- Provides redundancy of LBM service to maintain the availability of CAC mechanism during server outage
- Allows admin to associate an LBM Group to Unified CM “Server” controlling how a Unified CM node communicates to the LBM
- Running LBM service in every UCM server might not be the most efficient use of resources for every design
- The Admin can use the LBM group to optimise network delay and performance

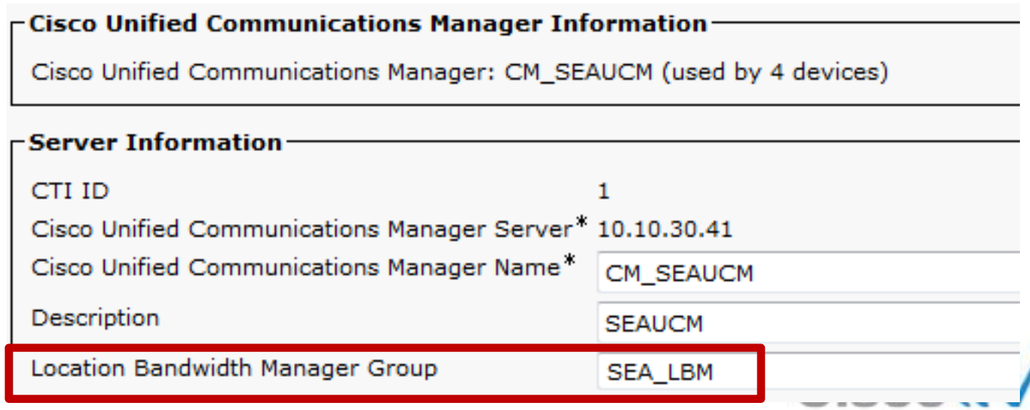


Location Bandwidth Manager (LBM)

LBM Group Config

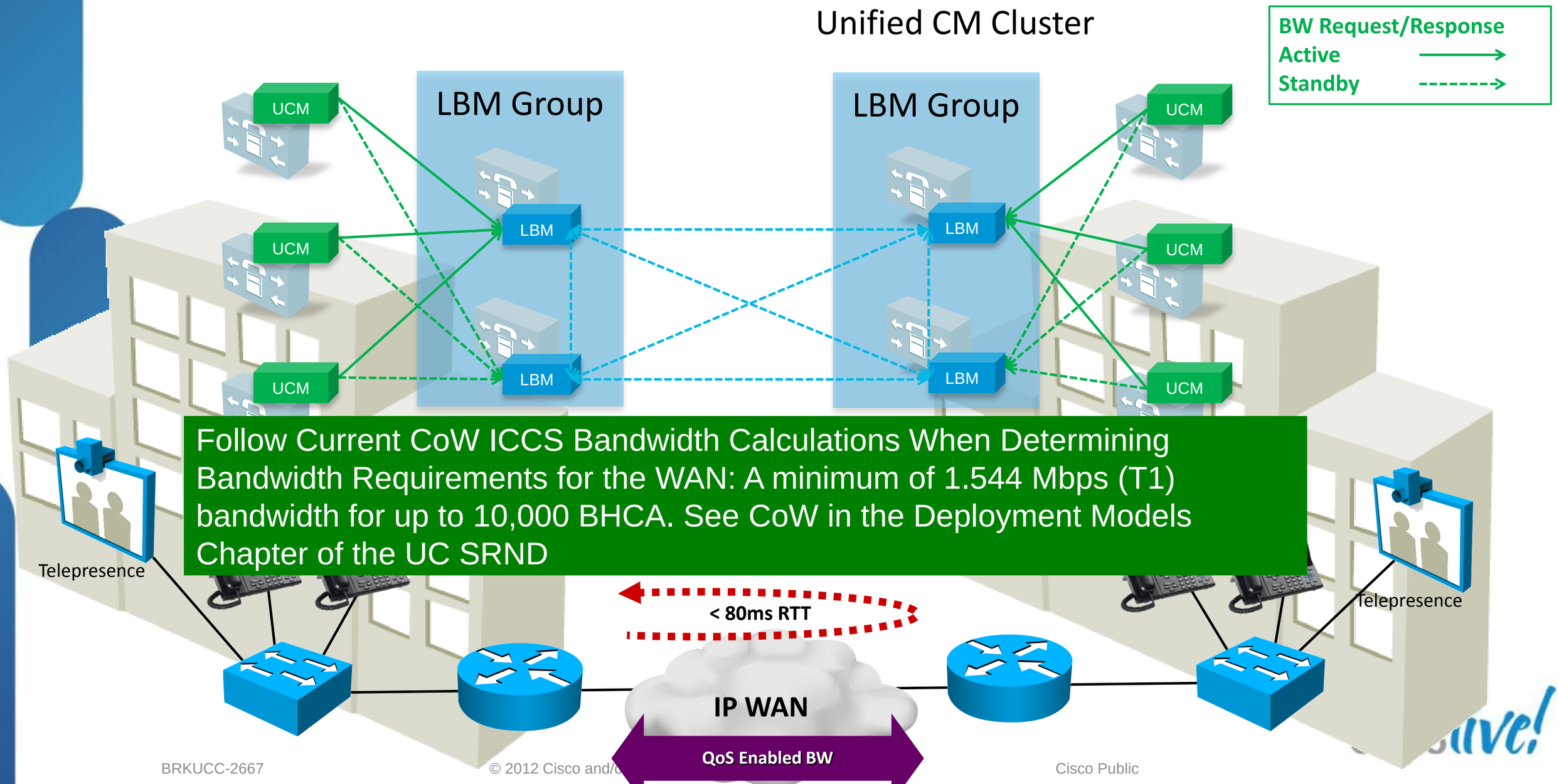




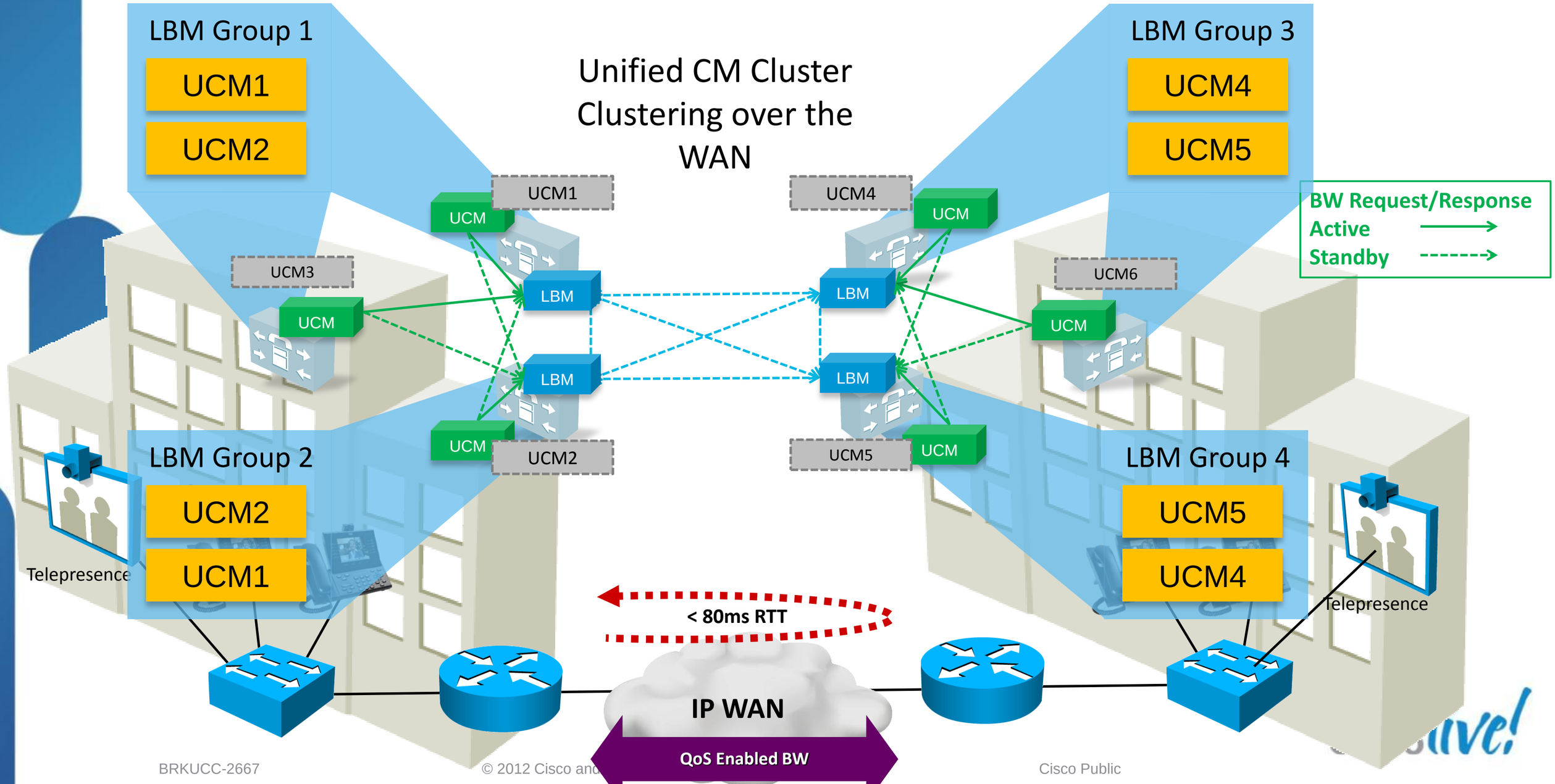


- An LBM Group Association Determines Which LBMs a UCM Service Communicates with. In Absence of an LBM Group UCM communicates with the Local LBM Only.

Clustering over the WAN (CoW) - LBM



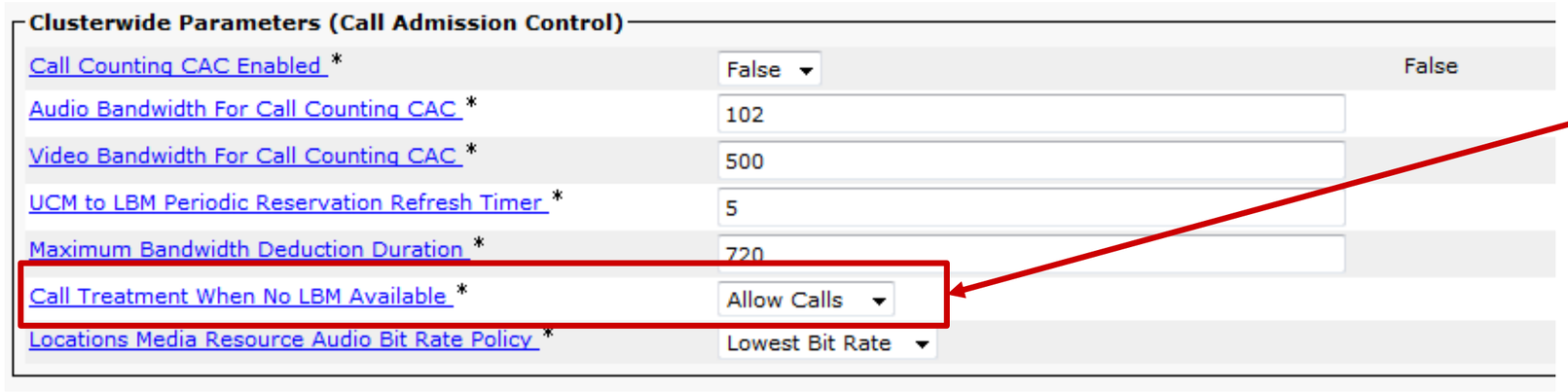
Clustering over the WAN (CoW) - LBM



Location Bandwidth Manager (LBM)

LBM Group Config

- Unified CM LBM Determination Order:
  - LBM Group Designation
  - Local LBM
  - Service Param: “Call Treatment when no LBM available” (allow calls = Default)



Changing This Is Not Recommended

- LBM group Recommendations:
  - Use local LBM when available
  - Redundant LBMs at each call processing site
  - For Split DC Designs, Redundant LBMs on each DC
  - For Load Reduction of Active Subscribers Use Dedicated LBMs or Enable LBM on The Stand-by SUBs

Key Takeaways

Summary

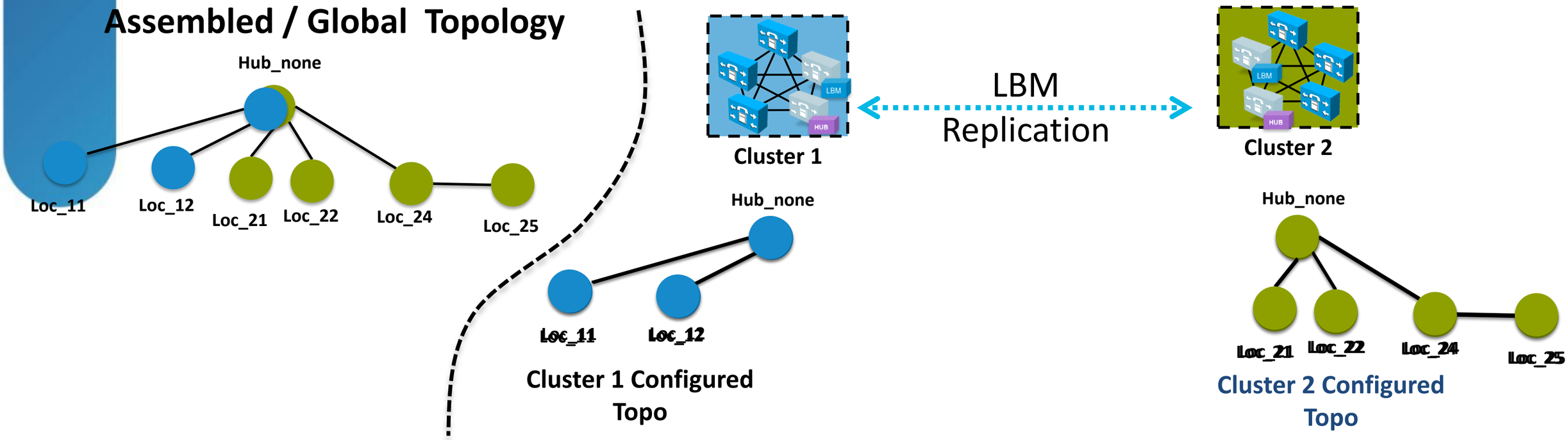
- LBM is a New Feature Service
- LBM is Fully Meshed Within The Cluster
- LBM is Responsible For Modeled Topology and Servicing UCM Requests
- Recommendations for LBM Group Usage
  - Manage How The Unified CM Service Interacts with LBM (co-loc/dedicated)
  - Minimise LBM Full Mesh BW in CoW or Dual DC

    Min 2 Per Site for Redundancy
  - Off-load Active LBMs to Inactive Stand-by Subscribers

Inter-Cluster E-LCAC with LBM

Inter-Cluster Enhanced Locations CAC

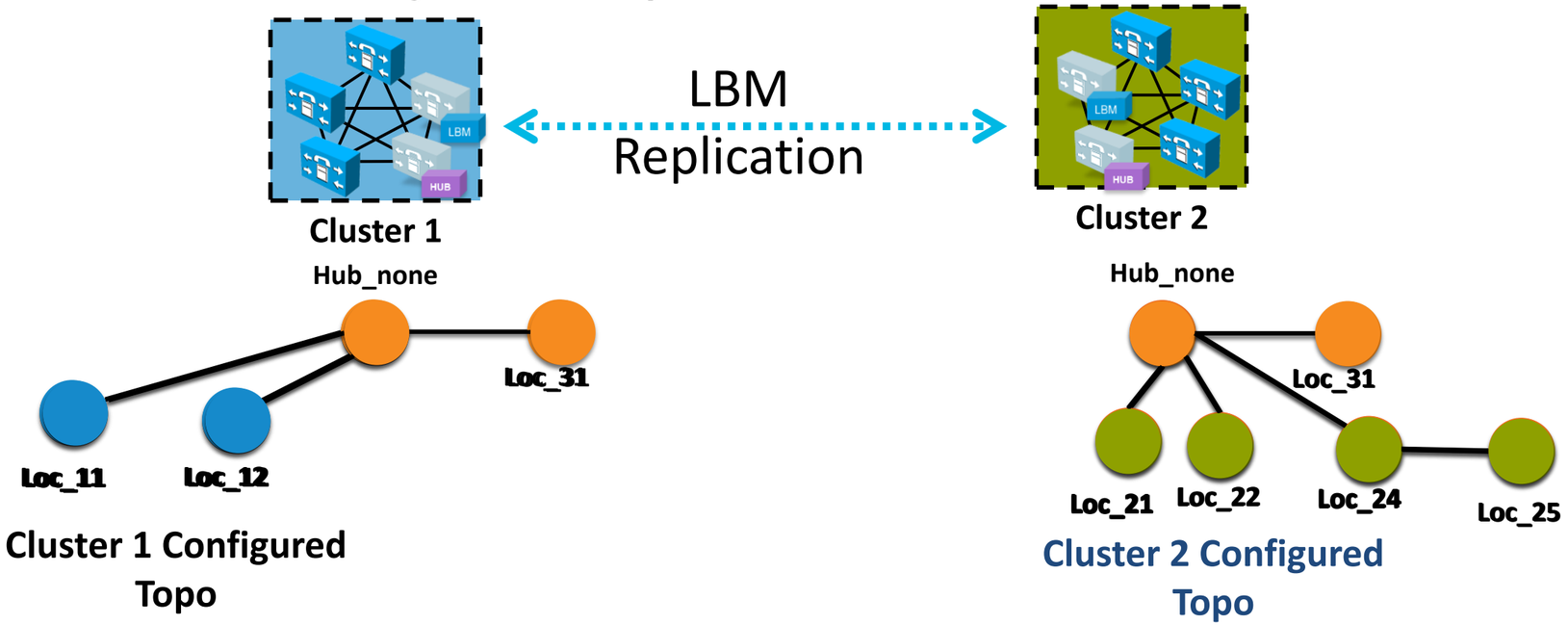
- Extends Enhanced Locations CAC Network Modeling Across Multiple Clusters
- Each Cluster Manages Its Own Topology
- Each Cluster Then Propagates Its Topology to Other Clusters Configured In the LBM Inter-Cluster Replication Network
- Each Cluster Then Creates a Global Topology (“Assembled Topology”) Piecing Together Each Clusters Replicated Topology



Inter-Cluster Enhanced Locations CAC

Shared Locations – What are they?

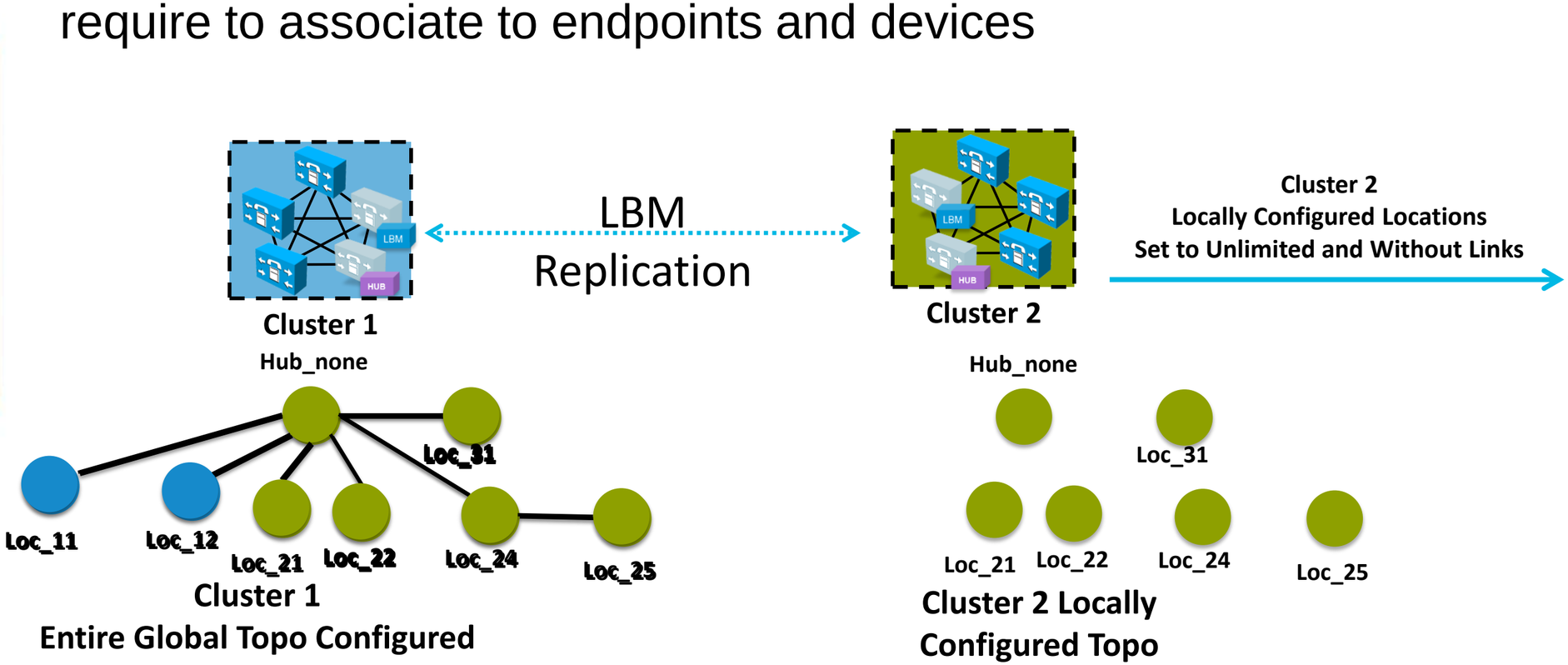
- A Shared Location is a Location that is configured with the “Same Name” on Clusters Participating in a the LBM Replication Network
- A Shared (“common”) Location Serves 2 Purposes
  1. Enables Clusters to collate their respective configured topologies to one another
  2. Provides the Ability for Multiple Clusters to CAC the Same Locations



Inter-Cluster Enhanced Locations CAC

Location and Link Management Cluster

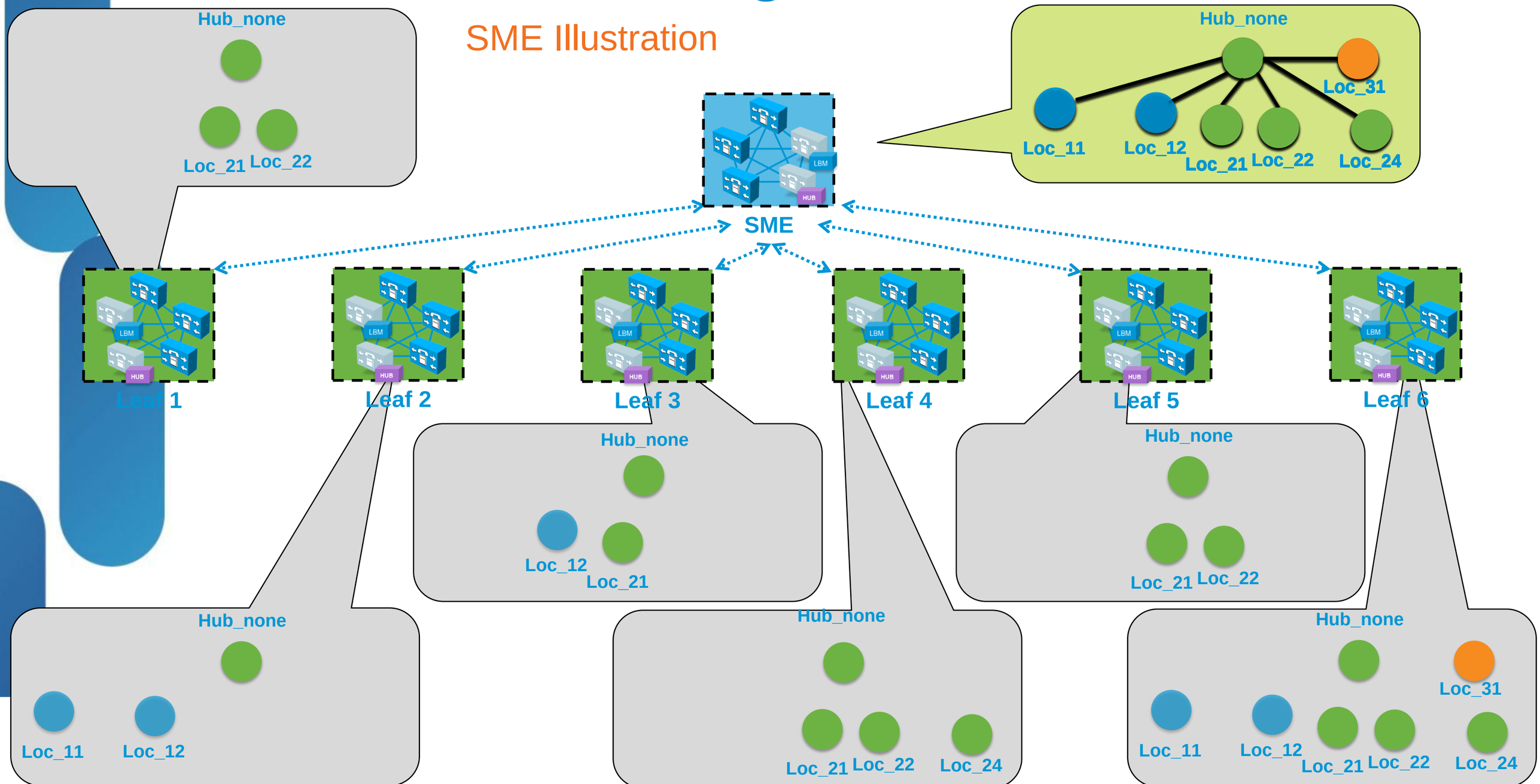
- Single Cluster (e.g. SME) manages ALL Locations and Links for the entire Locations Replication Network
- All Other Clusters (e.g. Leaf Clusters) need only configure the Locations that they require to associate to endpoints and devices



Location and Link Mgmt Cluster

LBM Replication

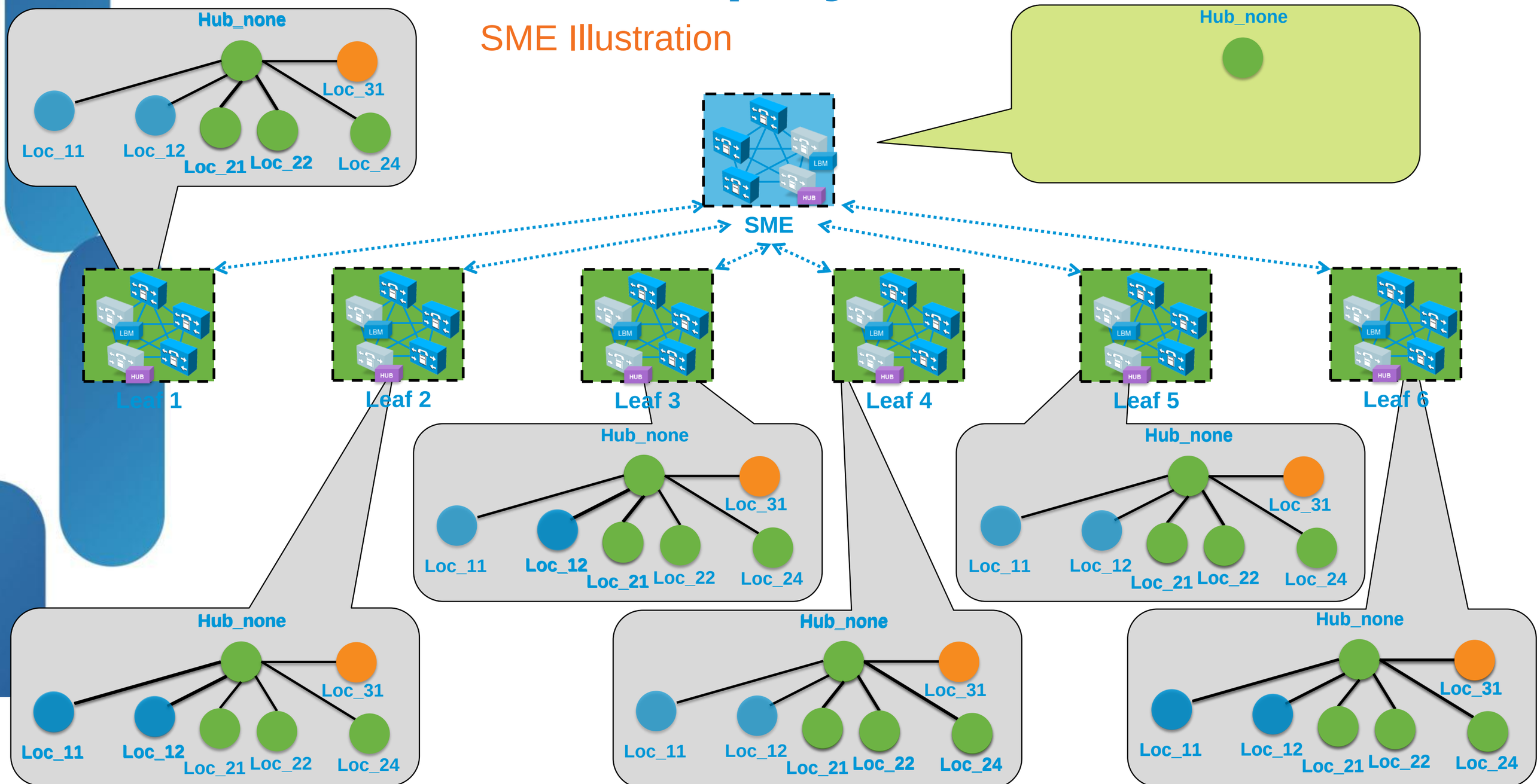
SME Illustration



Generic E-LCAC Deployment

LBM Replication

SME Illustration



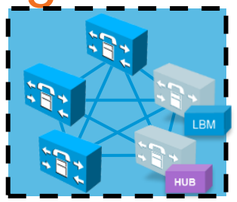
Inter-Cluster Enhanced Locations CAC

Location and Link Management

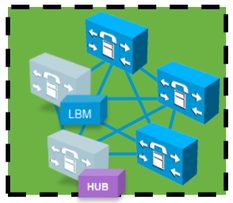
- Recommendations for Location and Link Management Clusters
  - All links and Locations are Managed in the Management Cluster
    - All Locations, BW Values, Links and Weights
  - Leaf Clusters ONLY Configure Locations
    - Use Unlimited BW Values on the Locations in Leaf Clusters
    - Do Not Configure Links in Leaf Clusters
  - LBM Will Always Use the Lowest Most Restrictive Bandwidth and Weight Value Retrieved from Replication
- Benefits
  1. Manage Enterprise CAC Topology From a Single Cluster
  2. Leaf Clusters (Other Clusters) ONLY require the configuration of Locations needed for Device and Endpoint Association.

Inter-Cluster Enhanced Locations CAC

SIP Trunk Passing Location Information



Cluster 1



Cluster 2

LOCATION

SIP Call-Info Header

Call-Info: <urn:x-cisco-remotecc:callinfo>;x-cisco-loc-id=1a9b779f-8422-e4c1-3c35-ceb12bc14e93;x-cisco-loc-name=**LOC_11**;x-cisco-fateshare-id=AFL2:89615159 x-cisco-video-traffic-class=desktop

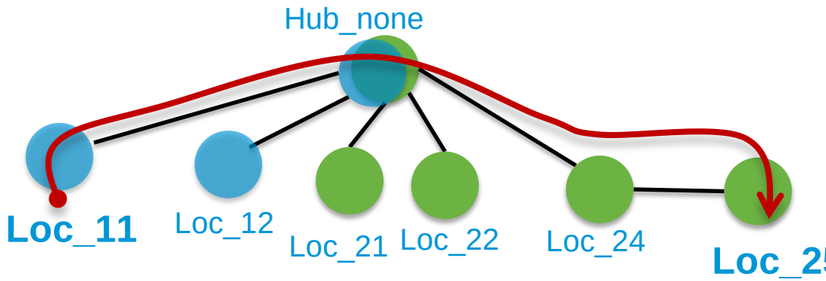
Cluster_ID:Call_ID

Video Traffic Class

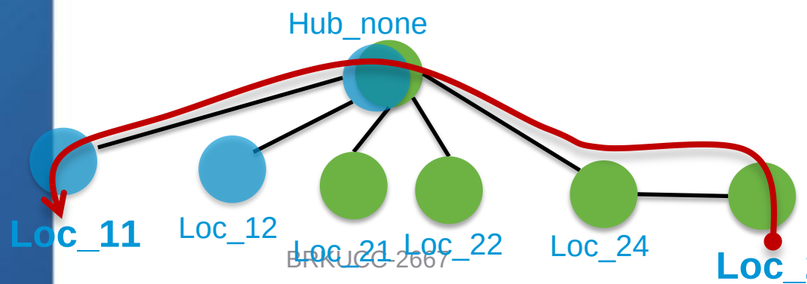
INVITE

UCM1 sends: Location name, Location PKID, FateShareID, Traffic-Class

Cluster2 UCM2 uses the received location info to perform E2E location CAC bandwidth reservation using its "Assembled Topology". It then replicates the reservation.



Cluster1 UCM1 uses the received location info to perform E2E location CAC bandwidth reservation using "Assembled Topology". It then replicates the reservation.



180 Ringing

UCM2 sends: Location name, Location PKID, FateShareID, Traffic-Class

LOCATION

SIP Call–Info Header

Call-Info: <urn:x-cisco-remotecc:callinfo>;x-cisco-loc-id=4f3fc6c3-f902-eb3c-6fb8-b177eb03192a;x-cisco-loc-name=**LOC_25**;x-cisco-fateshare-id=AFL1:72851723 x-cisco-video-traffic-class=desktop

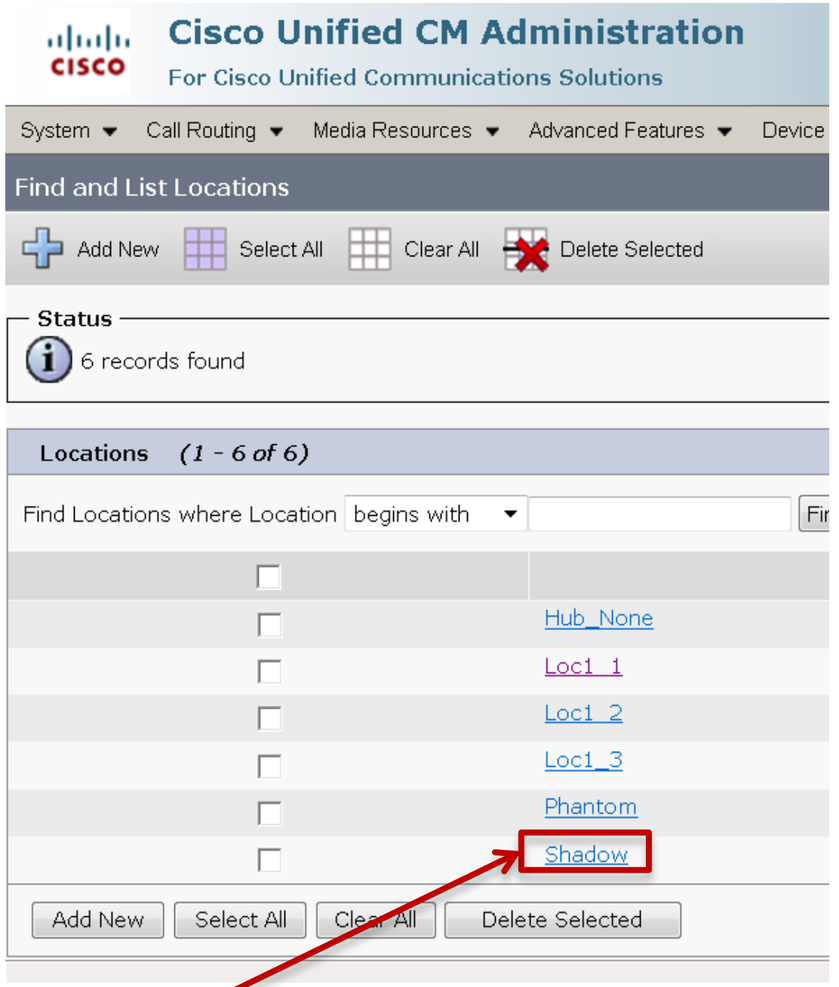
Cluster_ID:Call_ID

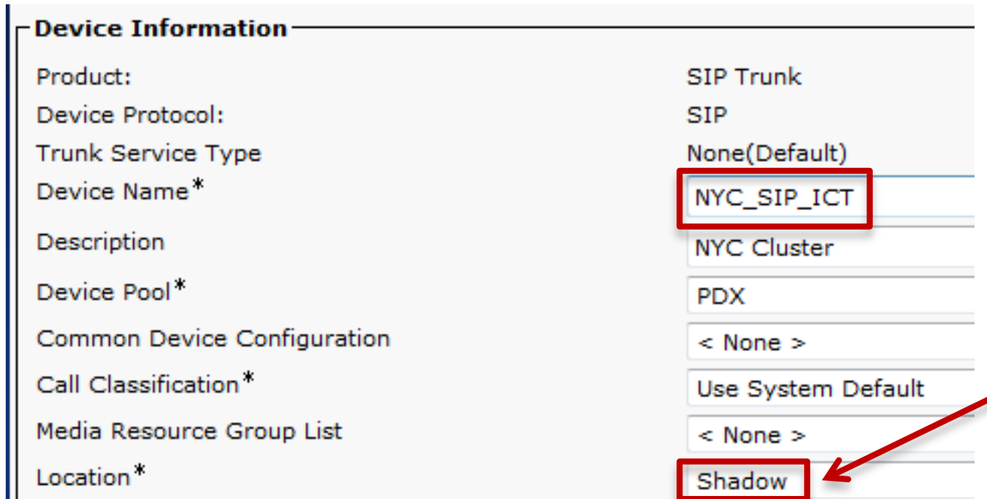
Video Traffic Class

Enhanced Locations CAC

"Shadow" Location – New Location

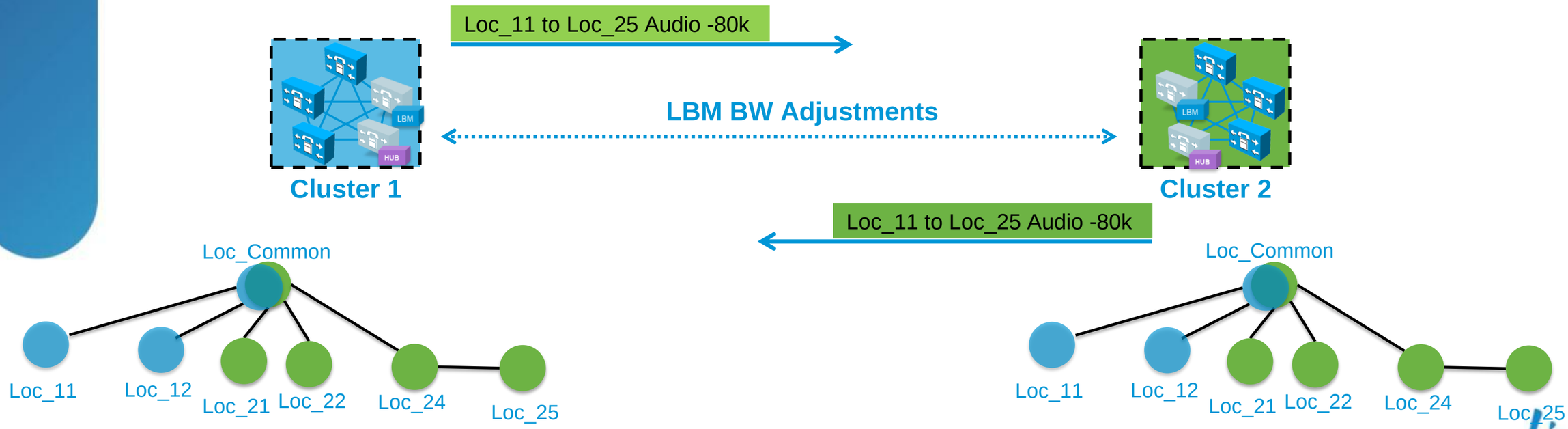
- The Shadow Locations Is Used To Enable A SIP Trunk to Pass Enhanced Locations CAC Information Such As: *Location name, Location PKID, FateShareID, Traffic-Class*
- In Order to Pass This Location Information Across Clusters The SIP ICT Needs to be Assigned to the "Shadow" Location
- Similar to the "Phantom" Location It Cannot Have a Link to Other User/Device Locations. As Such No bandwidth Can Be Reserved Between The "Shadow" Location and Other User/Device Locations
- Any Device Other Than a SIP ICT That Are Assigned to The Shadow Location Are Treated As If They Were Associated to Hub_None.





Inter-Cluster Enhanced Locations CAC

- Race Conditions in Bandwidth Reservations Are Inevitable Since Reservations Are Local and Replicated Out
- Bandwidth Oversubscription Can Occur During Race Conditions
  - Oversubscription Is Transient
  - Bandwidth Overhead Should Be Provisioned In The Network to Accommodate Such Cases
  - Consider Links Where CAC Limits Are Often Reached



Inter-Cluster Enhanced Locations CAC

- Each Cluster Requires a Complete View of the Modeled Topology Locally In Order to Calculate The End-to-End Reservation Path
- Each Cluster is Required to Replicate the Local Topology that it Manages
- Location Requirements:
- A Cluster Requires the Location be Locally Configured for Location to Device Association
- Each Cluster Should be Configured with the Immediately Neighbouring Locations Such That Each Clusters Topology Can Inter-connect (**Not Required with Link and Location Management Cluster**)
- Links Also Need to be Configured to Establish the Inter-connect Points in the Topology

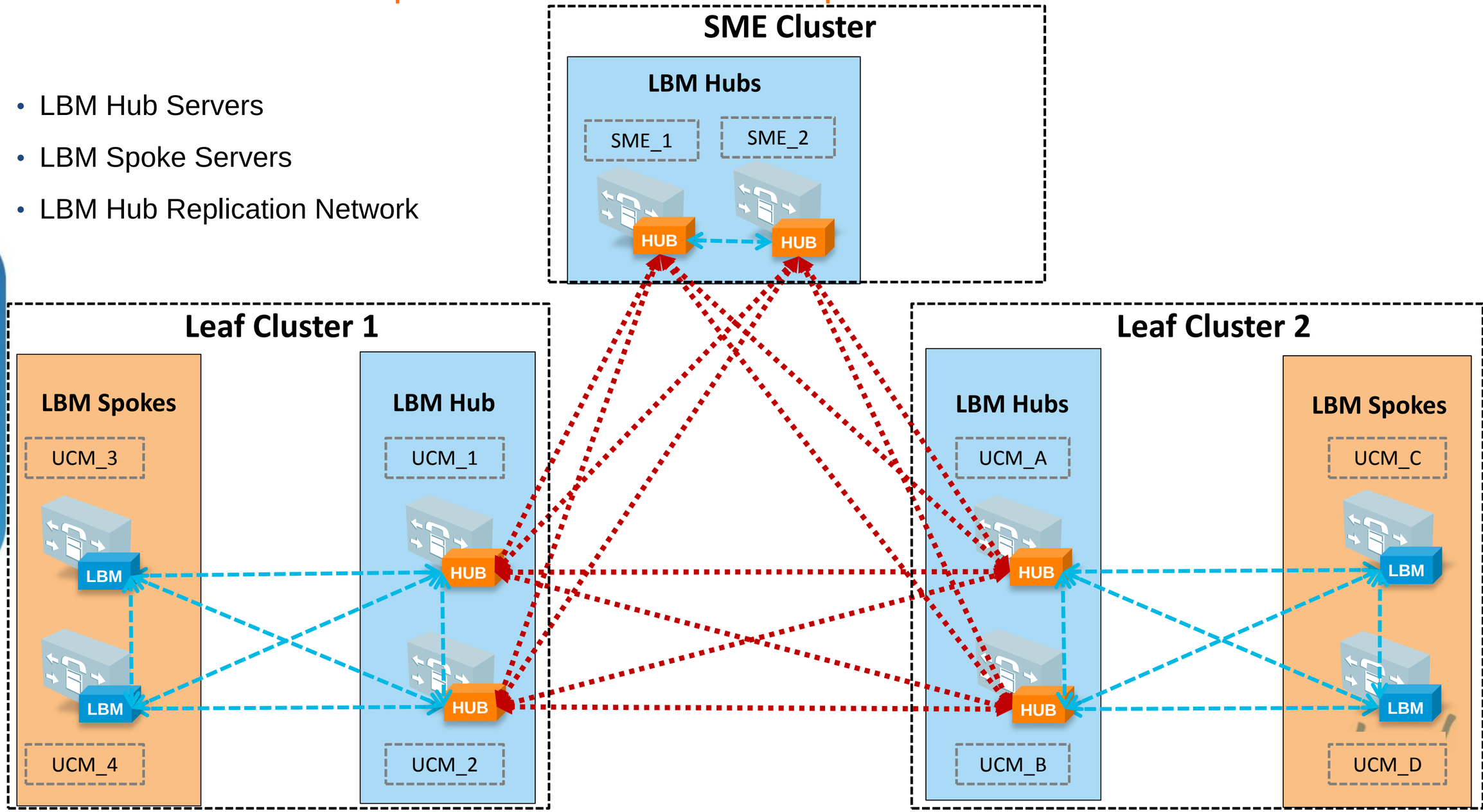
Inter-Cluster Enhanced Locations CAC

- Discrepancies of Bandwidth Limits and Weights on Shared Links and Locations Are Resolved By Using The Minimum of the Assigned Values
- Naming The Locations Consistently Across Clusters is Critical.
  - Follow The Practice: “Same Location Same Name, Different Location Different Name”
- Hub_None Location Should be renamed to be unique in each cluster, Or It Will Be Shared By Other Clusters
- Cluster-ID should be unique on each Cluster (Make Serviceability Reports More Usable)

LBM Network – Hubs, Spokes and Hub Bootstrap

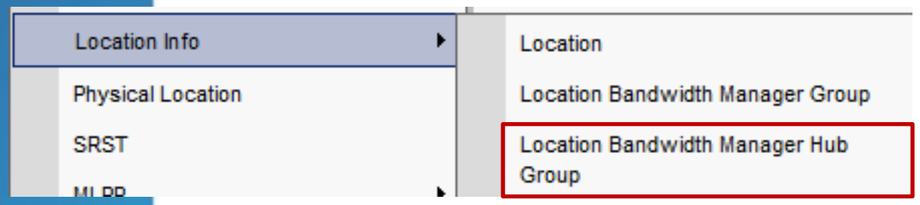
Centralised Hub Bootstrap Server for The LBM Replication Network

- LBM Hub Servers
- LBM Spoke Servers
- LBM Hub Replication Network



Inter-Cluster Enhanced Locations CAC

LBM Hub Group – Configuration



Location Bandwidth Manager Hub Group Information

Name* LBM Hub Group PDX

Description LBM Hub Group (NYC-SEA Registration Servers)

Location Bandwidth Manager Hub Group Members

Member 1* 10.10.20.43

Member 2 10.10.30.41

Member 3

Location Bandwidth Manager Hub Group Usage Information

By moving the LBM service up into the section "LBM Services Currently Use this LBM Hub Group", the current LBM Hub Group is assigned to the s
service. By moving the service down to the section "LBM Services NOT Use this LBM Hub Group", the hub group assignment for the selected LBM
removed, thus, the selected LBM service will use the default LBM hub node if available.

LBM Services Currently Use this LBM Hub Group: 10.10.20.41 (hub,active) (LBM Hub Group PDX)

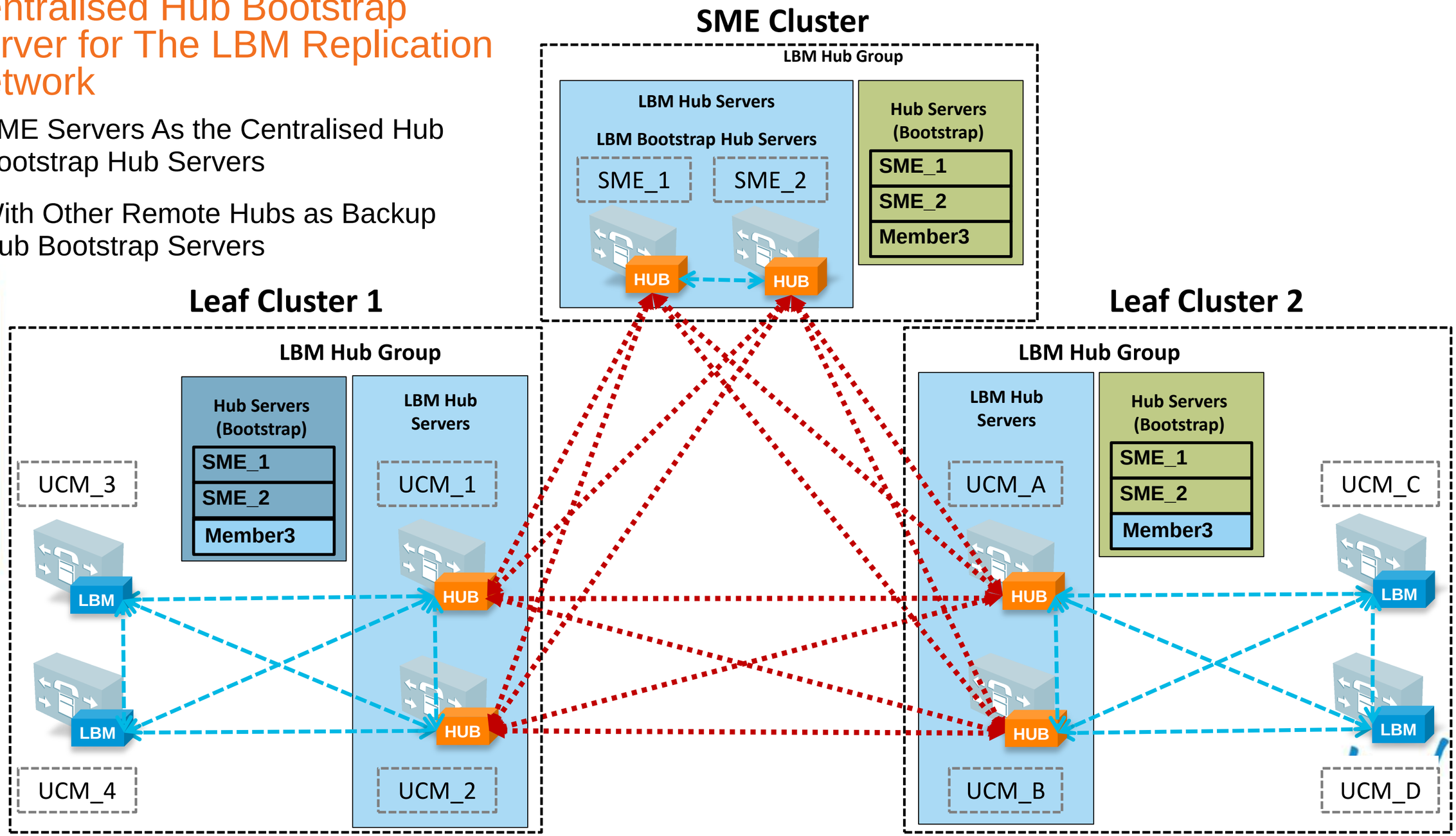
LBM Services Not Use this LBM Hub Group:

- Remote Hub Servers (BootStrap)
  - Responsible for Informing The Hub Server Network of the LBM Hub Servers
  - Can Be Any Hub In The Network
  - Can Indicate up to 3 Per Hub Group
- Hub Servers (Local LBMs)
  - Communicates Directly to Other Remote Hub Servers in LBM Replication Network
- Spoke Servers (Local LBMs)
  - Communicates to Other Remote Hub Servers in LBM Replication Network Via The Local (in Same Cluster) Hub Server

LBM Network – Hubs, Spokes and Hub Bootstrap

Centralised Hub Bootstrap Server for The LBM Replication Network

- SME Servers As the Centralised Hub Bootstrap Hub Servers
- With Other Remote Hubs as Backup Hub Bootstrap Servers



Inter-Cluster Enhanced Locations CAC

LBM Hub Group – Hub And Spoke Roles

1. **An LBM is a Hub When it is Assigned to an LBM Hub Group**
2. **An LBM is a Spoke when it is Not assigned to an LBM Hub Group**

Rules for Establishing LBM Hub Replication Network

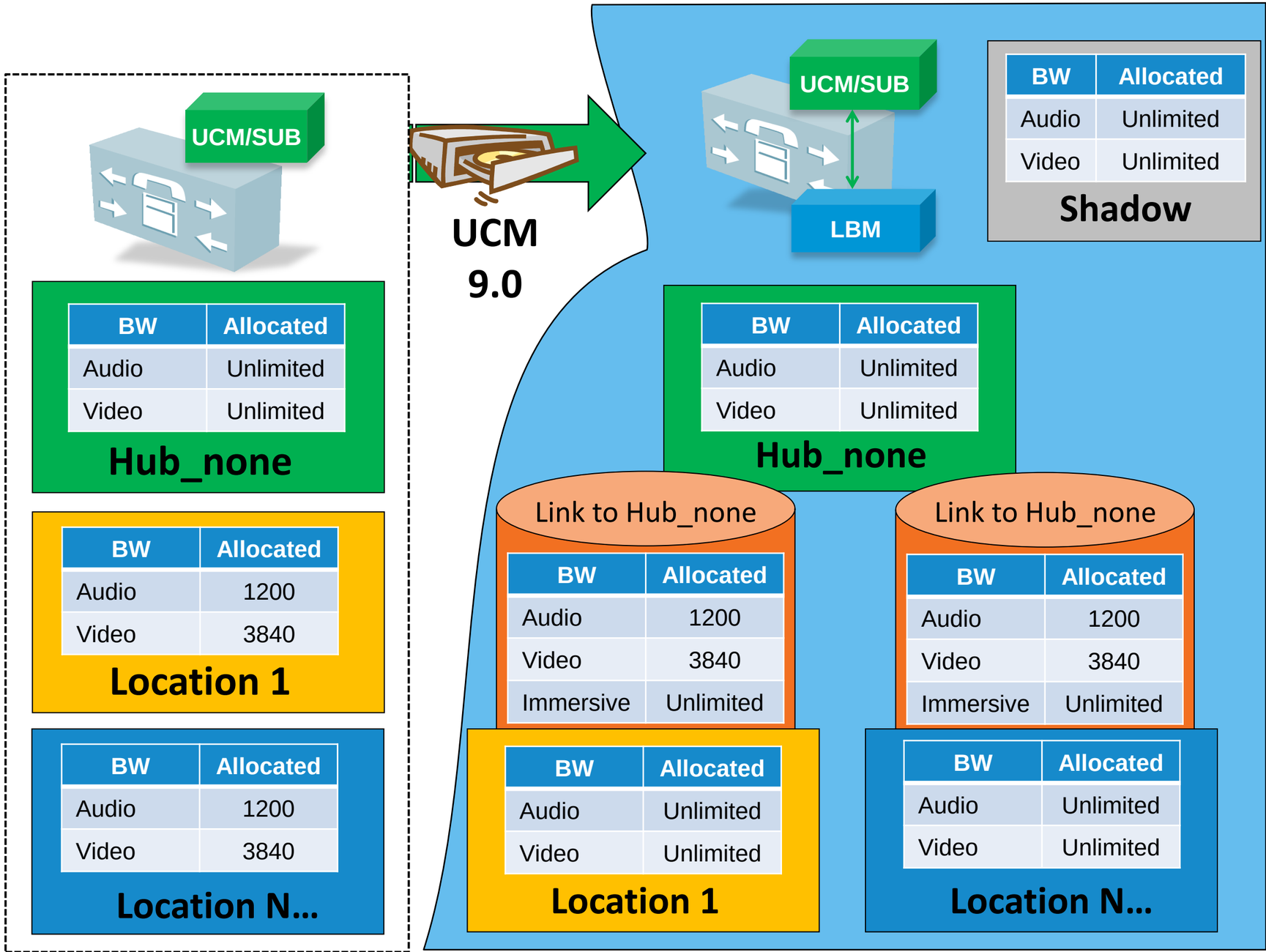
1. If a Cluster has Multiple LBM Hubs, the Lowest IPv4 (entire) Address LBM Hub will Function as The Sender of Messages to Other Remote Clusters.
2. The LBM Hub Who Functions as The Sender for Messages in the Cluster Will Select the 1st LBM Hub of Each Cluster to Send Message to.
3. The LBM Hubs Who Receive Messages from Remote Clusters Will Forward the Received Messages to the LBM Spokes in Their Local Cluster
4. Forwarded Messages Have a Unique Random String in Them Such That Messages Received Twice Will Be Dropped to Stop Any Replication Storm/Loop
5. Other LBM Hubs in the Cluster Who Receive the Forwarded Message Will Not Forward On To LBM Spokes Because the Message is Not From A “Remote” Cluster

Upgrade / Migration

Migration to Enhanced Locations CAC

Settings After An Upgrade To 9.0:

- The LBM Is Activated On Each UCM Subscriber
- No LBM Group or LBM Hub Group Are Created
- UCM Service Communicates With Local LBM
- Fully Meshed LBM Services
- No Inter-Cluster E-LCAC Enabled
- Intra-Location Bandwidth Values Are Set to Unlimited
- Bandwidth Values Assigned To Locations Are Migrated To A Link Connecting Any User-Defined Location and Hub_None
- Phantom And Shadow Locations Have No Links



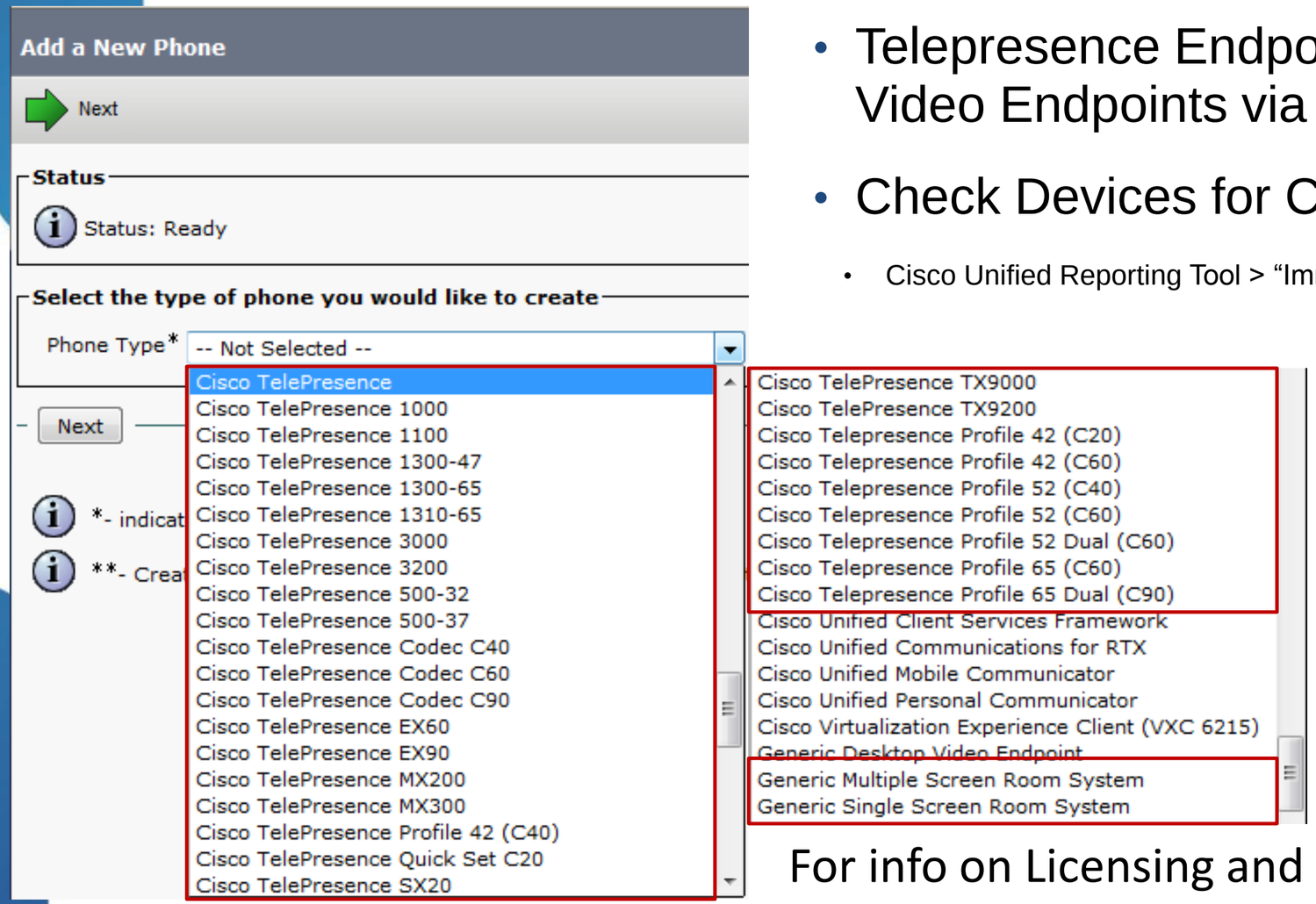
Sizing and Performance

Sizing and Performance

- 2000 Max Locally Configured Locations
- 8000 Max Total Replicated Locations (via Inter-Cluster CAC)
- Sizing with LBM Co-located (Cisco Sizing Tool Will Assume LBM Impact)
- Sizing with LBM Dedicated (Need More Testing)
  - How Many Dedicated LBMs Per Cluster
  - How Many LBMs Per CoW Site (2 for Redundancy)
- Basic SME Testing Done (Shows promising results in increased CPS rate)
  - TBD On Option to Select Sizing W/ or W/O LBM in CST
- Planned Testing Post FCS
  1. Clustering over the WAN (CoW) – LBM BW Characterisation: Determine BW Savings / Optimisations
  2. Inter-Cluster CAC in Multi-Cluster Distributed Designs – LBM BW Characterisation: Determine BW Necessary for given BHCA
  3. Performance Impact for Dedicated LBMs
- Business Edition 5k and 6k Support for Replicated Locations? (TBD)

TelePresence and UC Video Interop

TelePresence Endpoints in Unified CM



- Telepresence Endpoints are Identified as Immersive Video Endpoints via QED Setting (Not Configurable)
- Check Devices for Capability:
  - Cisco Unified Reporting Tool > “Immersive Video Support for TelePresence Devices”

For info on Licensing and a List of Phone Types:
http://zed.cisco.com/confluence/display/CCM/User+Based+Licensing

Video Call Traffic Class

- “Video Call Traffic Class” Determines the Classification of a Trunk with which the “SIP Profile” is Associated: Desktop Video, High Definition Immersive Video or a System that has Both Classifications of Video Endpoints (i.e. VCS)
  - Immersive – High-definition immersive video
  - Desktop – Standard desktop video
  - Mixed – A mix of immersive and desktop video
- Video Call Traffic Class Determines which Video Pool to Deduct Bandwidth:
  - “Video Bandwidth” and/or “Immersive Bandwidth” Pools

Video Traffic Class Exchange Between Clusters

- The video call traffic class of the calling endpoint is passed between clusters in the call-info header of the SIP messages when Inter-Cluster location CAC is enabled and the location of the SIP ICT is set to “**phantom**” or “**shadow**”:

INVITE sip:1000@10.89.81.50:5060 SIP/2.0

Via: SIP/2.0/TCP 10.89.81.53:5060;branch=z9hG4bK56b357e6f

From: <sip:2007@10.89.81.53>;tag=38-d60eed00-d06a-4336-942a-dcf5621e3dae-27068646

To: <sip:1000@10.89.81.50>

Date: Tue, 25 Oct 2011 23:17:29 GMT

Call-ID: 80d55000-ea714389-6-3551590a@10.89.81.53

…

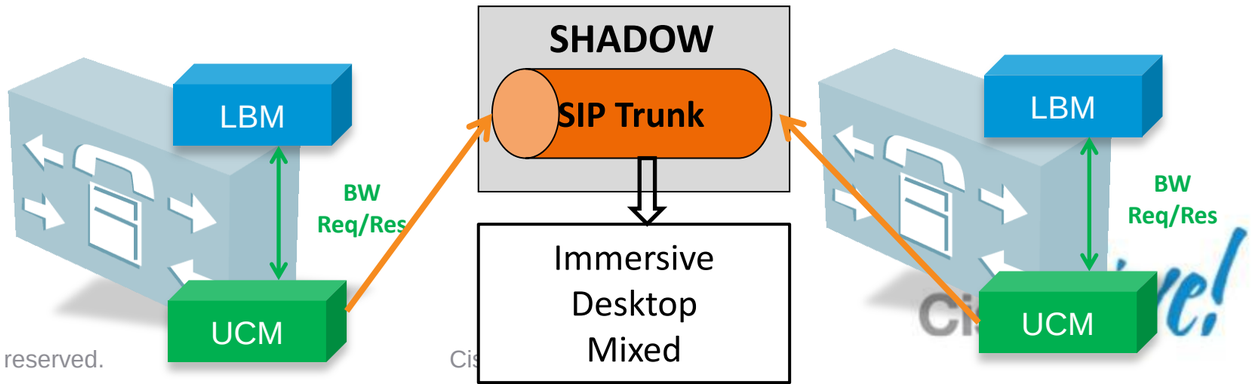
Call-Info: <sip:10.89.81.53:5060>;method="NOTIFY;Event=telephone-event;Duration=500”

Call-Info: <urn:x-cisco-remotecc:callinfo>;x-cisco-loc-id=158f5439-a6ec-5e71-efce-efc28be325f4;x-cisco-loc-name=loc14;x-cisco-fateshare- id=cl53:27068645;**x-cisco-video-traffic-class=immersive**

Cisco-Guid: 2161463296-0000065536-0000000001-0894523658

Session-Expires: 1800

…

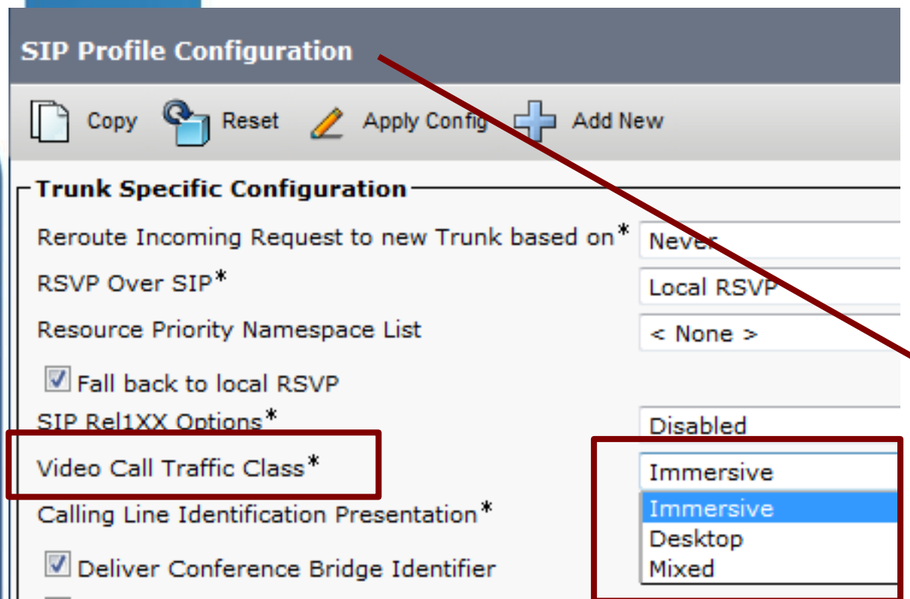


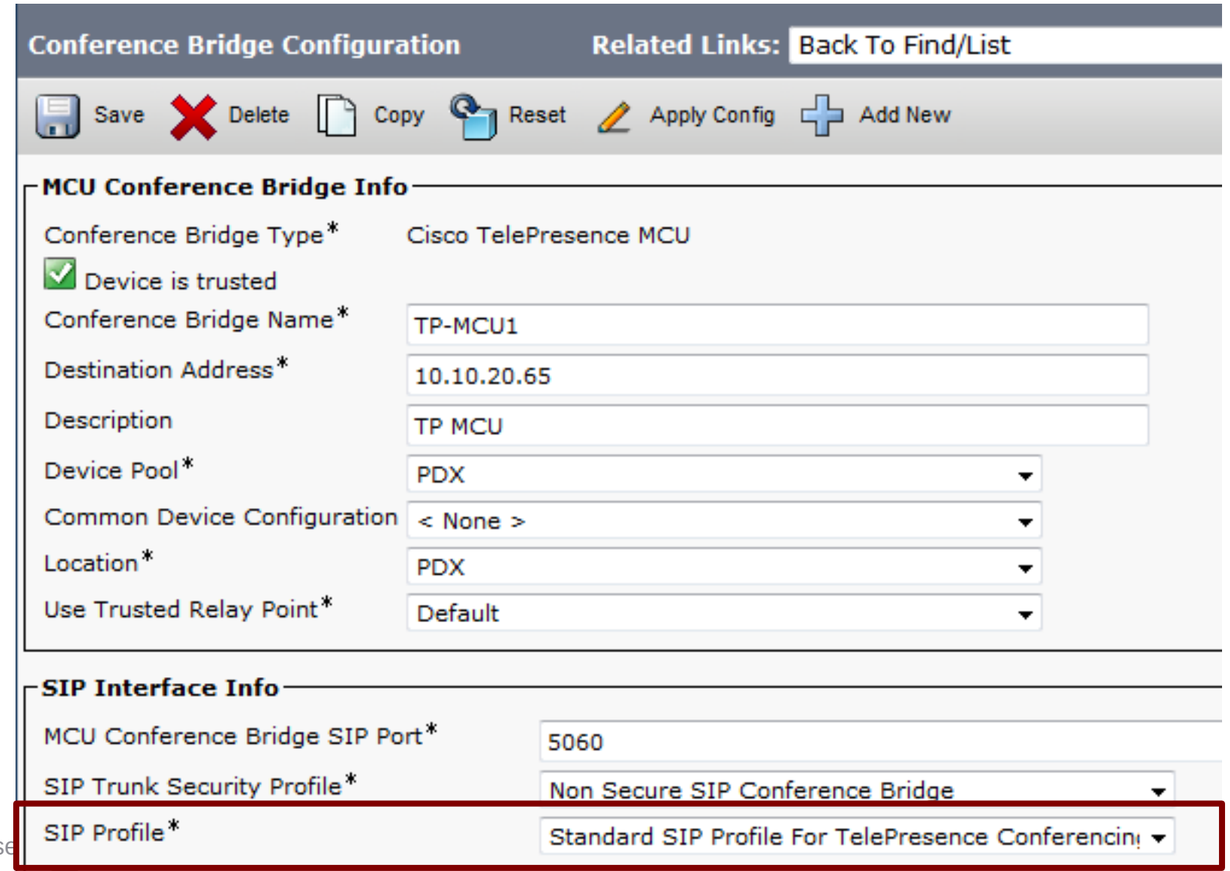
Overview of TelePresence CAC

Video Call Traffic Class in SIP Profile

- SIP Trunks (SIP Profile > Trunk Specific Configuration) are used to Classify a Device or System as Desktop Video, High Definition Immersive Video or a System that has Both Classifications of Video Endpoints (i.e. Pre 9.0 UCM or VCS, ...)
  - **Immersive** – High-definition immersive video
  - **Desktop** – Standard desktop video
  - **Mixed** – A mix of immersive and desktop video

- Separate Immersive Bandwidth Setting on Locations and Links

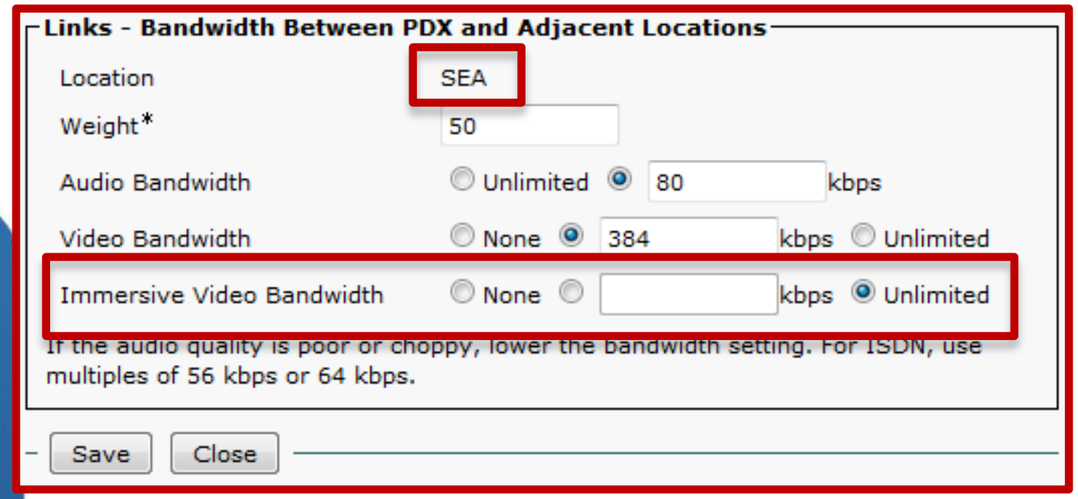




Overview of TelePresence CAC

Locations CAC

- Separate Immersive Bandwidth Setting on Locations and Links
  - Desktop Video and TelePresence Can Reside in the Same Location
  - Bandwidth to be Deducted Separately for Desktop Video and TelePresence Immersive Video

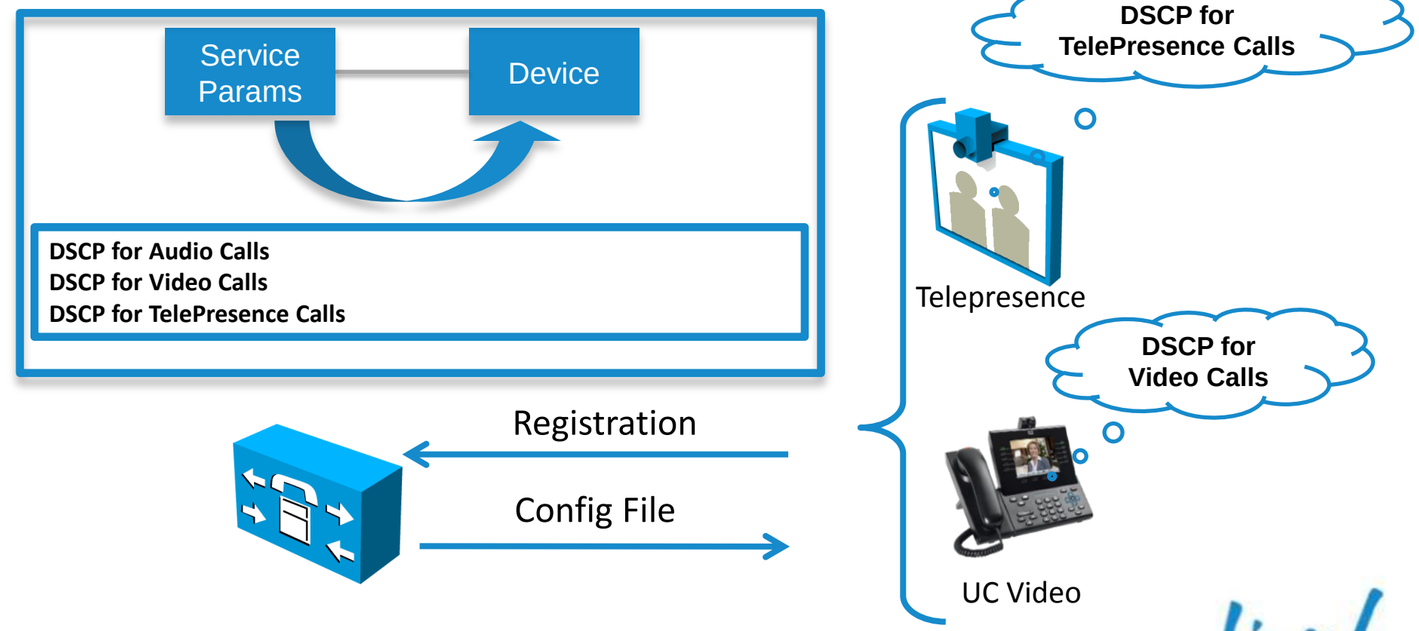


QoS Marking

- UCM Provides DSCP Values Via The Service Parameters to Endpoints For Packet Marking:

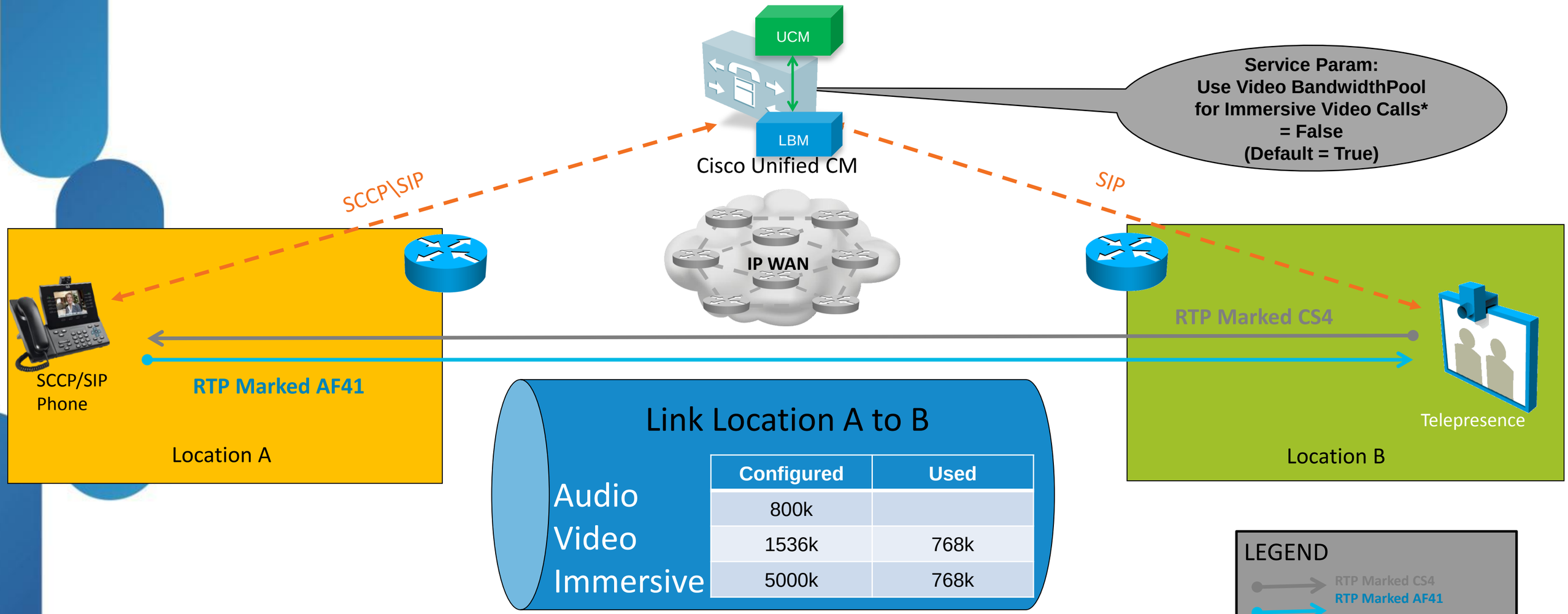
  AF41 for Video (Default)

  CS4 for Telepresence (Default)



TelePresence Video Interoperability

E-LCAC Bandwidth Deductions and Media Marking, Multi-Site



Overview of TelePresence CAC

Video Call Traffic Class in SIP Profile

TelePresence Endpoints

- TelePresence Endpoints have a Fixed QED setting (non-configurable) and are identified by Unified CM as Immersive (Video Call Traffic Class is Immersive)
- BW Reservation Determined By The Device Types of Devices in a Video Call

SIP Trunk

- BW Reservation of a SIP trunk call is determined by the calling device type and video call traffic class of the SIP trunk device

  SIP trunk for an MCU, a Device at a Fixed Location or a UC System (Pre 9.0 UCM or VCS)

- Video Call Traffic Class of the SIP trunk device is configured in SIP profile

  Immersive, Desktop or Both

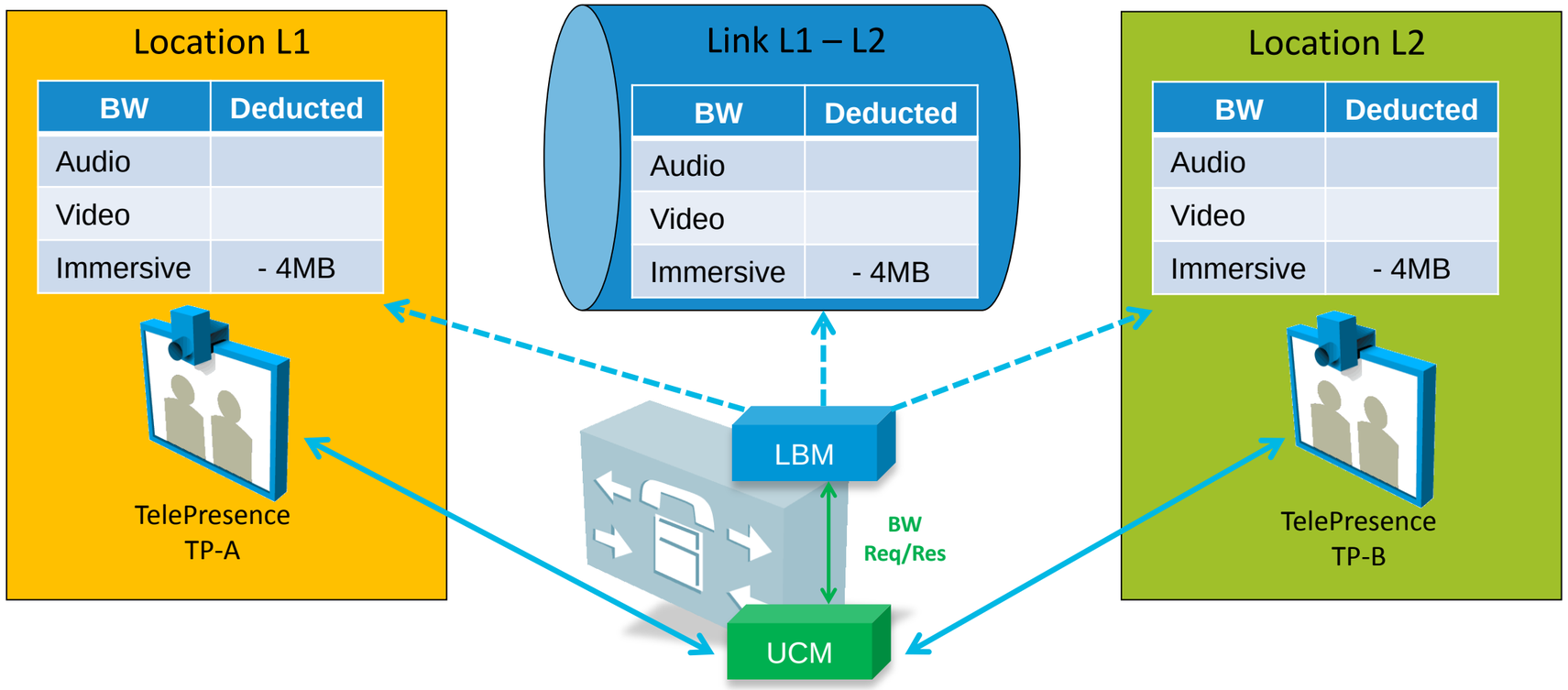
Endpoint A	Endpoint B	Locations Pool
Immersive Video	Immersive Video	Immersive Pool
Immersive Video	Desktop Video	Immersive and Video Pool
Desktop Video	Desktop Video	Video Pool
Audio Only Call	Any	Audio Pool

Local Endpoint	SIP Trunk	Locations Pool
TelePresence Endpoint	Immersive	Immersive Pool
TelePresence Endpoint	Desktop	Immersive and Video Pool
TelePresence Endpoint	Mixed	Immersive and Video Pool
Desktop Endpoint	Immersive	Immersive and Video Pool
Desktop Endpoint	Desktop	Video Pool
Desktop Endpoint	Mixed	Immersive and Video Pool
Non-Video Endpoint	Any	Audio Pool

Overview of TelePresence CAC

Call Flows: End-to-End TelePresence Immersive Video

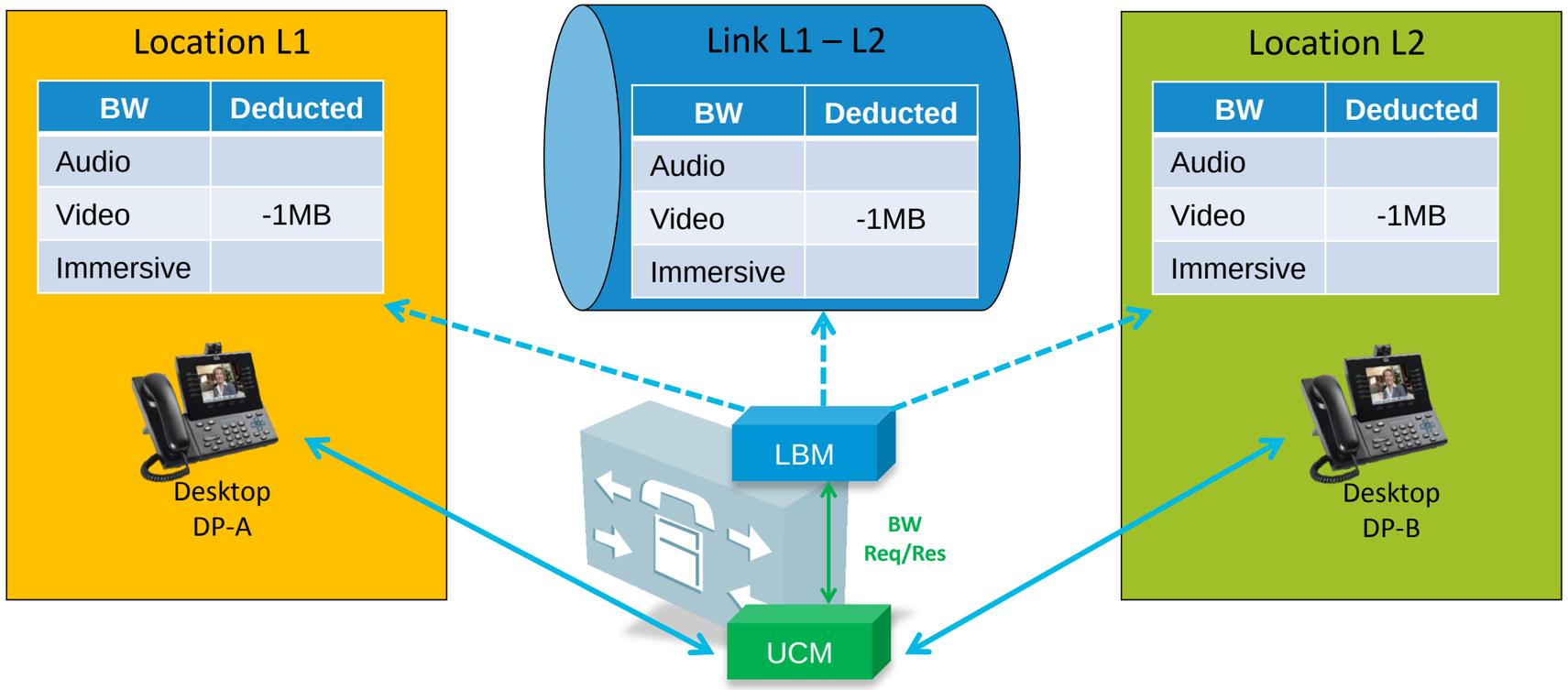
- End-to-End Immersive Video endpoint calls will deduct bandwidth from the Immersive Bandwidth Pool of the Locations and the Links along the “Effective Path”
- Example: TP-A in Location L1 calls TP-B in Location L2



Overview of TelePresence CAC

Call Flows: End-to-End Desktop Video

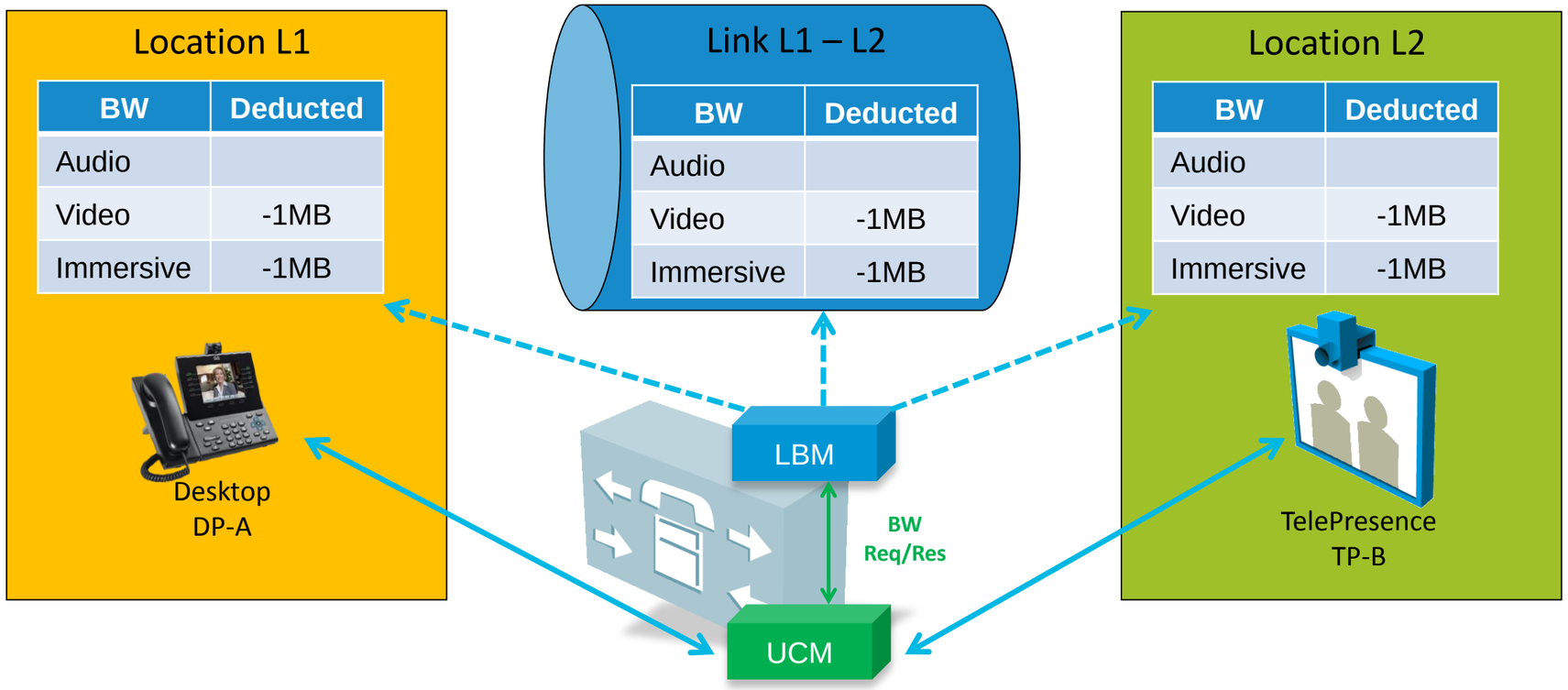
- End-to-End Desktop Video endpoint calls will deduct bandwidth from the Video Bandwidth Pool of the Locations and the Links along the “Effective Path”
- Example: DP-A in Location L1 calls DP-B in Location L2



Overview of TelePresence CAC

Call Flows: Desktop to TelePresence Video

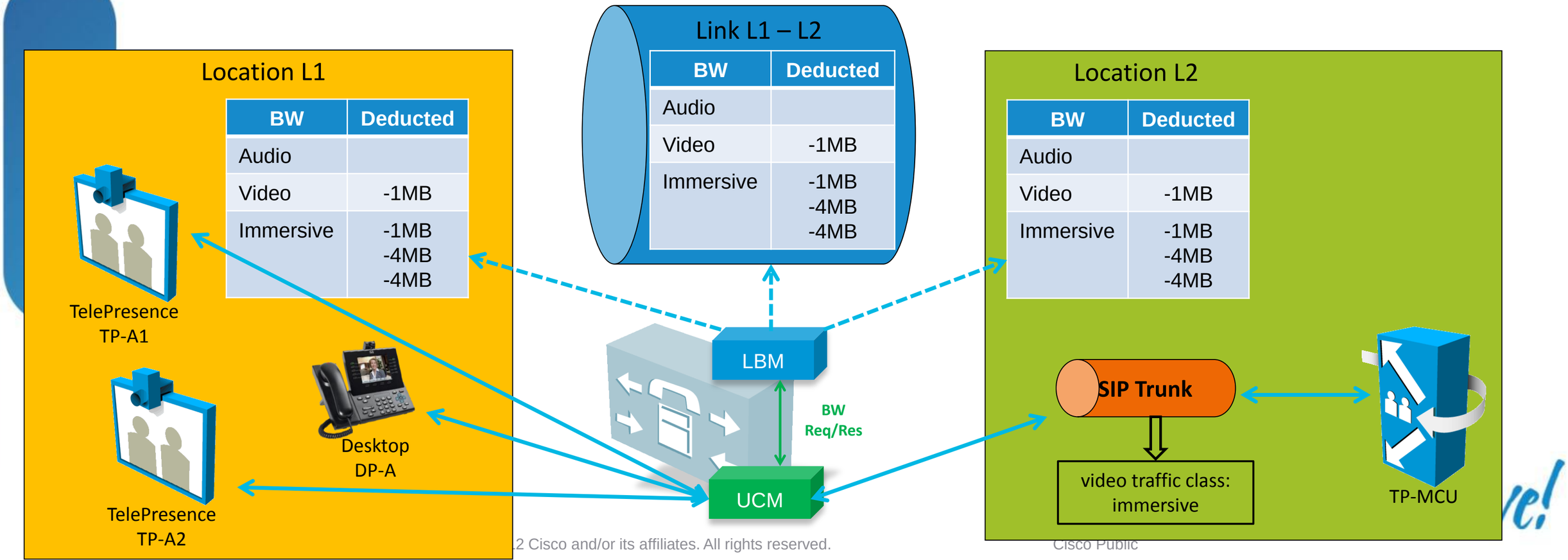
- When a Desktop Video endpoint calls a TelePresence endpoint bandwidth is deducted both Video and Immersive Bandwidth Pools of the Locations and the Links along the “Effective Path”
- Example: DP-A in Location L1 calls TP-B in Location L2



Overview of TelePresence CAC

Call Flows: Video Conference with an MCU

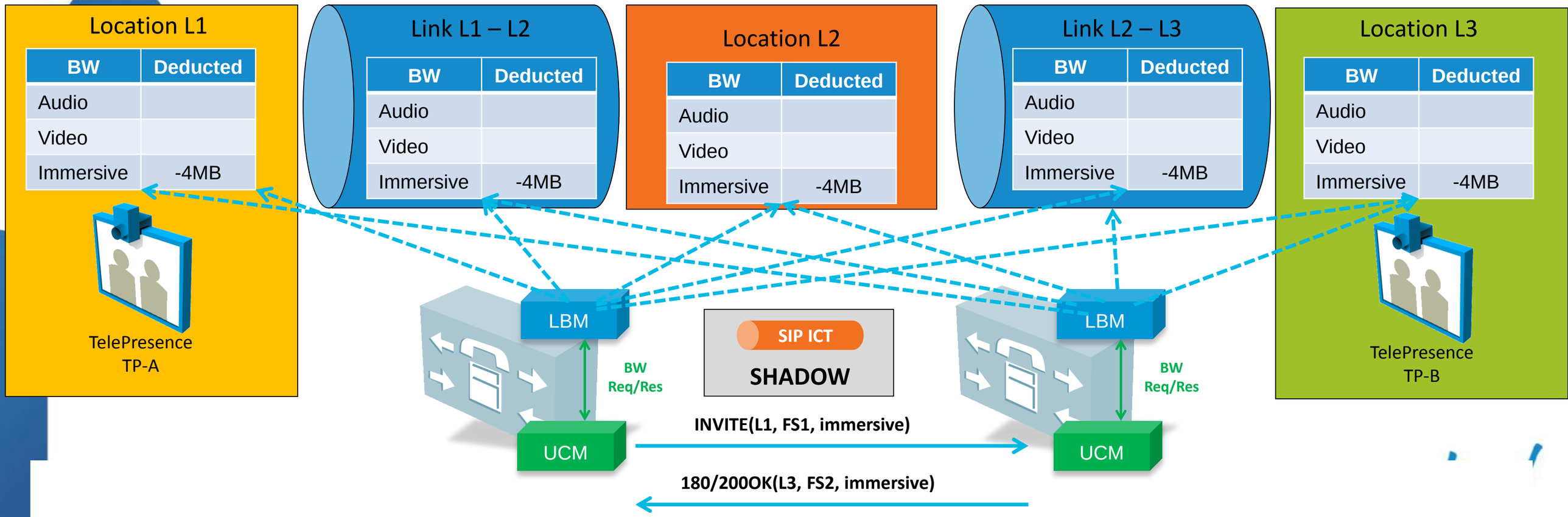
- In this example a Desktop Video endpoint and 2 TelePresence endpoints call a SIP Trunk configured with a Video Traffic Class of Immersive which points to a TelePresence MCU.
- Bandwidth is deducted both Video and Immersive Bandwidth Pools of the Locations and the Links along the “Effective Path”.



Overview of TelePresence CAC

Call Flows: End-to-End TelePresence Immersive Video Across Clusters

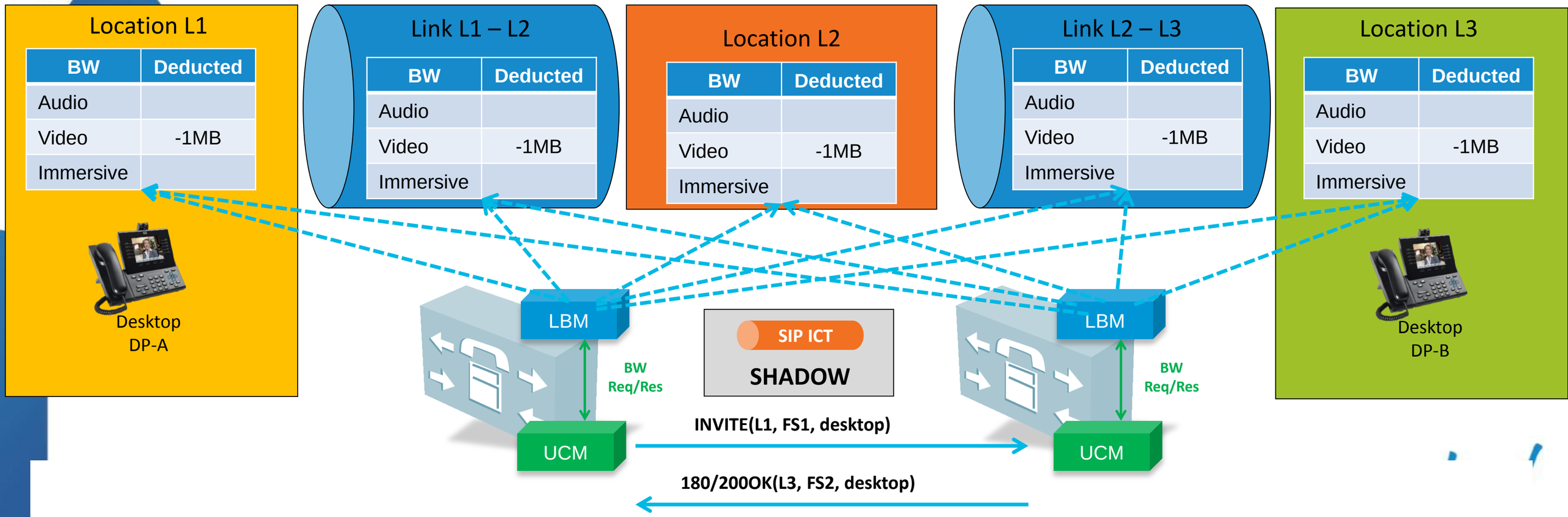
- End-to-End Immersive Video endpoint calls will deduct bandwidth from the Immersive Bandwidth Pool of the Locations and the Links along the “Effective Path”
- Example: TP-A in Location L1 calls TP-B in Location L3 Across Clusters



Overview of TelePresence CAC

Call Flows: End-to-End Desktop Video Call Across Clusters

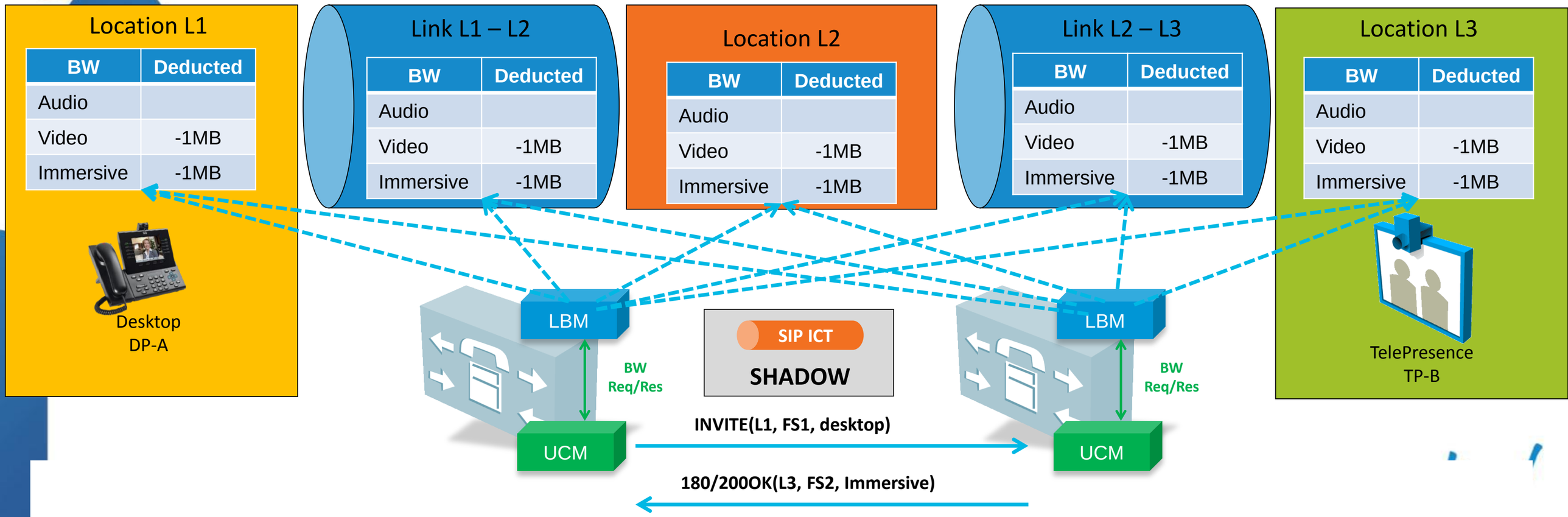
- End-to-End Desktop Video endpoint calls will deduct bandwidth from the Video Bandwidth Pool of the Locations and the Links along the “Effective Path”
- Example: DP-A in Location L1 calls DP-B in Location L3 Across Clusters



Overview of TelePresence CAC

Call Flows: Desktop to TelePresence Video Across Cluster

- When a Desktop Video endpoint calls a TelePresence endpoint across Cluster bandwidth is deducted both Video and Immersive Bandwidth Pools of the Locations and the Links along the “Effective Path”
- Example: DP-A in Location L1 calls TP-B in Location L3 Across Clusters



TelePresence Interop - Summary

- Manage TelePresence Endpoint and UC Video Endpoints in the same Location
- Support TelePresence in Inter-cluster E-LCAC and Network Modeling Deployments

Overview of TelePresence CAC

TelePresence Immersive – Key Takeaways

- **Device Configuration and Provisioning**
  - Telepresence Endpoints are Classified as Immersive Video Endpoints via QED Setting (Not Configurable)
  - SIP Trunks are (SIP Profile Trunk Specific Configuration) used to identify a Device or System
    - Immersive – High-definition immersive video
    - Desktop – Standard desktop video
    - Mixed – A mix of immersive and desktop video
  - Separate Immersive Bandwidth Setting on Locations and Links
- **Bandwidth Deduction for Video Calls**
  - End-to-End TelePresence Deduct from the Immersive Pool
  - TelePresence to Desktop Video Call Deducts from Both Video Pools (Video and Immersive)
- **Support End-to-End Immersive Video Calls between UCM Clusters**
  - Video Call Traffic Class Passed Between Clusters with SIP ICT (in shadow location)
  - Support Inter-Cluster Supplementary Services with Immersive Video Calls

Q & A

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