



Optimized Conferencing for Cisco Unified Communications Manager and Cisco VCS

Solution Guide

Release 3.0

Cisco TelePresence Conductor XC2.3
Cisco TelePresence Management Suite 14.4
Cisco TelePresence Server 4.0
Cisco TelePresence MCU Series 4.5

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Introduction

The Optimized Conferencing for Cisco Unified Communications Manager and Cisco Video Communication Server solution (Optimized Conferencing) is one part of our Pervasive Conferencing program to integrate Unified CM-based and TelePresence-based collaboration networks into a common architecture. The goal of the program is to provide a simple, scalable platform which supports optimal use of conference resources and the best possible conference experience for participants.

About this document

This document explains the recommended architecture to support Optimized Conferencing across your video network, and the underlying concepts of the architecture. It is intended to provide a high-level view of Cisco's recommended solution for optimal deployment of video conferencing. This document does not describe how to deploy the solution. Instead it provides links to external deployment guides which contain step by step instructions for deploying the infrastructure required to support the solution.

The deployment guides referenced by this document are written for partners and technical sales people who have a good technical understanding of Cisco video infrastructure products and their place in a video architecture. They expect as a minimum that readers are familiar with installing and configuring the associated product.

Terms used

Standards-based. Describes devices or technology that support the wider ITU-T standards for video conferencing (including H.323, H.320, and SIP). In contrast to SIP-only elements designed specifically for SIP environments.

WebEx conferencing. Describes conferences that allow joint video participation by Cisco TelePresence users and WebEx users. Also known as Cisco WebEx Enabled TelePresence (formerly Cisco TelePresence WebEx OneTouch).

Product names

For clarity the following short versions of Cisco product names are used:

Table 1: Product names used in this document

Product	Short name
Optimized Conferencing for Cisco Unified Communications Manager and Cisco Video Communication Server	Optimized Conferencing
Cisco Unified Communications Manager	Unified CM
Cisco TelePresence Conductor	TelePresence Conductor
Cisco TelePresence Server	TelePresence Server
Cisco TelePresence MCU Series	MCU
Cisco TelePresence Management Suite	Cisco TMS
Cisco TelePresence Management Suite Provisioning Extension	Cisco TMSPE

Table 1: Product names used in this document (continued)

Cisco TelePresence Management Suite Extension for Microsoft Exchange	Cisco TMSXE
Cisco TelePresence Video Communication Server	Cisco VCS
Cisco Business Edition 6000	BE6000
Cisco Unified Communications Manager Session Management Edition	Unified CM SME

Overview of Optimized Conferencing

The Optimized Conferencing Release 3.0 solution provides a streamlined network architecture to extend video conferencing functionality across Cisco TelePresence products. It supports the following video conferencing methods:

- Personal conferences. Permanent conferences with pre-defined numbers that participants can call into at any time.
- Scheduled conferences. Conferences with a pre-booked start and end time, including Cisco WebEx participation.
- Instant conferences. Spontaneous conferences which are "escalated" from point to point calls.

The solution comprises a SIP-based core conferencing architecture with a set of supported deployments and endpoints. Each supported deployment extends the core architecture in a specific configuration, depending on the call controller used and the conference services required.

Core architecture

The core architecture contains these key video conferencing elements, which are identical in all deployments:

- Cisco TelePresence Server (TelePresence Server) and/or Cisco TelePresence MCU Series (MCU) conference bridges.
- Cisco TelePresence Conductor (TelePresence Conductor) for bridge resource management.
- Cisco TelePresence Management Suite (Cisco TMS) for conference provisioning, monitoring, and scheduling.

Call control

Either the Cisco Unified Communications Manager (Unified CM) or the Cisco TelePresence Video Communication Server (Cisco VCS) can be used for call control. The Unified CM is recommended. Deployments with Unified CM are known as "Unified CM-centric" and deployments with Cisco VCS are known as "Cisco VCS-centric".

CAUTION: Support for any given deployment, feature, or component in Optimized Conferencing Release 3.0 is dependent on the requirements described in this guide regarding supported device types, software versions, and interoperability.

Key benefits

- Simplified, optimal user experience for conference participants.
- Flexible, extendable architecture that supports deployment of one or more of permanent, scheduled, and instant (ad hoc and Multiway™) conferencing capabilities.
- Dynamic optimization of conference resources on the TelePresence Server for inbound calls.
- Ability to increase the number of conference participants beyond the capacity of a single MCU bridge.
- Resilience in the video network, which allows bridges to be taken offline for maintenance (excluding scheduled bridges).

Conferencing types

The Optimized Conferencing solution supports the following conference types:

Table 2: Conferencing capabilities in Optimized Conferencing

Conference type	Description
Rendezvous / personal (permanent conferences)	Pre-defined addresses that allow conferencing without previous scheduling. The host shares the address with other users, who can call in to that address at any time.
Scheduled	Pre-booked conferences with a start and end time. Optionally with a pre-defined set of participants.
Ad hoc (instant / escalated)	Manually escalated from a point-to-point call hosted on a Unified CM, to a three-party call hosted on a conference bridge.
Multiway (instant / escalated)	Manually escalated from a point-to-point call hosted on a Cisco VCS Control, to a three-party call hosted on a conference bridge.

Ad hoc and Multiway are different types of instant (or escalated) conferencing. Ad hoc is the Unified CM-based version and Multiway is the Cisco VCS equivalent. [Appendix 1: Conferencing fundamentals \[p.55\]](#) describes each conference type in detail.

In all deployment models the solution supports conferencing between individuals in any [Location](#), using the endpoints listed in [Solution components and required versions \[p.12\]](#). As conference attendees join the conference, they join at the resolution supported by their endpoint provided that it is below or equal to the maximum level set by the conference administrator.

Supported deployment scenarios

Unified CM-centric deployments

The standard Unified CM-centric deployment supports Optimized Conferencing within the local Unified CM-managed enterprise. It can be extended to support any of these scenarios:

- Participation by external users—remote and mobile workers registered to the local Unified CM, WebEx users, and business-to-business conferencing.
- Interoperability with Microsoft Lync.
- Interoperability with standards-based endpoints.

Cisco VCS-centric deployments

The standard Cisco VCS-centric deployment supports Optimized Conferencing within the local Cisco VCS-managed enterprise. It can be extended to support any of these scenarios:

- Participation by external users—remote and mobile workers registered to the Cisco VCS Expressway, Cisco WebEx users, and business-to-business conferencing.
- Interoperability with Microsoft Lync.
- Interoperability with endpoints managed by a Unified CM or other non-VCS call controller within the enterprise.

Cisco Business Edition 6000

Optimized Conferencing is also available for Cisco Business Edition 6000 (BE6000) environments. The basic deployment for video conferencing in the local BE6000 enterprise can be extended for remote access.

Which deployment to use?

The choice of which deployment to use is based on the primary call controller. Organizations that are exclusively Unified CM-based should use one or more of the Unified CM-centric deployments. Organizations that are exclusively Cisco VCS-based should use one or more of the Cisco VCS-centric deployments.

The Unified CM is the recommended call control device for the solution.

Solution at a glance

Table 3: Services and features in Optimized Conferencing

Service / feature	Comments
Ad hoc, rendezvous, and Multiway conferencing	Conference bridges managed through TelePresence Conductor.
Scheduled conferencing	Conference bridges managed by Cisco TMS directly onto the bridges. Supported on all MCUs and on TelePresence Server 7010 and 8710.
ActiveControl for conference participants	TelePresence Server bridges.
Cisco Business Edition 6000 deployments	New
Cisco ClearPath video quality technology	TelePresence Server, MCU 8510 and MCU 5300 Series bridges.
Collaboration Meeting Room provisioning and user portal	New Using Cisco TelePresence Management Suite Provisioning Extension (Cisco TMSPE) provisioning extension for Cisco TMS.
Entry-level conference bridges	<ul style="list-style-type: none"> ■ Cisco TelePresence Server on Virtual Machine ■ Cisco TelePresence Server on Multiparty Media 310/320
Microsoft Lync interoperability	New Interoperability with Microsoft Lync 2013 is supported, using the Cisco Expressway-C or Cisco VCS Control for interworking.
Optimization of conference bridge resources	TelePresence Server bridges.
Segment switching (multiscreen immersive systems)	New TelePresence Server bridges. Segment switching is the default behavior in this release.
Simplified configuration for TIP multiscreen endpoints	TelePresence Server bridges.
User-based licensing (some cases only)	New Via Cisco Personal Multiparty licenses.
Virtual conference bridges	Cisco TelePresence Server on Virtual Machine
Cisco WebEx-based conference participation	Conference bridges managed by Cisco TMS directly onto the bridges. Supported on all MCUs and on TelePresence Server 7010 and 8710.

What's new

For details of new and changed features in Optimized Conferencing Release 3.0, see the latest solution release notes on Cisco.com.

Core architecture for Optimized Conferencing

The core elements of Optimized Conferencing are present in all deployments:

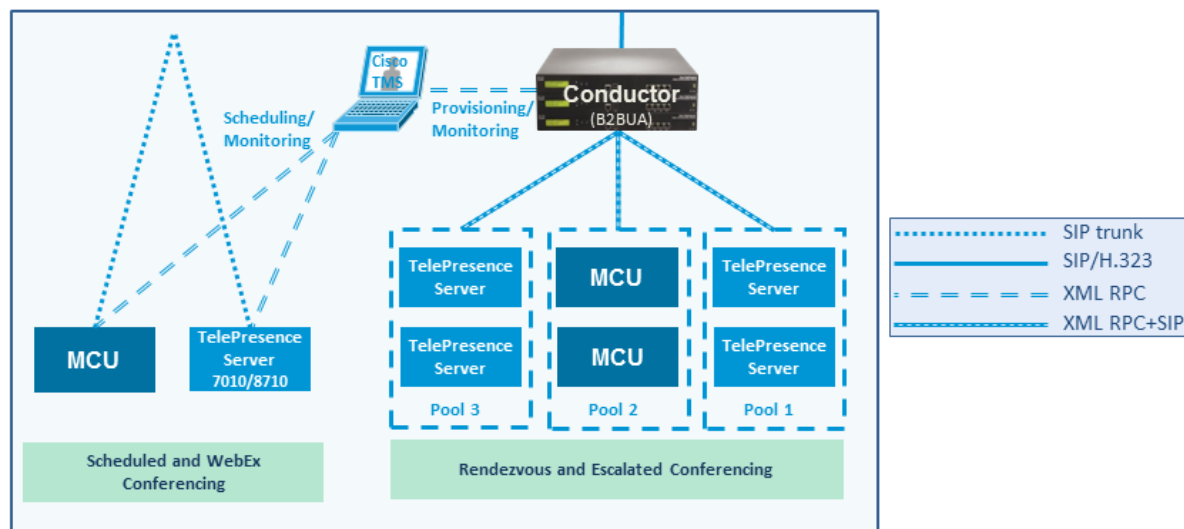
- TelePresence Server and/or MCU conference bridges
- TelePresence Conductor
- Cisco TMS

With the exception of bridges used for scheduled conferences, the TelePresence Conductor manages the conference bridges. SIP trunks connect the bridges to the TelePresence Conductor, which in turn is trunked to one or more call controllers. All XML RPC connections also go via the TelePresence Conductor. Bridges used for scheduled conferences are trunked direct to the call controller. The Cisco TMS is linked by XML RPC connections to the TelePresence Conductor for provisioning and monitoring of non-scheduled conferences, and direct to the bridges for scheduled conference management.

The architecture is exclusively SIP. Conferencing with H.323 endpoints requires interworking by a Cisco VCS.

Note: The solution is IPv4 based.

Figure 1: High-level view of the architecture



Role of the TelePresence Conductor

TelePresence Conductor manages the bridge resources for rendezvous conferences, and for ad hoc conferences (Unified CM-centric deployments) or Multiway conferences (Cisco VCS-centric deployments). It selects which bridge or bridge pools to host a specific conference and balances the conference load across the bridges in the defined pools. The call control element (Unified CM or Cisco VCS) is unaware of the individual bridges in the network and communicates only with the TelePresence Conductor.

In certain cases TelePresence Server bridges are optimized dynamically by TelePresence Conductor if *Optimize resources* is enabled in the TelePresence Conductor conference template.

Role of the Cisco TMS

For non-scheduled conferences, Cisco TMS allows administrators to control ongoing conferences using the Cisco TMS Conference Control Center (see [Conference control for non-scheduled conferences \[p.35\]](#)).

Cisco TMS with the Cisco TMSPE also supports automated bulk provisioning by administrators of personal Collaboration Meeting Rooms (CMRs), and a user portal for individuals to define and manage their own personal CMRs.

For scheduled conferences, the Cisco TMS performs conference scheduling and conference control functions directly on the bridges (see [Scheduled conferencing \[p.34\]](#)).

Conference bridges for non-scheduled conferencing

For rendezvous, ad hoc and Multiway conferencing, bridges are grouped into pools of like devices in TelePresence Conductor, to which Conductor applies Service Preferences to prioritize use of the pools for specific conference calls. The illustration above shows co-located bridges in Pools 1-3 behind TelePresence Conductor for rendezvous and escalated conferencing.

TelePresence Server bridges must be configured in remotely managed mode. The TelePresence Server on Multiparty Media 310/320 and Cisco TelePresence Server on Virtual Machine do not need configuring as they are always in remotely managed mode.

Conference bridges for scheduled conferencing

Scheduled conferencing, including WebEx Enabled TelePresence meetings for participation by Cisco WebEx users, is supported on MCU and TelePresence Server 7010 and 8710 conference bridges. The bridges must be connected directly to the call controller and not via TelePresence Conductor. [Figure 1: High-level view of the architecture \[p.10\]](#) above shows two dedicated bridges used for scheduled/Cisco WebEx conferencing.

TelePresence Server 7010 and 8710 bridges must be configured in locally managed mode. Scheduled conferencing is not supported on the TelePresence Server on Multiparty Media 310/320 or the Cisco TelePresence Server on Virtual Machine.

For guidance about configuring TelePresence Server bridges see the [TelePresence Server product documentation](#). For information about resource optimization see [Cisco TelePresence Conductor Administrator Guide XC2.3](#) and [Cisco TelePresence Server Version 4.0 Printed Help](#).

Solution components and required versions

The products used in Optimized Conferencing and the required software/firmware versions for each product are listed below. Your organization may not use all the products but those that are used must be running the specified version. (For information about upgrading see [Implementing Optimized Conferencing \[p.46\].](#))

- [Infrastructure \[p.12\]](#)
- [Endpoints, soft clients and peripherals \[p.13\]](#)

Note: In networks with multiple Unified CM or Cisco VCS installations, for full Optimized Conferencing functionality every installed Unified CM or Cisco VCS must be at the required version.

Infrastructure

Table 4: Required software for infrastructure products

Product	Required version	Role
TelePresence Conductor	XC2.3	Conference resource allocation
Cisco TMS	14.4	Conference management & scheduling
TelePresence Server 7010 and MSE 8710, TelePresence Server on Multiparty Media 310/320, TelePresence Server on Virtual Machine	4.0	Conference bridges
MCU 5300 Series, 4500 Series, 4501 Series, 4200 Series, MCU MSE Series 8420 and 8510	4.5	Conference bridges
Unified CM	9.1(2)SU2 or 10.5(1)	Call control
Cisco Expressway-C	X8.1.1 or later X8.2 recommended—required for Microsoft Lync interoperability.	Proxy registration to Unified CM for remote, secure endpoint registration. Media termination capabilities. Microsoft Lync interworking.
Cisco Expressway-E	X8.1.1 or later X8.2 recommended	Secure firewall traversal
Cisco VCS Control	X8.1.1 or later (except X7.2.3 can be used for H.323 registration). X8.2 recommended—required for Microsoft Lync interoperability.	Call control (Cisco VCS-centric deployments). H.323 interworking. Microsoft Lync interworking.

Table 4: Required software for infrastructure products (continued)

Cisco VCS Expressway	X8.1.1 or later X8.2 recommended	Secure firewall traversal. Registration of standards-based endpoints across the Internet.
Cisco TMSPE	1.2	Conference provisioning
Cisco TMSXE	4.0 or 4.0.1	[Optional] Conference management & scheduling for Microsoft environments
Cisco WebEx	T28.12 or later	Participation by WebEx users (WebEx Enabled Conferencing)

Endpoints, soft clients and peripherals

Table 5: Required software for endpoints, soft clients and peripherals

Product	Version	Supported in deployments...
Cisco TelePresence EX Series (EX60, EX90)	TC7.1.3	Unified CM-centric Cisco VCS-centric
Cisco TelePresence Quick Set C20, SX10, SX20, SX80		
Cisco TelePresence Codec C Series (C40, C60, C90)		
Cisco TelePresence Profile Series		
Cisco TelePresence MX200 and MX300		
Cisco Desktop Collaboration Experience DX650	10.1(2.33)	Unified CM-centric
Cisco TelePresence Systems CTS 3010, CTS 3210, CTS 1100 and CTS 1300	CTS 1.10.5 or later	Unified CM-centric
Cisco TelePresence System CTS 500-32	TX6.1.2 or later	Unified CM-centric
Cisco TelePresence TX9000 Series (TX9000 and TX9200 immersive systems)	TX6.1.2 or later	Unified CM-centric (although these endpoints can register to the VCS they are not supported for Optimized Conferencing Cisco VCS-centric deployments)
Cisco IP Video Phone E20	TE4.1.3 or later	Cisco VCS-centric
Cisco Unified IP Phone 9900 Series and 8900 Series	9.4(1)	Unified CM-centric
Cisco Jabber for Android	9.6	Unified CM-centric
Cisco Jabber for iPad	9.6.1	Unified CM-centric
Cisco Jabber for iPhone	9.6.1	Unified CM-centric

Table 5: Required software for endpoints, soft clients and peripherals (continued)

Cisco Jabber for Mac	9.6	Unified CM-centric
Cisco Jabber for Windows	9.7	Unified CM-centric
Cisco Jabber Video for TelePresence	4.7	Unified CM-centric
Microsoft Lync Client	Lync 2013 Client	Unified CM-centric Cisco VCS-centric

Note: The video conference network may also include other endpoints that support H.323 or SIP, and are registered to the Cisco VCS or call into it.

Deploying Optimized Conferencing in virtualized environments

Optimized Conferencing is supported for virtualized environments. As with all Cisco Unified Communications (UC) on Unified CM deployments, the following sizing guidelines and hardware requirements must be followed:

- http://docwiki.cisco.com/wiki/Unified_Communications_Virtualization_Sizing_Guidelines
- http://docwiki.cisco.com/wiki/UC_Virtualization_Supported_Hardware

In particular, physical CPU cores may not be over-subscribed for UC virtual machines. So one physical CPU core must equal one virtual machine vCPU core.

Hyperthreading on the CPU should be enabled when available. However, the resulting logical cores do not change UC app rules. The UC rules are based on a one-to-one mapping of physical cores-to-vcpu, not logical cores-to-vcpu.

Further details on running UC in a virtualized environment are available in http://docwiki.cisco.com/wiki/Unified_Communications_in_a_Virtualized_Environment

Deployments for Unified CM-centric networks

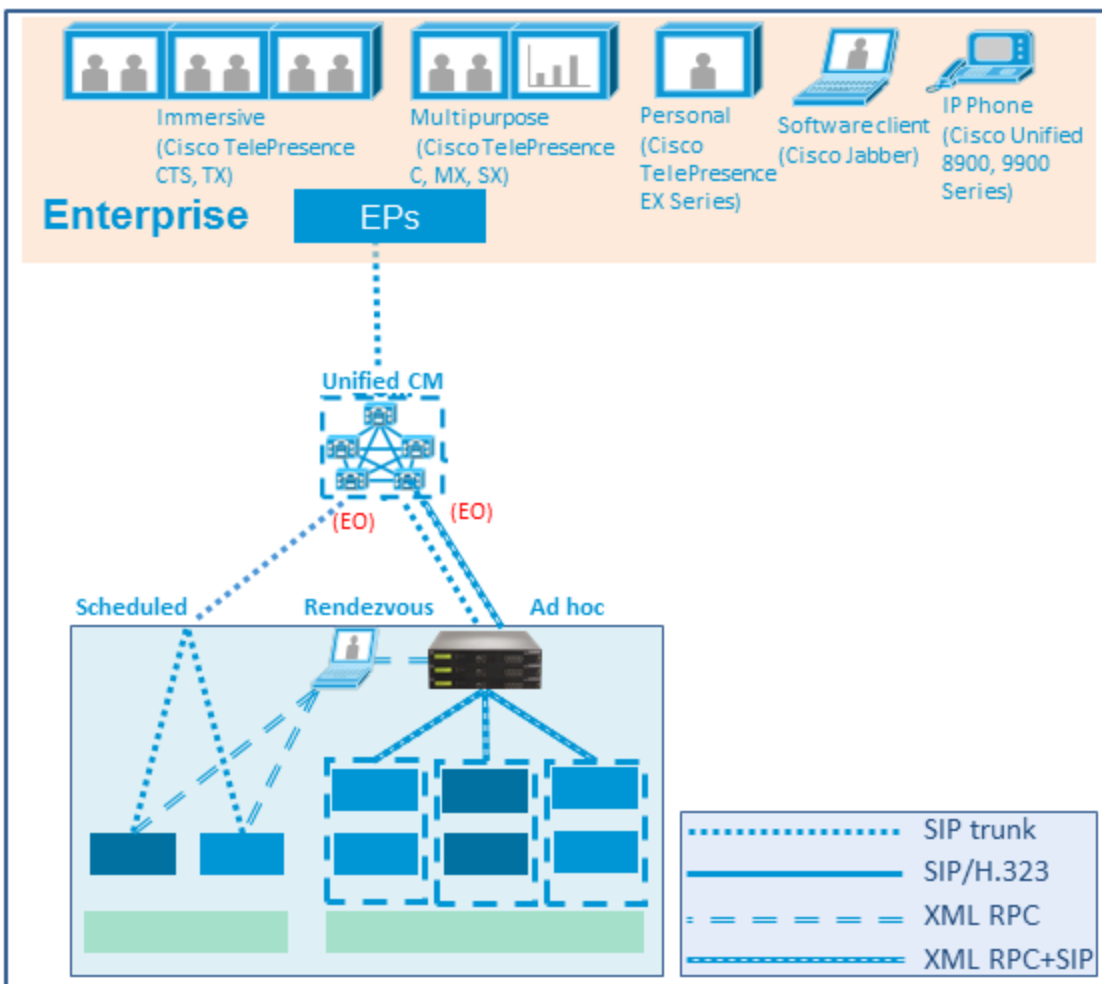
For clarity each deployment type is shown separately in the deployment diagrams here. However, you can use any or all of the deployments together. The final diagram shows all the deployments used in combination.

Unified CM-centric standard deployment

The standard deployment has one or more Unified CMs for call control. The TelePresence Conductor is trunked to the Unified CM. Conference bridges can be TelePresence Servers, MCUs, or both. Conference management facilities are provided by Cisco TMS over XML RPC connections.

Bridges used for rendezvous and ad hoc conferences are trunked to the TelePresence Conductor where they are organized into pools and service preferences and managed by the TelePresence Conductor. Bridges used for scheduled conferences (including Cisco WebEx participation) are trunked direct to the Unified CM. TelePresence Server bridges are configured in remotely managed mode when trunked to the TelePresence Conductor and in locally managed mode when trunked to Unified CM.

Figure 2: Unified CM-centric standard deployment



The standard deployment can be viewed as a single, large conference bridge behind the Conductor, combined with Unified CM call control and Unified CM-managed endpoints, and Cisco TMS for conference management. These elements together provide Optimized Conferencing for the local enterprise.

Limitations and requirements for all Unified CM-centric deployments

- Early Offer messaging is strongly recommended for all Unified CM-connected SIP trunks which carry TelePresence calls.
- The Multiway™ method of escalated conferencing is not recommended in Unified CM-centric deployments.
- TelePresence Server conference bridges used for scheduling must be configured in locally managed mode.
- The MCU auto attendant is not supported.
- If your deployment uses a Cisco VCS, note that Cisco Expressway and Cisco VCS do not support Early Media. So for calls involving a Cisco VCS, media is only heard after the call has connected (pre-answer messages and far end ring tones will not be heard).

Conference call flows

The Unified CM provides call registration and routing of voice and video between the connected endpoints. Rendezvous, ad hoc and scheduled calls are carried over SIP trunks. XML RPC connections are established between each Unified CM and the TelePresence Conductor.

Rendezvous and scheduled calls respectively are routed along (separate) single trunks from the Unified CM. In each case the same trunk is also used for all outgoing calls, so that incoming and outgoing calls follow the same path. In contrast, ad hoc calls route directly to Conductor from the Unified CM which created the conference, so multiple ad hoc trunks may exist. Each one has an associated XML RPC connection. Ad hoc conferences are controlled by their originating Unified CM, so an API/SIP trunk pair is required from each Unified CM that supports conferencing.

Rendezvous and scheduled conferences can route from any Unified CM. If a Cisco Unified Communications Manager Session Management Edition (Unified CM SME) is deployed it is assumed that it will be used for these trunks.

Rendezvous conferences for endpoints registered to Unified CM are channeled through TelePresence Conductor to the conference bridge.

Ad hoc call flows (which are managed by Unified CM) cannot be used to add participants to conferences created by any other method, such as a rendezvous conference. Other call flows cannot be used to add participants to ad hoc conferences. So the ad hoc call escalation method is only supported in an ad hoc conference that was created by it, and conferences generated by other methods cannot be extended by the ad hoc mechanism. This avoids any potential for chained conferences.

Note: Unified CM delivers ad hoc and rendezvous conferences to different IP addresses on TelePresence Conductor. Multiple Unified CMs (from Version 8.6.2) can access the same IP address on TelePresence Conductor. The Unified CMs do not need to be in the same physical location.

Rendezvous and ad hoc configuration summary

These are the configuration steps to route rendezvous and ad hoc calls through the Unified CM:

1. Configure all SIP trunks that carry TelePresence calls for [Early Offer messaging](#). If you do not want to do this you may leave the trunks as Delayed Offer for the standard deployment, but note that some extended

deployments may require Early Offer for certain trunks.

2. Configure the appropriate [Locations](#) in TelePresence Conductor. For details, see [Cisco TelePresence Conductor with Unified Communications Manager Deployment Guide](#).
3. [For ad hoc] Configure a Unified CM bridge resource (and a Media Resource Group and Media Resource Group List).
4. [For rendezvous] Configure a Unified CM Trunk and Route Pattern with a special TelePresence Conductor IP for rendezvous conferencing.
5. Configure the TelePresence Servers to use TelePresence Conductor for remote management. The TelePresence Server on Multiparty Media 310/320 and TelePresence Server on Virtual Machine do not need configuring as they are always in remotely managed mode.

From Optimized Conferencing Release 3.0, permanent conferences can also be provisioned on TelePresence Conductor using Cisco TelePresence Management Suite Provisioning Extension (Cisco TMSPE) and the Conductor Provisioning API. You configure bridge pools and Service Preferences on TelePresence Conductor, and define group-level templates in Cisco TMSPE which allow end-users to define their own personal CMRs through the Cisco TMSPE user portal. For details, see [Cisco TelePresence Management Suite Provisioning Extension with Cisco Unified CM Deployment Guide](#) and [Cisco TelePresence Conductor Product Programming Reference Guide XC2.3](#).

Scheduled conferences

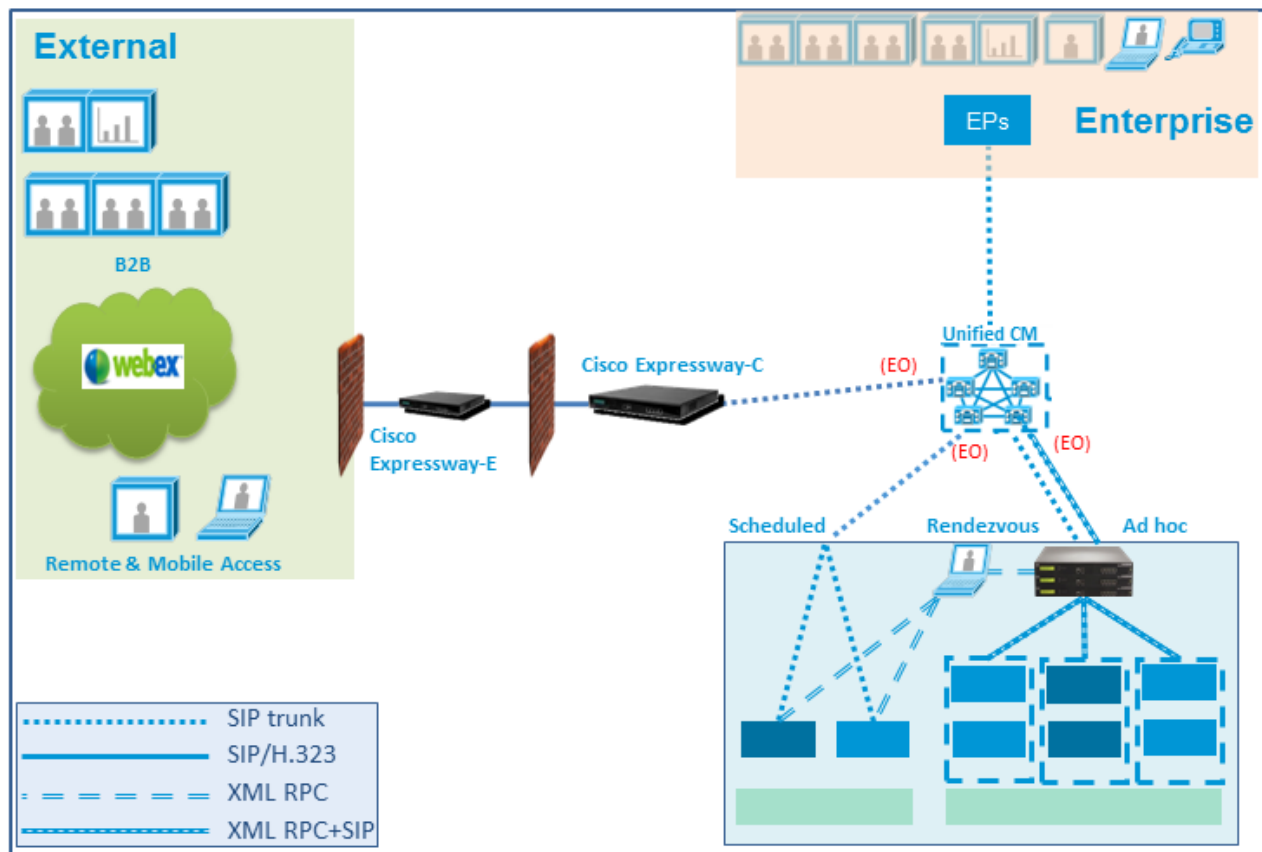
Conference scheduling and conference control functions are performed by Cisco TMS directly onto the conference bridges (not via the TelePresence Conductor).

Unified CM-centric external deployment

By trunking a Cisco Expressway to the Unified CM, the standard Unified CM-centric configuration can be extended to support access by participants who are external to the local enterprise:

- Remote and mobile workers registered to the local Unified CM.
- WebEx based users.
- Users in other organizations (business-to-business conferencing).

Figure 3: Optimized Conferencing with external access (Unified CM-centric)



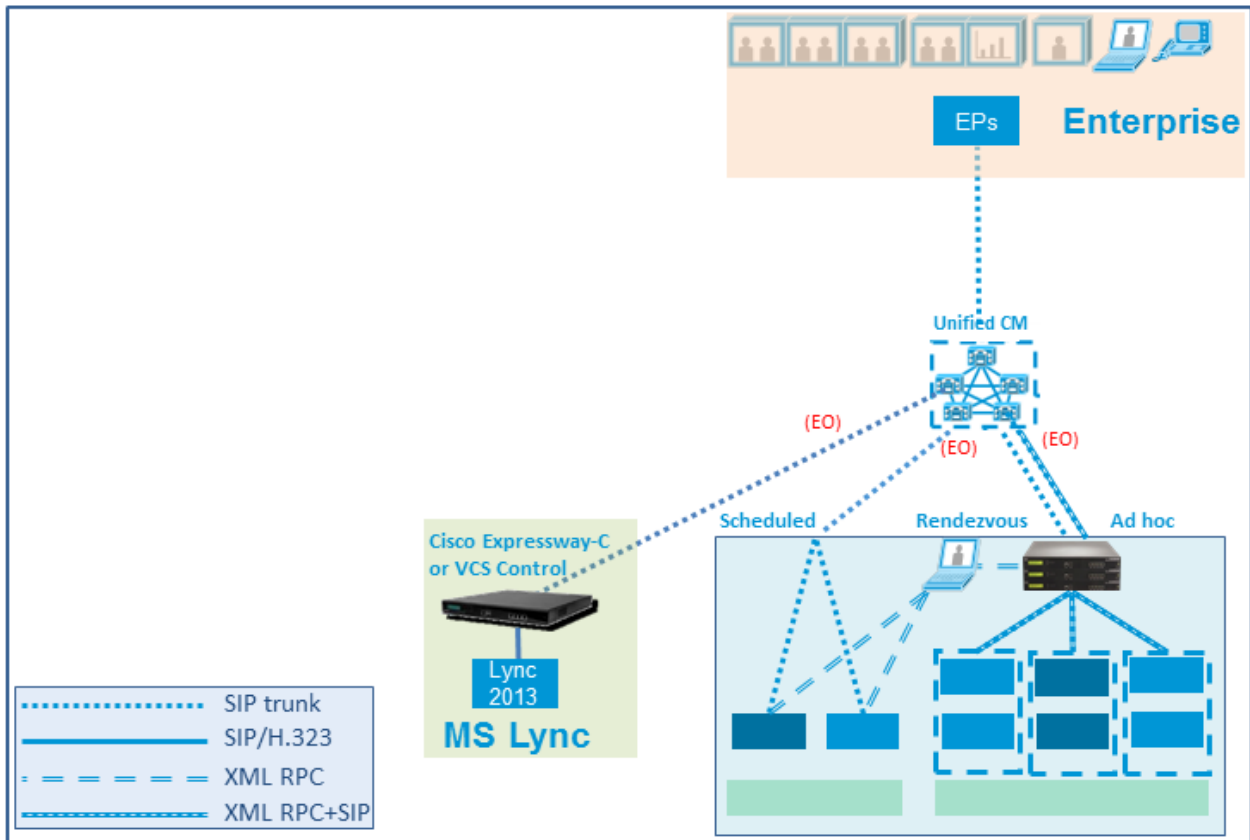
Requirements for external deployments

If you have not configured all SIP trunks for Early Offer (as recommended) you *must* configure Early Offer between any bridges used for WebEx Enabled TelePresence calls and the Cisco Expressway.

Unified CM-centric with Microsoft Lync 2013 deployment

This deployment extends the standard Unified CM-centric configuration to support interoperability with the Microsoft Lync 2013 service, over a Cisco Expressway-to-Unified CM trunk.

Figure 4: Optimized Conferencing with MS Lync 2013 (Unified CM-centric)



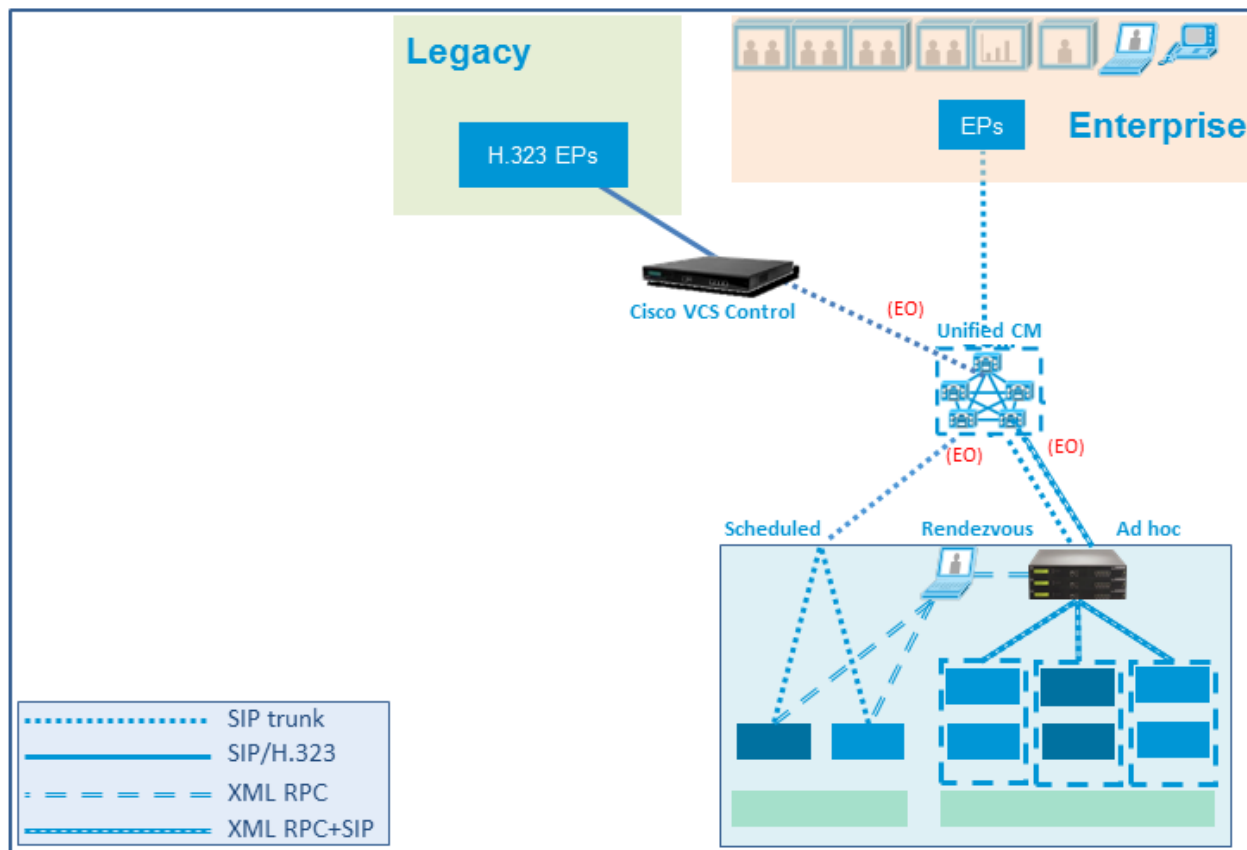
Limitations and requirements for Lync 2013 deployments

- Microsoft Lync Server 2013 and Lync 2013 clients.
- Cisco Expressway-C / Cisco VCS Control must be running Version X8.2 software.
- For capacity reasons we recommend that you implement separate Cisco Expressway-C or Cisco VCS Control devices for Lync access, and for other networking requirements respectively. [Figure 6: Optimized Conferencing combined deployment \(Unified CM-centric\) \[p.22\]](#) shows three devices: one for remote networking, one for Lync, and one for legacy interworking.
- You can optionally use a Cisco Expressway-C or a Cisco VCS Control as the Microsoft Lync gateway, depending on the Lync functionality required and your local organization preferences.
- The *Microsoft interoperability* key (formerly known as *Enhanced OCS Collaboration*) is required for the Cisco Expressway-C or Cisco VCS Control.
- Lync endpoints cannot share their content, although they can receive content as part of a composed TelePresence Server layout.
- Cisco TelePresence CTS 500-32 endpoints must be running TX6.1.2 software.

Unified CM-centric legacy deployment

This deployment extends the standard Unified CM-centric configuration to support interworking with standards-based endpoints, over a Cisco VCS-to-Unified CM trunk.

Figure 5: Optimized Conferencing with standards-based endpoints (Unified CM-centric)



Conference support for endpoints

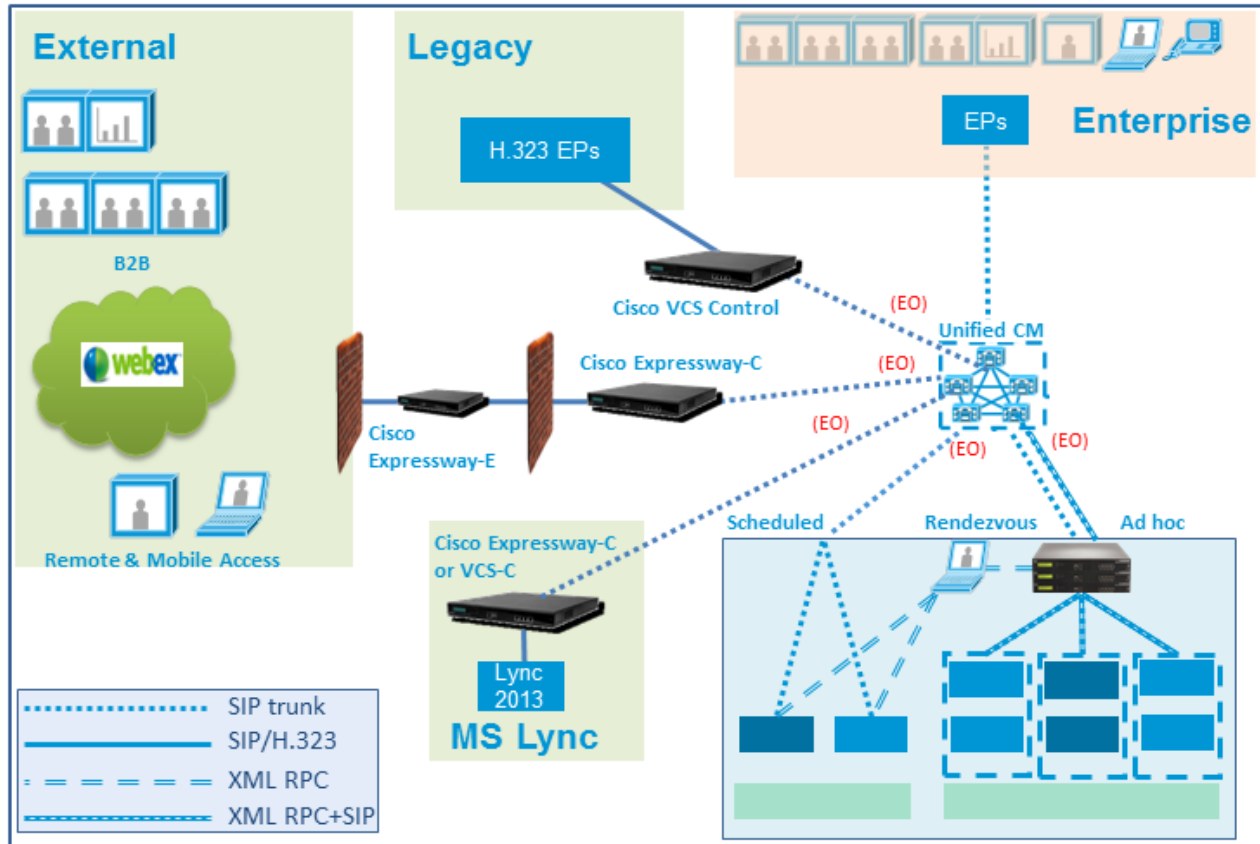
As in the standard deployment, rendezvous conferences for endpoints registered to Unified CM are channeled through TelePresence Conductor to the conference bridge. Additionally for this deployment, endpoints registered to a Cisco VCS Control can be included in the following conferences:

- Ad hoc conferences initiated by an endpoint registered to Unified CM. Cisco VCS Control-registered endpoints cannot initiate ad hoc conferences, but can be involved in them in every other way.
- Rendezvous conferences hosted on bridges behind the TelePresence Conductor connected to Unified CM.
- Scheduled/Cisco WebEx conferences hosted on the conference bridges connected directly to Unified CM.

Unified CM-centric combined deployment

Any or all of the extended Unified CM-centric deployments can be used together. This diagram shows a combined configuration that uses all the available deployment types:

Figure 6: Optimized Conferencing combined deployment (Unified CM-centric)



Note: Use dedicated gateways with the Lync 2013 deployment

If you use Lync 2013 interworking in a combined deployment, for capacity reasons we recommend that you implement separate Cisco Expressway-C or Cisco VCS Control devices for Lync access and for general remote networking respectively. A further dedicated Cisco VCS Control is recommended if you need to support standards-based devices. The previous diagram shows three devices: one for remote networking, one for Lync, and one for standards-based conferencing.

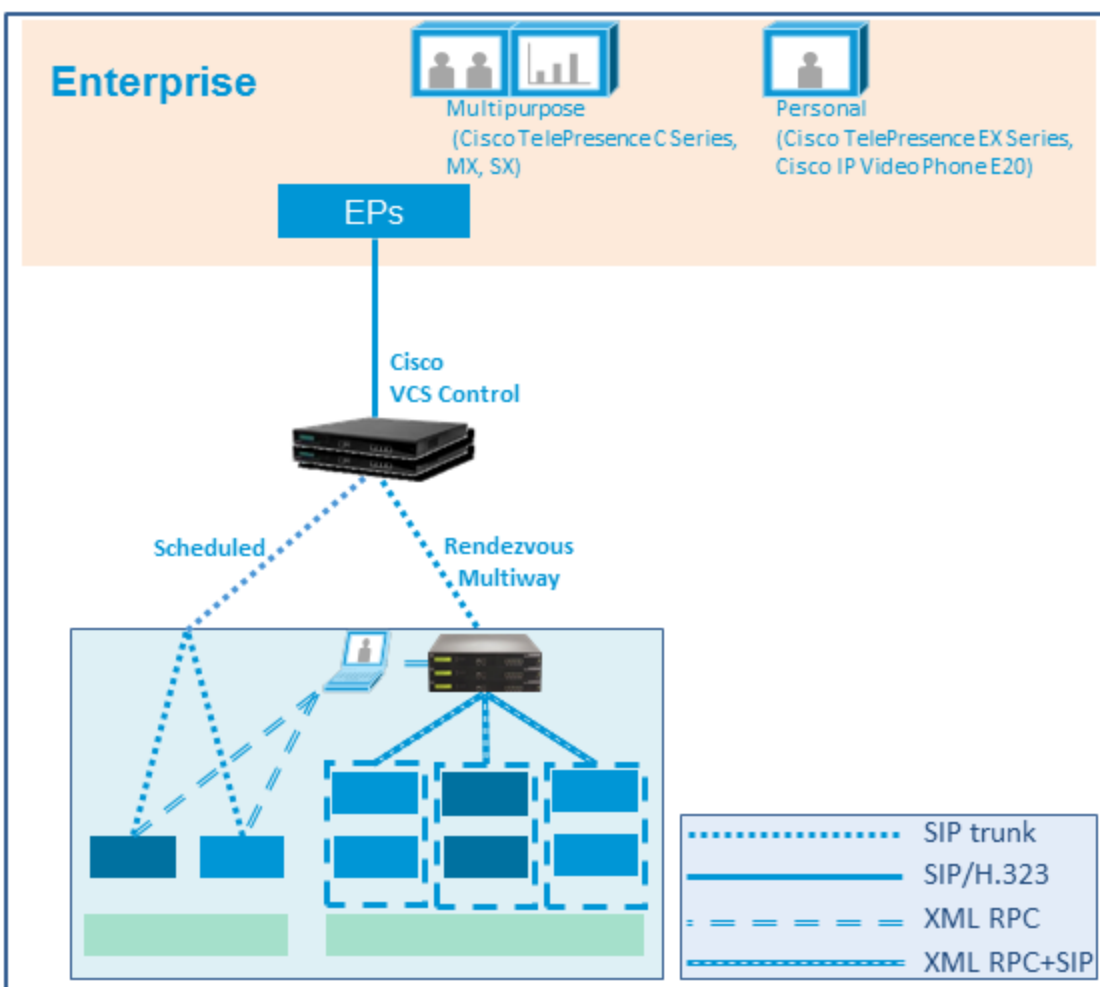
Deployments for Cisco VCS-centric networks

Cisco VCS-centric standard deployment

The standard deployment has one or more Cisco VCSs for call control. The TelePresence Conductor is trunked to the VCS. Conference bridges can be TelePresence Servers, MCUs, or both.

Bridges used for rendezvous and Multiway conferences are trunked to the TelePresence Conductor where they are organized into pools and service preferences and managed by the TelePresence Conductor. Bridges used for scheduled conferences (including Cisco WebEx participation) are registered direct to the Cisco VCS. TelePresence Server bridges are configured in remotely managed mode when trunked to the TelePresence Conductor and in locally managed mode when trunked to the Cisco VCS.

Figure 7: Cisco VCS-centric standard deployment



The standard deployment can be viewed as a single, large conference bridge behind the Conductor, combined with Cisco VCS call control and Cisco VCS-managed endpoints, and Cisco TMS for conference management. These elements together provide Optimized Conferencing for the local enterprise.

Limitations and requirements for all Cisco VCS-centric deployments

- The TelePresence Conductor must be deployed using its back-to-back user agent (B2BUA). The external policy server interface is not supported.
- The ad hoc method of escalated conferencing is not recommended in Cisco VCS-centric deployments.
- TelePresence Server bridges used for scheduling must be configured in locally managed mode and must not be connected to Conductor.

Conference call flows

The Cisco VCS provides call registration and routing of voice and video between the connected standards-based endpoints. Rendezvous, Multiway and scheduled calls are carried over SIP trunks. XML RPC connections are established between each Cisco VCS Control and the TelePresence Conductor.

Calls associated with non-scheduled conferences are managed by TelePresence Conductor on the conference bridges. Calls associated with scheduled conferences flow directly between the Cisco VCS Control and the bridges.

Rendezvous / Multiway and scheduled calls respectively are routed along (separate) single trunks from the Cisco VCS. In each case the same trunk is also used for all outgoing calls, so that incoming and outgoing calls follow the same path.

Conference support for endpoints

Rendezvous conferences for endpoints registered to Unified CM are channeled through TelePresence Conductor to the conference bridge (via Cisco VCS).

Endpoints registered to a Cisco VCS Control can be included in the following conferences:

- Rendezvous calls hosted on the bridges behind TelePresence Conductor (via Cisco VCS).
- Multiway conferences initiated by an endpoint registered to Cisco VCS Control, but hosted on the bridges behind TelePresence Conductor (via Cisco VCS).

Rendezvous and Multiway configuration summary

These are the configuration steps to route rendezvous and Multiway calls through the Cisco VCS Control:

1. Configure a zone for the SIP trunk between Cisco VCS Control and the TelePresence Conductor.
2. Define search rules in the Cisco VCS to point to the appropriate zone.
3. Configure any TelePresence Server 7010 and 8710 conference bridges to use the TelePresence Conductor for remote management (the TelePresence Server on Multiparty Media 310/320 and Cisco TelePresence Server on Virtual Machine do not need configuring as they are always in remotely managed mode).

Scheduled conferences

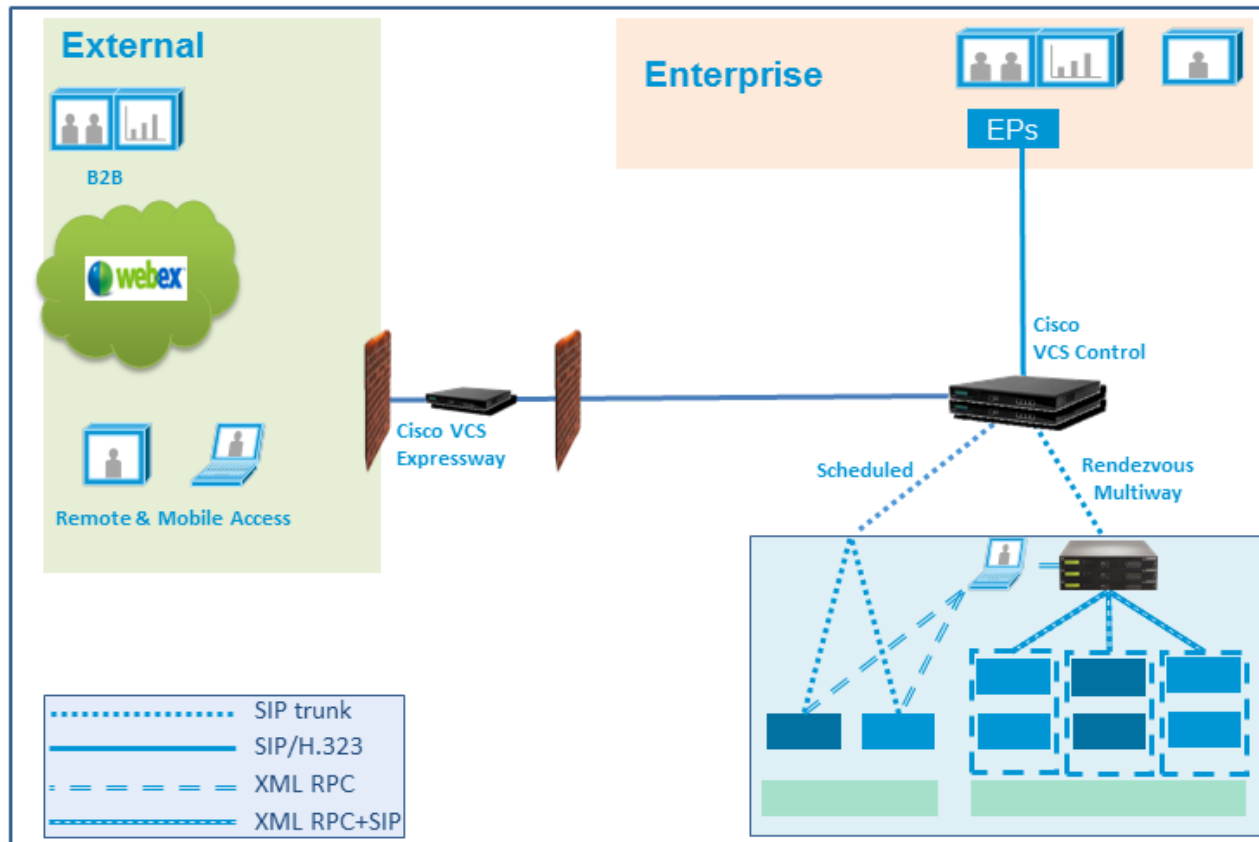
Conference scheduling and conference control functions are performed by Cisco TMS directly onto the conference bridges.

Cisco VCS-centric external deployment

By trunking a Cisco VCS Expressway to the Cisco VCS Control, the standard Cisco VCS-centric configuration can be extended to support access by participants who are external to the local enterprise:

- Remote and mobile workers registered to the local Cisco VCS.
- WebEx based users.
- Users in other organizations (business-to-business conferencing).

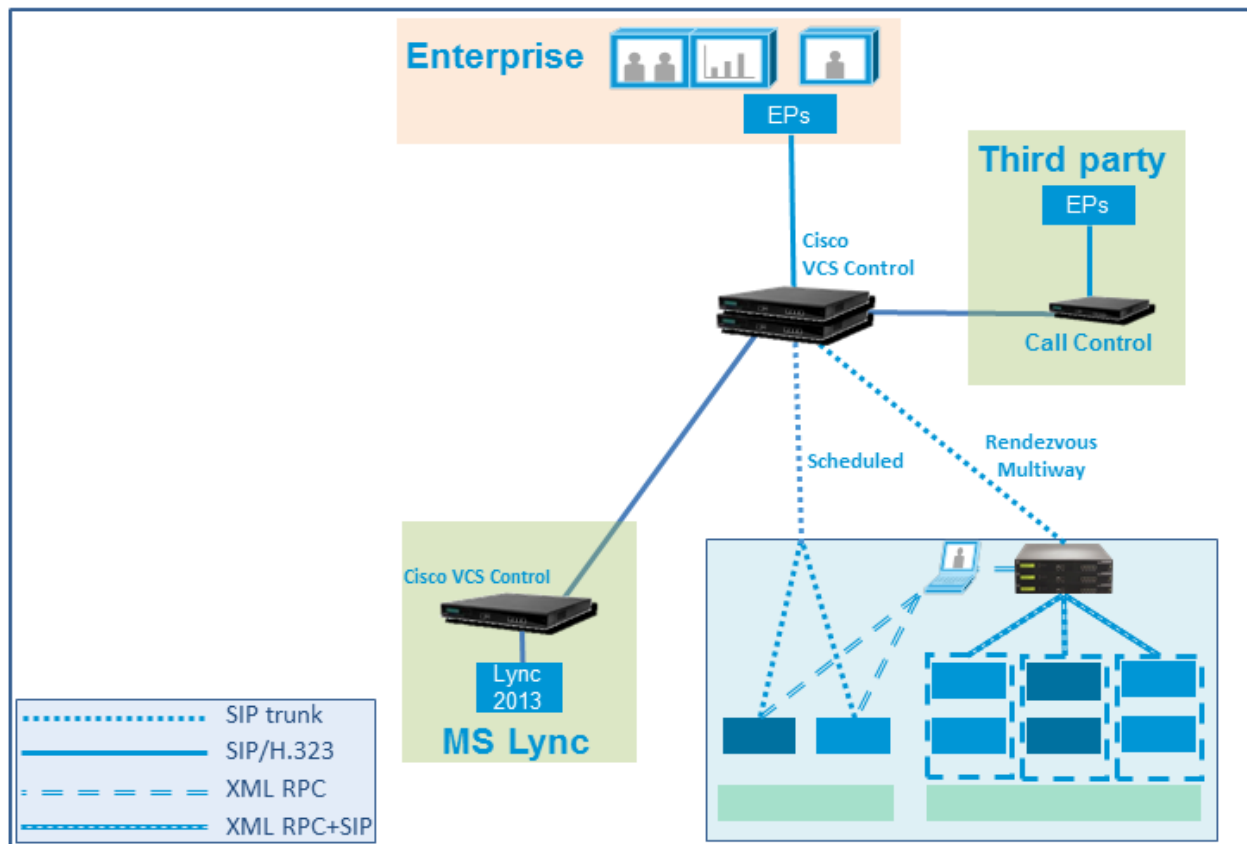
Figure 8: Optimized Conferencing with external access (Cisco VCS-centric)



Cisco VCS-centric interop deployment

This deployment extends the standard Cisco VCS-centric configuration to support interoperability with non-VCS call control systems or Microsoft Lync 2013 services within the enterprise.

Figure 9: Optimized Conferencing with interop support (Cisco VCS-centric)



Non-VCS call control

The diagram above shows a network configured to interoperate with a generic, third party call control system for additional SIP-based voice and video endpoints. Note that this could be one or more Unified CM systems, although we only recommend this approach for transitioning from a Cisco VCS-centric model to a Unified CM-centric model. Organizations that use the Unified CM are advised always to use the Unified CM-centric model.

Calls managed by the third party call controller are SIP-trunked to the Cisco VCS.

Limitations and requirements for interop deployments

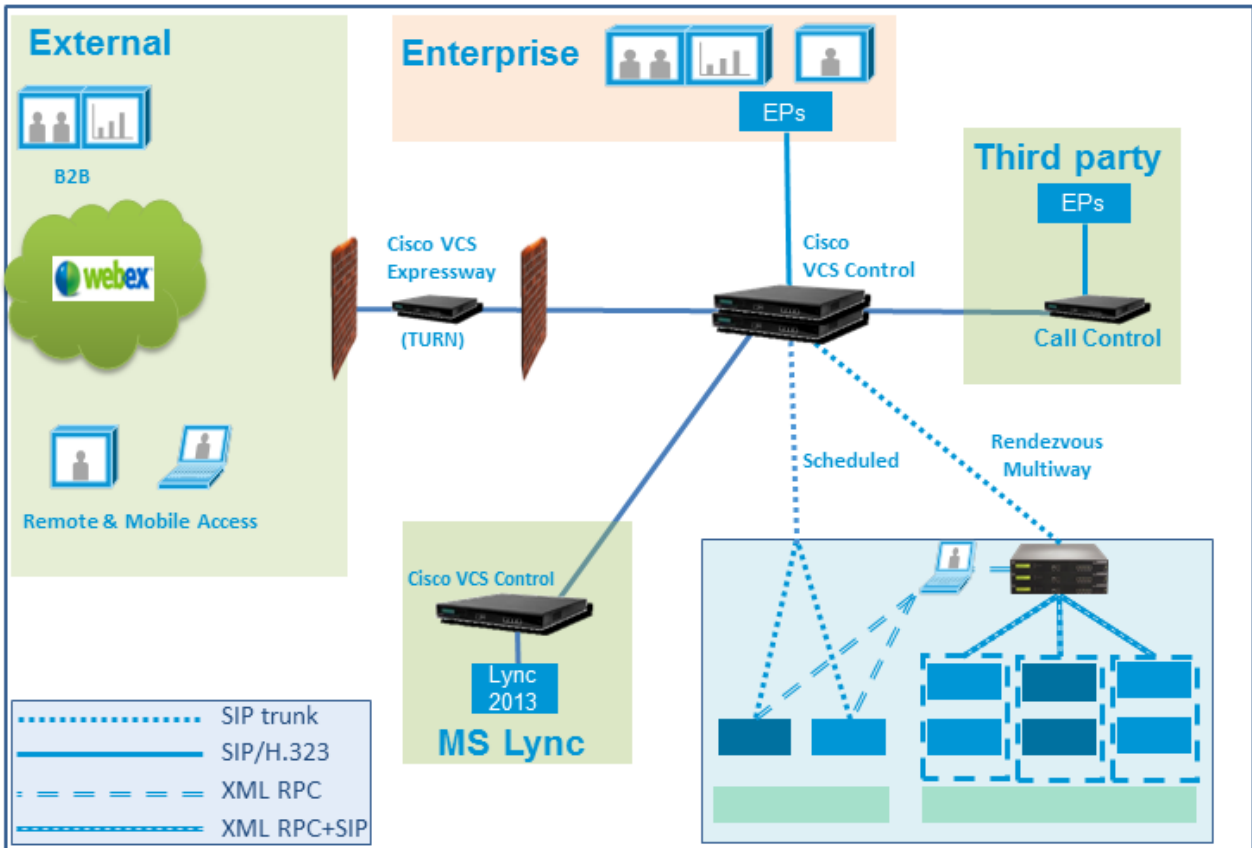
- Conference participation by users of some external services, including Cisco WebEx, requires SIP messaging to be [Early Offer](#). This is the default for VCS-managed systems. However, if you have a Unified CM in the network which is required to support WebEx or other Early Offer-based services, you must configure Early Offer messaging on the SIP trunks between the following elements:

- Bridges used for calls between Early Offer-based services and the Cisco Expressway.
- Any third-party call controller and the Cisco VCS Control.
- Any Unified CM-managed endpoints and the Cisco Expressway. The entire path from the calling device to the service must be configured to support Early Offer.
- If you do not need external Early Offer-based services, then any Unified CMs may be configured for either Delayed Offer or Early Offer.
- If you use Unified CMs, the Unified CM-based ad hoc conference method is not supported in Cisco VCS-centric deployments.
- Encrypted CTS systems are not supported. We do not recommend using encrypted CTS endpoints in Cisco VCS-centric deployments.
- The following requirements apply if you need Microsoft Lync interoperability:
 - Microsoft Lync Server 2013 and Lync 2013 clients.
 - Cisco VCS Control must be running Version X8.2 software.
 - For capacity reasons we recommend that you implement separate Cisco VCS Control devices for Lync access, and for general remote networking respectively. This is illustrated in [Figure 10: Optimized Conferencing combined deployment \(Cisco VCS-centric\) \[p.28\]](#), which shows separate devices for Lync and for remote networking.
 - The *Microsoft interoperability* key (formerly known as *Enhanced OCS Collaboration*) is required for the Cisco VCS Control.

Cisco VCS-centric combined deployment

Any or all of the extended Cisco VCS-centric deployments can be used together. The diagram shows a combined configuration that uses all of the individual deployment types.

Figure 10: Optimized Conferencing combined deployment (Cisco VCS-centric)



Note: Use dedicated gateways with the Lync 2013 deployment

If you use Lync 2013 interworking in a combined deployment, for capacity reasons we recommend that you implement separate Cisco VCS Control devices for Lync access and for general remote networking respectively. The diagram above shows two devices: one for remote networking and one for Lync.

Deployments for Cisco Business Edition 6000

The Cisco Business Edition 6000 (BE6000) consolidates multiple Cisco Unified Communications (UC) applications onto a single platform.

By using only the applications provided on the BE6000 platform it is possible to build an Optimized Conferencing deployment. This deployment uses the TelePresence Conductor and Cisco TelePresence Server on Virtual Machine together for conferencing and orchestration facilities, and Cisco TMS for conference provisioning and monitoring.

The following conferencing methods are supported:

- Ad hoc and rendezvous if using a Unified CM for call control
- Multiway and rendezvous if using a Cisco VCS for call control

Conferencing architecture

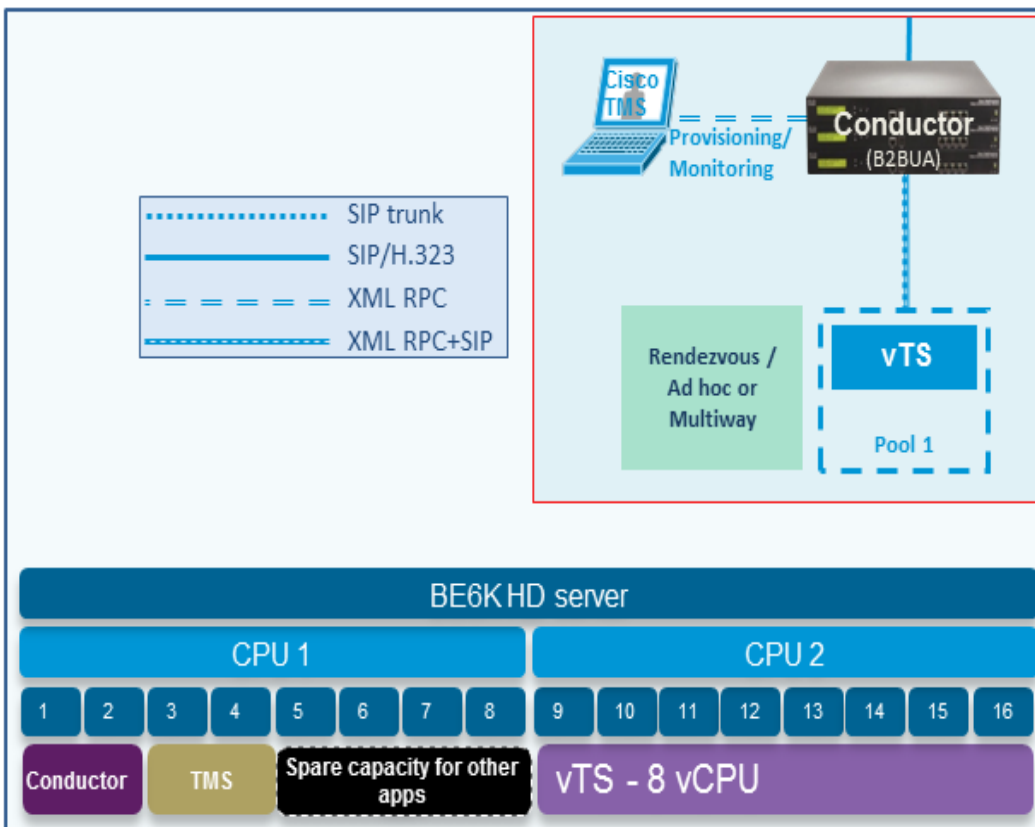
Although many BE6000 configurations are compatible with Optimized Conferencing, only the following configuration is recommended:

- BE6000 Product ID BE6K-SW-9X10X.
- Cisco Business Edition 6000 High Density server (this has two 8-core CPUs).
- Hyperthreading enabled.
- One 2-core virtualized Cisco TMS.
- One 2-core virtualized Cisco TelePresence Conductor (Essentials version).
- One 8-core Cisco TelePresence Server on Virtual Machine conference bridge.

It is assumed that call control is run on the remaining cores or on another BE6000 unit. The call control is either Unified CM (recommended) Version 10.5(1) or later, or Cisco VCS Version 8.1.1 or later.

This deployment can be scaled up by running additional vTS instances on further BE6000 systems or by adding dedicated hardware. Depending on their capacity requirements, scaled-up deployments may need either Conductor Select or full capacity Conductor licenses.

Figure 11: Conferencing architecture for Optimized Conferencing in BE6000 deployments



Implementation summary

Sizing and hardware must meet the general requirements for Cisco Unified Communications (UC) on Unified CM deployments (see [Deploying Optimized Conferencing in virtualized environments \[p.15\]](#)).

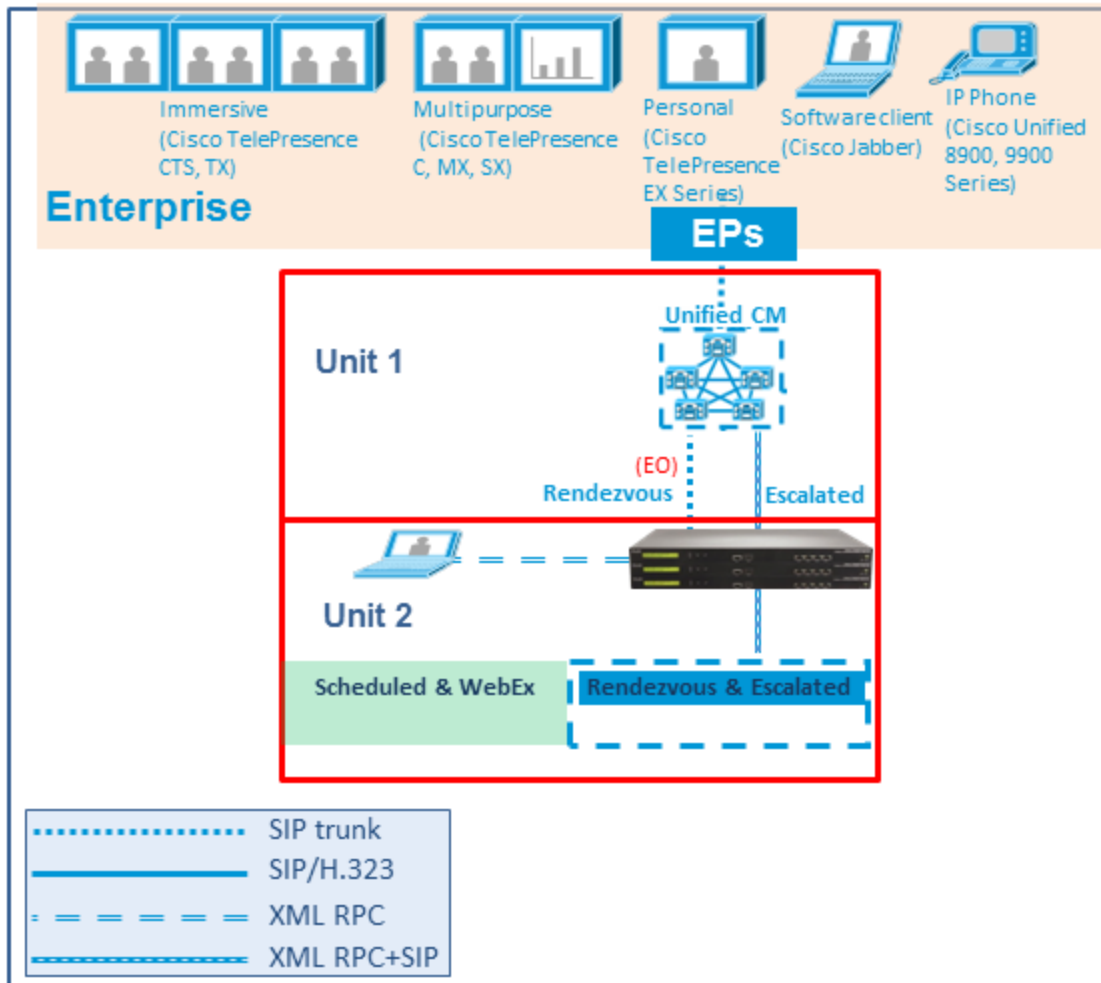
Due to third-party licensing restrictions the Optimized Conferencing components must be manually installed into the BE6000 after the BE6000 server system software is installed. That is, after installing the call controller and configuring the dial plan. Install the Optimized Conferencing components in the following order:

1. Cisco TelePresence Server on Virtual Machine and the TelePresence Conductor (in any order)
2. Cisco TMS
3. Cisco TMSPE
4. Cisco TMSXE

BE6000 standard deployment

In this example of a standard BE6000 deployment a Unified CM is used for call control, although a Cisco VCS could be used instead. The core conferencing elements are running on one BE6000 unit and the Unified CM is running on a second unit.

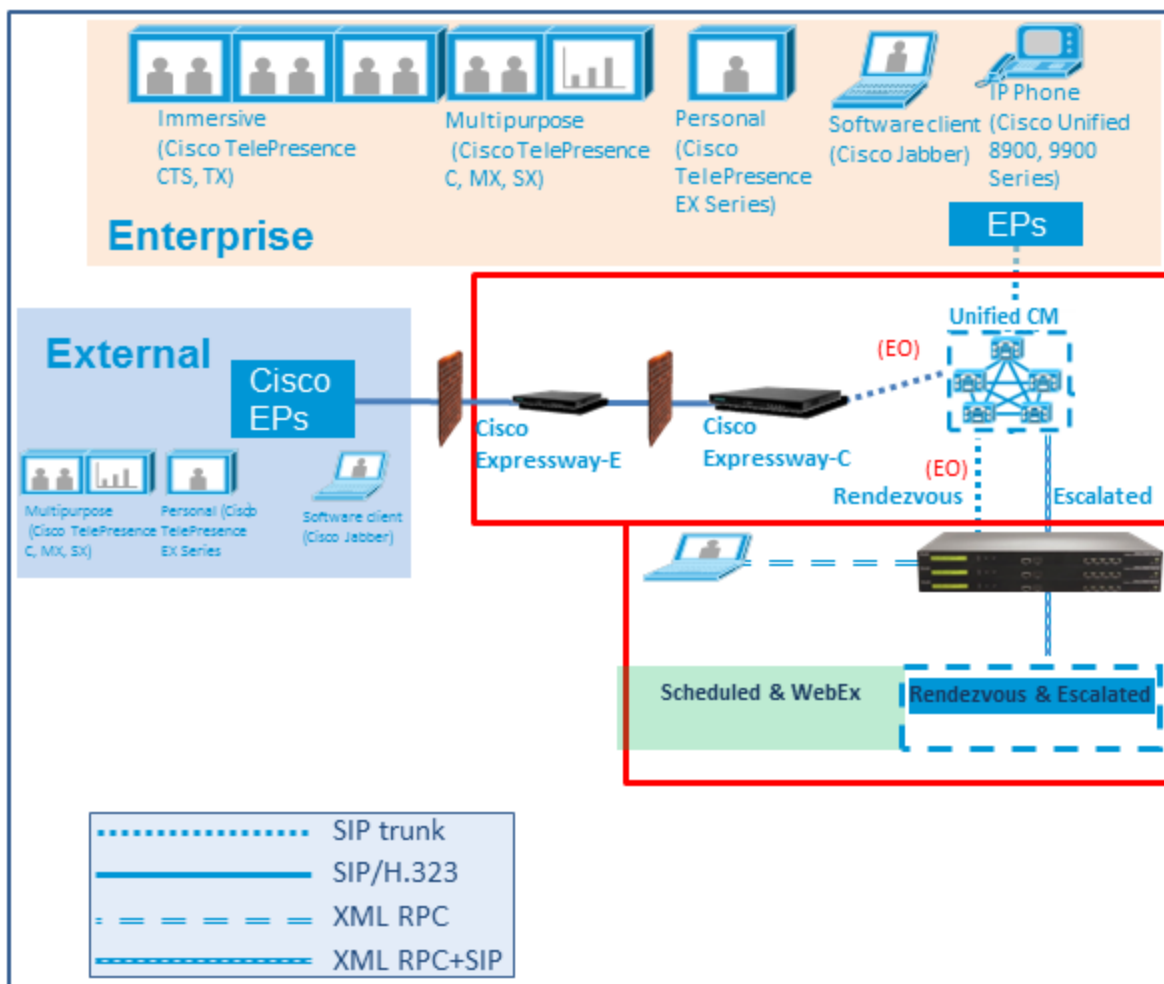
Figure 12: Standard deployment for Optimized Conferencing in BE6000



BE6000 external deployment

By trunking an Expressway to the call controller the standard configuration can be extended to support access by remote and mobile users who are registered to the local call controller. The example shows a Unified CM for call control. If you use a Cisco VCS, the Cisco Expressway-C would typically be replaced by a Cisco VCS Control, and the Cisco Expressway-E by a Cisco VCS Expressway.

Figure 13: External deployment for Optimized Conferencing in BE6000



Conferencing services

For explanations of each conferencing type described here, see [Appendix 1: Conferencing fundamentals \[p.55\]](#).

Rendezvous, ad hoc and Multiway™ conferencing

Note: In this context, references to "rendezvous" also include CMR conferences provisioned through Cisco TMS.

In Optimized Conferencing deployments, rendezvous conferences are configured on the TelePresence Conductor, so the conference is never statically defined on a single bridge. TelePresence Conductor load balances the conferences across the available bridges in a pool, increasing conference resilience while maintaining the ability to have unique conference settings per rendezvous conference. Rendezvous conferences in a Unified CM-centric deployment require a SIP trunk between Unified CM and TelePresence Conductor. Unified CM routes rendezvous participants to the IP address of this SIP trunk.

Multiway conference requests are routed from Cisco VCS direct to the TelePresence Conductor. The Multiway conference is hosted on a bridge connected to TelePresence Conductor. The endpoint user who escalates the call requires an endpoint that supports the **Merge and Accept** button. Multiway callers can be joined to a rendezvous conference. See the latest [Cisco TelePresence Multiway™ Deployment Guide](#) for the steps to configure Multiway conferences.

Ad hoc and rendezvous conference requirements may differ

For optimal user experience, ad hoc and rendezvous conferences may have different configuration requirements for conference PINs, quality, number of screens and so on. For example, if you define a conference PIN for rendezvous conferences in the conference template and you use the same template for ad hoc conferences, a PIN will also be required for ad hoc conferences (which you may not intend). To prevent the PIN being applied in the ad hoc case, define a separate template for ad hoc with no PIN set.

Avoid ad hoc escalations in other conference types and vice versa

An ad hoc escalation of a participant in a rendezvous, Multiway, or scheduled conference will cause a [chained conference](#). Clicking the conference button on the Unified CM endpoint causes the endpoint to try to create a new ad hoc conference escalation rather than extending the existing conference. The ad hoc conference will be chained with the existing conference. This results in the endpoints being across the two chained conferences, causing a degraded conference experience for participants.

Similarly, participants of ad hoc conferences should not be added to rendezvous, Multiway or scheduled conferences. Attempting to add a whole conference as a participant to an existing conference will also lead to a chained conference.

Note: Conference bridges can be set up in the TelePresence Conductor to host ad hoc conferences only, rendezvous conferences only, or both. Selecting both types of conference can minimize the number of bridges needed, as you only need equipment for the overall maximum number of conference participants, rather than the maximum ad hoc participants and the maximum rendezvous participants.

Do not use ad hoc in Cisco VCS-centric or Multiway in Unified CM-centric deployments

We do not recommend using ad hoc conferencing (the Unified CM method of escalated conferencing) in Cisco VCS-centric deployments, or Multiway (the Cisco VCS method) in Unified CM-centric deployments.

Third-party endpoints

Endpoints from other equipment providers can participate in ad hoc, Multiway, and rendezvous conferences using standard SIP. For Multiway, endpoints must implement the “join” button in order to be hosts. For ad hoc, endpoints must be registered to Unified CM, and must implement the “conference” button in order to be hosts.

Personal CMRs

In Optimized Conferencing, personal Collaboration Meeting Rooms (CMRs) provide rendezvous-type permanent conference numbers which are created with Cisco TMSPE in conjunction with the Conductor Provisioning API. (Note they are known as “personal CMRs” in Optimized Conferencing and just “CMRs” in Cisco TMSPE.) Users can dial a personal CMR number at any time to start a meeting.

Individual end-users create their own personal CMRs through the Cisco TMSPE user portal, based on group-level templates provisioned by their administrator. Each CMR created through the user portal has a corresponding conferencing bundle entity (“ConfBundle”) on TelePresence Conductor, which is created and managed through the Conductor Provisioning API and contains the data required to create a conference for one or more end-users, including conference template information, a set of conference aliases, a set of auto-dialed participants and a conference name. Note that ConfBundles are reported in the web UI as “Collaboration meeting rooms”. CMRs created using Cisco TMSPE cannot be modified through the TelePresence Conductor web UI. Conversely, conference templates and aliases created using Conductor cannot be modified through Cisco TMSPE.

Note: Cisco TMSPE is accessed from Cisco TMS (**Systems > Provisioning** menu).

Configuration information

For details about Cisco TMSPE settings, see [Cisco TelePresence Management Suite Provisioning Extension with Cisco Unified CM Deployment Guide](#) or [Cisco TelePresence Management Suite Provisioning Extension with Cisco VCS Deployment Guide](#).

For details about the Conductor Provisioning API, see [Cisco TelePresence Conductor Product Programming Reference Guide XC2.3](#).

Scheduled conferencing

The solution supports direct scheduling for conferences onto the MCU and/or TelePresence Server conference bridges, rather than through TelePresence Conductor. Scheduling is performed with Cisco TMS, using any of the following:

- The Cisco TMS **Booking > New Conference** page.
- Smart Scheduler, which is part of the Cisco TMSPE user portal.
- Microsoft Outlook, through Cisco TelePresence Management Suite Extension for Microsoft Exchange (Cisco TMSXE).
- Other clients using Cisco TelePresence Management Suite Extension Booking API (Cisco TMSBA).

Configuration information

For guidance on using Cisco TMS to schedule conferences, see [Cisco TelePresence Management Suite Administrator Guide 14.4](#).

Avoid ad hoc escalations

An ad hoc escalation of a participant in a scheduled conference will cause a [chained conference](#). This happens because the escalation creates a new three-party conference, where one of the participants is the scheduled meeting. The result is a degraded conference experience for the participants.

Requirements for scheduled conferencing

- TelePresence Servers must be configured in locally managed mode.
- Scheduling is not supported on the TelePresence Server on Multiparty Media 310/320 and TelePresence Server on Virtual Machine.

Third-party endpoints

Endpoints from other equipment providers can participate in scheduled conferences.

WebEx Enabled TelePresence

Cisco WebEx and TelePresence users can participate jointly in scheduled meetings hosted on MCU or TelePresence Server 7010 and MSE 8710 bridges. Both SIP and PSTN-based audio is supported for the audio portion of the call between Cisco WebEx and the conference bridges (the audio connections between WebEx participants and the WebEx conference can be PSTN audio, SIP audio or computer telephony).

Requirements for WebEx Enabled TelePresence conferencing

- The standard requirements for scheduled conferencing apply (see [Requirements for scheduled conferencing \[p.35\]](#) above).
- Early Offer messaging is required (see [Early Offer for SIP messaging \[p.40\]](#)).

Conference control for non-scheduled conferences

For non-scheduled conferences, the solution supports only the following subset of the standard Cisco TMS **Conference Control Center** features. These allow administrators to control certain aspects of ongoing conferences—see which conferences are running on conference bridge resources, add or remove participants, hand over conference controls to a participant, and end a conference:

Table 6: Cisco TMS Conference Control Center features for non-scheduled conferences

On a conference	On a participant
Set picture mode mode (only applied to participants who join after the setting is changed)	Mute/unmute audio
Add participant	Mute/unmute outgoing audio
End	Mute/unmute video
	Disconnect
	Change display name (the new name is not updated in the TMS interface)
	Send message
	Show snapshot (MCU bridges only)
	Set picture mode

Conferencing features and options

ActiveControl to endpoints

ActiveControl provides conference control functions and conference information for endpoints that have Touch controllers and run appropriate TC software (Version TC7.1.3 or later is recommended). From the touchpad users can see a list of participants and other information during a conference. On certain endpoints they can change the conference layout displayed locally, and users can disconnect other participants.

Requirements for ActiveControl

TelePresence Server must be running in remotely managed operation mode.

We recommend software Version TC7.1.3 or later.

Configuration information

From version TC7.1, ActiveControl is set to auto mode by default. This means that by default ActiveControl is always enabled on Unified CM-managed systems from Version 9.1(2) and later (which advertise iX protocol support) and Cisco VCS systems from Version X8.2 (these include an optional zone filter to disable the iX protocol from INVITE requests—by default the filter is off).

CAUTION: Enabling ActiveControl may cause call failures in some situations

ActiveControl, or more specifically the iX protocol which supports it, must be used with care if you connect the Optimized Conferencing network to external networks or to older systems. In these cases limitations exist on where you can enable iX. For details of the configuration requirements, see [ActiveControl in Optimized Conferencing for Cisco Unified CM and Cisco VCS Deployment Guide](#).

ClearPath packet loss resilience

Cisco ClearPath technology is supported for conferences, and uses advanced error correction techniques to optimize video quality over low quality connections. No configuration is required as ClearPath is enabled by default in all supported devices.

User-based licensing (Cisco Personal Multiparty)

In Unified CM deployments, product licenses for rendezvous and ad hoc conferences can be purchased based on user numbers rather than device capacities, via Cisco Personal Multiparty licenses. These are available through the Cisco Unified Workspace Licensing (Cisco UWL) Professional license package or as separate licenses.

For each license a named host can set up rendezvous or ad hoc conferences with up to three other participants, on devices such as Cisco Jabber-enabled mobile and desktop products, using a dedicated personal conference address.

Requirements for user-based licensing

- Only Unified CM-centric deployments support this feature.
- Ad hoc and rendezvous conference types, including personal CMRs, are supported.
- Service levels (quality settings) up to HD 720p30 are supported.

Configuration information

[Cisco TelePresence Conductor with Cisco Unified Communications Manager Deployment Guide, Appendix: Personal 4-Way Multiway Conferencing](#)

Administration for TIP multiscreen devices

This feature applies to deployments with Cisco TIP multiscreen endpoints and TelePresence Server bridges. Cisco TIP devices are automatically allocated the appropriate number of screens, up to the *Default maximum screens* setting in the template, except in the following cases:

- Pre-configured endpoints. Resources are allocated according to the configured settings.
- Ad hoc conferences. The default maximum screens defined in the conference template are allocated (although on subsequent successful connection, the allocation is optimized down if appropriate).

Manual configuration may still be needed for multiscreen devices that do not support TIP, and for some third-party devices. For details about resource allocation and optimization settings, see [Cisco TelePresence Conductor Administrator Guide](#)

TelePresence Server resource optimization

TelePresence Server resources are allocated to an individual endpoint based primarily on the number of screens it should use and the quality settings to be applied for that endpoint. Resources are initially allocated when a participant joins the conference. Resource optimization refers to the ability subsequently to free up any unused portion of the initial allocation and make those resources available for other conferences or later attendees.

One of the following TelePresence Server optimization profiles can be applied via the Conductor advanced template parameters, to define varying levels of media token optimization for conference participants:

Table 7: TelePresence Server resource optimization levels

Setting	Description
maximizeEfficiency	Participants will be assigned a very low number of far end media tokens based on their call capabilities and call bandwidth.
favorEfficiency	Participants will be assigned a low number of far end media tokens based on their call capabilities and call bandwidth.
favorExperience	Participants will be assigned a high number of far end media tokens based on their call capabilities and call bandwidth.
maximizeExperience	Participants will be assigned a very high number of far end media tokens based on their call capabilities and call bandwidth.
capabilitySetOnly	Participants will be assigned the maximum number of far end media tokens based on their call capabilities only. (This was the behavior in previous releases.)

Note: Resource optimization does not occur for out-dialed participants. Out-dialed calling methods have their own mechanisms for defining specific quality requirements, which it would be inappropriate to override.

Microsoft Lync 2013 interoperability

Optimized Conferencing supports interoperability with Microsoft Lync 2013 environments via interworking by the Cisco Expressway-C or Cisco VCS Control, which interworks as follows:

- Between Microsoft H.264 SVC (Scalable Video Coding) and standard H.264 SVC.
- Between Microsoft H.264 SVC and standard H.264 AVC (Advanced Video Coding).

Lync users can call into ad hoc, rendezvous and scheduled conferences.

Requirements for Lync 2013 interoperability

Requirements for Lync 2013 interoperability are detailed in [Unified CM-centric with Microsoft Lync 2013 deployment \[p.20\]](#) and [Cisco VCS-centric interop deployment \[p.26\]](#) respectively.

Configuration information

In Cisco VCS-centric deployments, the Cisco VCS and Lync are peers. In Unified CM-centric deployments, the Unified CM connects to the Lync server via the VCS, which acts as a SIP back-to-back user agent and media helper.

- For configuration details in Unified CM-centric deployments, see [Cisco Expressway and Microsoft Lync Deployment Guide \(X8.2\)](#)
- For configuration details in Cisco VCS-centric deployments, see [Cisco VCS and Microsoft Lync Deployment Guide \(X8.2\)](#)

Segment-switched display of TelePresence rooms

By default, Cisco TelePresence Server conference bridges use segment switching when displaying speakers in TelePresence rooms with multiple cameras onto multiscreen endpoints. This is a change to the previous, room-based default behavior.

With traditional room-based switching, all of the streams from a multi-camera room are switched simultaneously when the loudest speaker is in that room, into the display on multiscreen endpoints (assuming those endpoints had enough screens). With segment switching, the TelePresence Server independently switches the display for each individual camera (segment). So only the stream for the speaker's table segment is switched, not the other streams in the room. Segment switching is also known as speaker switching or panel switching.

Conference participants with Cisco CTS or TX Series endpoints can manually choose between segment-switched or room-switched mode.

Configuration information

Administrators can choose between segment-switched or room-switched mode in the TelePresence Conductor conference template (or through the TelePresence Server API). If you use Cisco TMS to provision conferences on Conductor, you need to set this option in the Cisco TMS **Custom Parameters** for the conference template, using the following JSON command:

```
"callAttributes: {"displayLayoutSwitchingMode": <*****>}"
```

 where <*****> should be specified as **switchingRoomSwitched** or **switchingSegmentSwitched**

Configuration and technology considerations

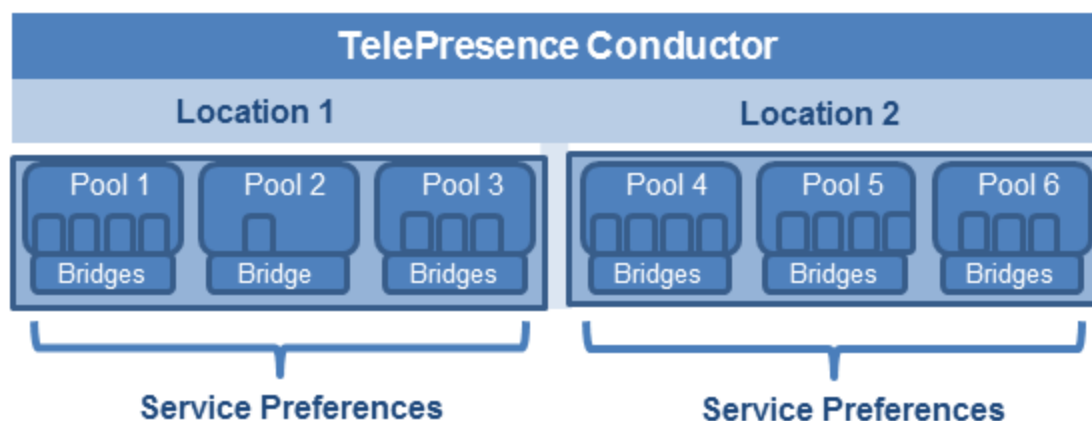
Locations, Pools and Service Preferences

In the context of Optimized Conferencing, Locations are configured in the TelePresence Conductor and are used for two purposes:

- Unified CM-centric deployments. To mimic the expectation of the Unified CM that it is connecting to separate conference bridges in different locations.
- Cisco VCS-centric deployments. To define a connection between the TelePresence Conductor and one or more Cisco VCSs via the back-to-back user agent (B2BUA) on TelePresence Conductor.

Pools are configured in the TelePresence Conductor to organize and manage conference bridges. Each bridge (except those used for scheduling) is assigned to a conference bridge pool. Service Preferences are configured to define a prioritized order in which to use the conference bridge pools if conference resources are limited. At least one Service Preference is required, although you can optionally place all pools into a single Service Preference. Each standard TelePresence Conductor license supports up to 30 bridges and 30 locations. See [Appendix 2: Understanding Locations, Pools and Service Preferences \[p.57\]](#) for detailed information.

Figure 14: Locations, Pools and Service Preferences in Optimized Conferencing



Encryption

Communication security across Optimized Conferencing is provided by TLS encryption of the signaling and SRTP encryption of the media. All SIP communication can be encrypted with SIP TLS between Unified CM and TelePresence Conductor. All TelePresence Conductor-to-bridge SIP communication *must* be encrypted.

Configuration information

See the appropriate deployment guide:

- [Cisco TelePresence Conductor with Unified Communications Manager Deployment Guide](#) for Unified CM-centric deployments
- [Cisco TelePresence Conductor with Cisco VCS \(B2BUA\) Deployment Guide](#) for Cisco VCS-centric deployments

Unified CM normalization script settings

This section applies if you use any of the SIP normalization scripts in Unified CM (for encryption and TLS on SIP trunks used for TelePresence):

- *telepresence-conductor-interop* for TelePresence Conductor-connected trunks.
- *vcs-interop* for Cisco VCS Control / Cisco Expressway-C-connected trunks.
- *telepresence-mcu-ts-direct-interop* for MCU / TelePresence Server-connected trunks.

The script content is identical in each case, but they are designed to apply in different situations.

You must set the following threshold values for each script that you use.

Setting	Value
Memory Threshold	1000
Lua Instruction Threshold	2000

To work with script settings, on the Unified CM go to **Device > Device Settings > SIP Normalization Script**. To apply the scripts to SIP trunks, on the Unified CM go to **Device > Trunk**. Details about how to download the scripts and add them to Unified CM are in [Appendix 3: Adding the Unified CM normalization scripts \[p.60\]](#).

Early Offer for SIP messaging

With Early Offer, the session initiator sends its capabilities in the SIP Invite and the called device chooses the preferred codec. For the Optimized Conferencing solution we recommend that all SIP trunks which carry TelePresence calls are configured for Early Offer.

Additionally, Early Offer is *required* from any direct scheduled bridges to Cisco Expressway or Cisco VCS to support WebEx Enabled TelePresence calls, and from Unified CM endpoints to Cisco Expressway for any other services that require Early Offer, such as Cisco WebEx and some third party conferencing services. The entire path from the calling device to the service must be configured to support Early Offer.

Cisco VCS-centric deployments always run in Early Offer mode and this section is only relevant to Unified CM-centric deployments. It provides the recommended approach for configuring outbound trunks as Early Offer.

Note: The default configuration for Unified CM trunks is **Delayed Offer**.

All trunks between the following Optimized Conferencing elements should be enabled for Early Offer. No media termination point (MTP) resources should be made available to these trunks, directly or indirectly:

- Unified CM to Cisco Expressway-C
- Unified CM to Cisco VCS Control
- Unified CM to TelePresence Conductor
- Unified CM to TelePresence Server
- Unified CM to MCU
- Unified CM to Unified CM trunks which carry traffic originating from a TelePresence endpoint and any of the network elements listed above should also be enabled for Early Offer, with no media termination point

(MTP) resources. For example, in a call flow scenario of EX90 >> UCM1 >> UCM2 >> Conductor >> TelePresence Server, the trunk between UCM1 >> UCM2 and the trunk between UCM2 >> Conductor should be enabled for Early Offer.

To restrict the use of MTPs, all MTP resources should be removed from all Cisco Unified Communications Manager Session Management Edition (Unified CM SME) clusters, and all MTP resources on Unified CM clusters should be placed in Media Resource Groups that are inaccessible both to TelePresence endpoints and to SIP trunks carrying TelePresence traffic.

Some specific points apply in various deployment scenarios:

Scenario 1. Configuring Early Offer in a single Unified CM system

TelePresence Conductor and conference bridges are connected to the Unified CM, with Unified CM trunked to the Cisco Expressway. Endpoints are registered to the Unified CM. In this scenario the following trunks must be configured for Early Offer:

- Unified CM to Cisco Expressway-C.
- Unified CM to the TelePresence Conductor.

Scenario 2. Configuring Early Offer in a multi-cluster system (TelePresence Conductor connected to Unified CM SME)

One or more Unified CM SME clusters with connected leaf Unified CM clusters. The TelePresence Conductor and conference bridges are connected to the Unified CM SME. The Unified CM SME is trunked to the Cisco Expressway-C. In this scenario the following trunks must be configured for Early Offer:

- Unified CM SME to Cisco Expressway-C.
- Unified CM SME to the TelePresence Conductor.

Note: In multi-cluster systems with three or more clusters, where one Unified CM cluster is a dedicated Unified CM SME, endpoints never register to the Unified CM SME but always to a leaf Unified CM cluster.

Scenario 3. Configuring Early Offer in a multi-cluster system (TelePresence Conductor connected to leaf clusters)

One or more Unified CM SME clusters with connected leaf Unified CM clusters. The TelePresence Conductor and conference bridges are connected to the leaf cluster(s). A single trunk connects the Unified CM SME to the Cisco Expressway-C. In this scenario the following trunks must be configured for Early Offer:

- Unified CM SME to Cisco Expressway-C.
- Leaf Unified CM clusters to the TelePresence Conductor.
- Leaf Unified CM clusters to the Unified CM SME.

Configuring Early Offer (and fallback to Delayed Offer) for SIP trunks

1. For each trunk, do one of the following depending on your Unified CM version:
 - For Unified CM Version 9.1(2) systems, enable the **Early Offer support for voice and video calls (insert MTP if needed)**.
 - For Unified CM Version 10.5(1) systems, in the **Early Offer support for voice and video calls** dropdown, select *Best Effort (no MTP inserted)*.

2. Remove all MTP resources from the following elements:
 - a. Unified CM SME clusters (in the case of Unified CM SME deployments).
 - b. All TelePresence endpoints and SIP trunks on all Unified CM clusters.
3. Set **SIP Trunk DTMF Signaling Method** to *RFC 2833* (the default).
4. Enable the **Accept Audio Codec Preference in Received Offer** option on the following elements:
 - a. All Unified CM SME SIP trunks (in the case of Unified CM SME deployments).
 - b. All SIP trunks that carry TelePresence calls on all Unified CM clusters.

Fallback to Delayed Offer

For outgoing calls, the default settings provide for automatic fallback to Delayed Offer in cases where no MTP resource exists. Without fallback, issues may arise in non-Optimized Conferencing areas of the network. For incoming calls, Early Offer is supported with no requirement for MTP resources.

Endpoints

Any TelePresence endpoints registered to Unified CM should be configured with a Media Resource Group List (MRGL) that does not contain any MTP resources. So that when the endpoints place a call that traverses one of the above trunk types an MTP will not be available within the MRGL of the endpoint.

Audio-only quality setting in ad hoc conferencing (TelePresence Servers)

TelePresence Conductor Version XC2.3 supports audio-only as a quality setting (service level) for TelePresence Server conference bridges. A default audio-only option is provided (**Conference configuration > Quality settings**) which like other quality settings is applied through the conference template, auto-dialed participant, or pre-configured endpoint codec values.

This section describes some limitations and recommendations to be aware of when using the audio-only quality setting with ad hoc conferencing in Unified CM deployments. System behavior may not be as you expect.

Note: The issues described in this section apply to ad hoc conferences only and are not relevant to rendezvous and CMR conferences.

Limitations

- For Intelligent Bridge Selection purposes, in ad hoc conferences Unified CM always treats TelePresence Conductor as a video resource regardless of the Conductor template settings. It does not differentiate between audio and video templates. The implications of this are described in the example below.
- TelePresence Conductor does not support the audio-only quality setting for MCU bridges.

Example: audio-only handling for ad hoc conferences

Assume a single-TelePresence Conductor configuration with these templates defined for Unified CM Media Resource Group 1:

- Cond-Video (*HD* specified for **Participant quality**)
- Cond-Audio (*Audio-only* specified for **Participant quality**)

The Conductor is added to Unified CM as two separate conference bridges, using separate IP addresses. One address is linked to the Cond-Video template and the other to Cond-Audio.

Note that Unified CM's Intelligent Bridge Selection does not favor the Cond-Video resource for ad hoc conferences involving two or more video endpoints, and the Cond-Audio resource for ad hoc conferences involving audio-only endpoints. Instead, because Unified CM believes all Conductor resources to be video resources, load balancing is performed between Cond-Video and Cond-Audio. This may result in a group of video endpoints being allocated to the Cond-Audio resource and having no video (because audio and video templates are not differentiated).

Recommendations for audio-only in ad hoc conferences

1. In Unified CM, use a dedicated Media Resource Group (MRG) for TelePresence Conductor conference bridges with an audio-only template.
2. Do not add any other type of audio conference bridge (such as PVDMs) to the MRG.
3. Assign the MRG to a Media Resource Group List (MRGL) and assign this MRGL to your audio-only endpoints.

IPv4

Optimized Conferencing deployments support IPv4 only. All Unified CM bridges and endpoints within the deployment must be configured to use IPv4. Bridges and endpoints connected to a Cisco VCS Control may be configured to use IPv6 provided that the Cisco VCS Control is also configured to use IPv6.

Content channel

Most TelePresence endpoints support the use of a second video channel known as the content channel. Typically this is used for presentations running alongside live video.

Configuration information for MCU conference bridges

- For MCU bridges managed by TelePresence Conductor, set the **Content mode** for the Conference template in Conductor to *Transcoded* (**Advanced parameters**).
- For directly managed MCU bridges, set the **Content mode** to *Hybrid*.

Note: Transcoded mode is only relevant for MCU bridges. When this mode is selected in a TelePresence Conductor template, a dedicated content port or video port will be allocated depending on the MCU model and configuration.

H.323 interworking

The Optimized Conferencing network is SIP-based. If you want to connect H.323 endpoints to conferences within the Optimized Conferencing network, the call must be interworked before reaching the TelePresence Conductor. This can be done by configuring the Cisco VCS Control or Cisco Expressway-C to perform the necessary SIP/H.323 interworking.

Configuration information

- To perform interworking only for locally registered endpoints, set the **H.323 <-> SIP interworking mode** to *Registered only* (accessed from **VCS configuration > Protocols > Interworking**).
- If you want to allow interworking of business-to-business H.323 calling between external networks and your conferences, set the **H.323 <-> SIP interworking mode** to *On*. This will interwork all incoming calls.

Resilience and clustering

A full capacity standard TelePresence Conductor can be part of a cluster of up to three Conductors. Each full capacity Conductor (or each cluster) can manage up to 30 conference bridges or 2400 concurrent conference calls. Clustering does not increase the maximum number of conference bridges / concurrent calls that can be supported, which remains at 30 bridges / 2400 calls for full capacity Conductors.

Note: The TelePresence Conductor Select supports two Conductors in a cluster. The TelePresence Conductor Essentials does not support clustering.

Deploying clusters of TelePresence Conductors and bridges ensures service availability even if individual conference bridges or Conductors are taken out of service.

Configuration information

For details see the appropriate clustering deployment guide ([Cisco TelePresence Conductor Clustering with Cisco Unified Communications Manager Deployment Guide](#) or [Cisco TelePresence Conductor Clustering with Cisco VCS \(B2BUA\) Deployment Guide](#)).

Entry-level conferencing

Optimized Conferencing supports entry-level SIP-based video conferencing, with lower cost platforms—virtualized or physical—that can support lower capacity configurations. Capacity can be grown subsequently by adding screen licenses. Single-bridge configurations can use a trial version of Cisco TelePresence Conductor (TelePresence Conductor Essentials), which does not need a release key, running as a virtual machine.

Table 8: Bridges that support entry-level SIP-based video conferencing in an Optimized Conferencing deployment

Bridge	Type
Cisco TelePresence Server on Multiparty Media 310	Physical
Cisco TelePresence Server on Multiparty Media 320	Physical
Cisco TelePresence Server on Virtual Machine	Virtual

All bridges support a conference service level (quality setting) for 360p30 video. Physical bridges can be clustered (stacked) as two units together in any combination to increase capacity.

Note: The overall media capacity of clustered bridges is restricted to the normal call limits for the relevant bridge type.

Limitations

In this release, Cisco WebEx-based conferencing is not available on entry-level and virtual platforms.

Implementing Optimized Conferencing

Optimized Conferencing Release 3.0 is intended primarily for organizations with an existing Optimized Conferencing Release 2.0 deployment, who want to take advantage of the new features in Release 3.0.

This section describes how to implement Release 3.0 across your network:

1. Upgrade / install each product in your solution deployment to the required version for Release 3.0. Follow the sequence specified in [Recommended order for upgrading / installing \[p.47\]](#). At this stage, do *not* update your configuration for Release 3.0 functionality.
2. Verify the new software runs satisfactorily on your existing Release 2.0 configuration and that the network functions as expected.
3. Check that all Release 3.0 configuration prerequisites are complete. See [Prerequisites for configuration \[p.48\]](#).
4. Configure the deployment for Release 3.0 functionality. See [Configuration process \[p.49\]](#).

CAUTION: To ensure continuity of operation, we recommend that the products are upgraded / installed in the recommended order.

This section does not cover the Cisco Business Edition 6000 (BE6000). For information about implementing a BE6000 deployment, see [Deployments for Cisco Business Edition 6000 \[p.29\]](#).

Recommended order for upgrading / installing

Follow the sequence in the table below to implement Optimized Conferencing in your video network. This sequence applies to upgrades from the previous Optimized Conferencing Release 2.0 or to first-time implementations of Optimized Conferencing, and to Unified CM-centric and Cisco VCS-centric deployments. It has been tested by Cisco and verified to interoperate at all stages.

The software can be downloaded from <http://www.cisco.com/cisco/software/navigator.html>. See the associated product documentation for instructions on how to upgrade each software component.

Note: This sequence differs from the previous Optimized Conferencing release.

Table 9: Recommended upgrade / install sequence for Optimized Conferencing components

Order	Component	Software version
1	Unified CM	9.1(2)SU2 or 10.5(1) (if not already on a supported release). Version 10.5(1) is required for Microsoft Lync interoperability. This component is not relevant to Cisco VCS-centric deployments unless a Unified CM exists in the VCS enterprise.
2	Cisco VCS	X8.1.1 or later. X8.2 is recommended —and required for Microsoft Lync interoperability. X7.2.3 or later is supported for H.323 registration. Not relevant to Unified CM-centric deployments unless a Cisco VCS exists in the Unified CM enterprise.
3	Cisco Expressway	X8.1.1 or later. X8.2 is recommended —and required for Microsoft Lync interoperability. Not relevant to Cisco VCS-centric deployments unless a Unified CM exists in the enterprise.
4	Cisco TMS	14.4
5	MCU	4.5
6	TelePresence Server	4.0
7	TelePresence Conductor	XC2.3
8	Cisco TMSPE	1.2
9	Endpoints	Endpoints can be upgraded in any order except the newly introduced Cisco TelePresence MX 300 G2, SX10 and SX80, which should be upgraded after other endpoints in the deployment.

Prerequisites for configuration

Before you start the system configuration for Optimized Conferencing, make sure the following prerequisites are complete:

- [First-time installations] You have access to the administration web interfaces of the following devices on your network:
 - A Unified CM is required for Unified CM-centric deployments, already configured with a base configuration. Ensure connectivity by registering at least three endpoints to Unified CM, and make sure they are all capable of calling each other with voice and video communications. For Unified CM-related information, see the [Cisco Unified Communications Manager](#) documentation on Cisco.com.
 - A Cisco VCS is required for Cisco VCS-centric deployments. For Cisco VCS-related information, see the [Cisco TelePresence Video Communication Server](#) documentation on Cisco.com.
 - Cisco TMS is required for scheduled conferencing, and for conference provisioning and monitoring. For Cisco TMS-related information, see the [Cisco TelePresence Management Suite](#) documentation on Cisco.com.
 - A TelePresence Conductor, deployed using its back-to-back user agent (B2BUA). For Conductor-related information, see the [Cisco TelePresence Conductor](#) documentation on Cisco.com.
 - One or more conference bridges, either TelePresence Servers or MCUs.
- [First-time installations] Basic configuration for each conference bridge must be complete, as described in the relevant Installation Guide or Getting Started Guide:
 - [TelePresence Server 7010](#)
 - [TelePresence Server MSE 8710](#)
 - [TelePresence Server on Virtual Machine](#)
 - [TelePresence Server on Multiparty Media 310/320](#)
 - [MCU 5300 Series](#)
 - [MCU 4500 Series](#)
 - [MCU 4200 Series](#)
 - [MCU MSE 8420](#)
 - [MCU MSE 8510](#)
- For TelePresence Server bridges the operation mode must be configured as follows:
 - Remotely managed for bridges pooled behind TelePresence Conductor.
 - Locally managed for bridges used for scheduling, which must be directly connected to the call control device.
- Unified CM endpoints and bridges must be configured to use IPv4. Bridges and endpoints connected to a Cisco VCS Control may be configured to use IPv6 provided that the Cisco VCS is also configured to use IPv6.
- Endpoints must be registered to Unified CM and/or to Cisco VCS as appropriate.
- All devices must be running the required software / firmware versions (see [Solution components and required versions \[p.12\]](#)).

Configuration process

This topic summarizes the Optimized Conferencing configuration process. [Appendix 4: Migration paths to Optimized Conferencing Release 3.0 \[p.61\]](#) provides detailed upgrade paths, depending on whether you are an existing Optimized Conferencing site or are implementing the solution for the first time.

CAUTION: It is essential that you follow in full the steps in the deployment guides referenced below for each task that applies to your chosen deployment.

Step 1. Check the release notes

Check the release-specific configuration considerations described in the latest solution release notes for Optimized Conferencing Release 3.0 on [Cisco.com](https://www.cisco.com).

Step 2. Configure the TelePresence Conductor

Configure the TelePresence Conductor for Optimized Conferencing. To do this follow the step by step instructions in the relevant deployment guide:

Unified CM-centric deployments	Cisco TelePresence Conductor with Unified CM Deployment Guide (XC2.3) (D14998) If you intend to use TMS to provision conferences, after configuring the bridge pools and Service Preferences on Conductor see Cisco TelePresence Management Suite Provisioning Extension with Cisco Unified CM Deployment Guide for instructions about TMS configuration.
Cisco VCS-centric deployments	Cisco TelePresence Conductor with Cisco VCS (B2BUA) Deployment Guide (XC2.3) (D15014) If you intend to use TMS to provision conferences, after configuring the bridge pools and Service Preferences on Conductor see Cisco TelePresence Management Suite Provisioning Extension with Cisco VCS Deployment Guide for instructions about TMS configuration.

In either case the TelePresence Conductor is deployed using its B2BUA and the external policy service interface is not supported. In addition to the steps described in the deployment guides, the following specific configuration requirements apply for Optimized Conferencing:

Note: The TelePresence Conductor configuration settings required for Optimized Conferencing have changed in this release.

- If you want to take advantage of automatic resource allocation and [optimization](#) of TelePresence Server resources, the Conference template in TelePresence Conductor must define appropriate maximum screen and quality settings, and enable the **Optimize resources** setting. Note that if you provision conferences through Cisco TMSPE these settings are configured through the Cisco TMSPE. For details about Conductor template settings, see [Cisco TelePresence Conductor Administrator Guide](#). For details about Cisco TMSPE settings, see [Cisco TelePresence Management Suite Provisioning Extension with Cisco Unified CM Deployment Guide](#) or [Cisco TelePresence Management Suite Provisioning Extension with Cisco VCS Deployment Guide](#).
- [Cisco VCS-centric deployments only] The VCS **Zone profile** for the trunk between Cisco VCS Control and TelePresence Conductor should be set to *Custom* with **Automatically respond to SIP searches** set to *On*. For details, see [Adding the TelePresence Conductor as a neighbor zone in Cisco TelePresence Conductor with Cisco TelePresence VCS \(B2BUA\) Deployment Guide](#).

Step 3. [Unified CM-centric deployments] Convert to Early Offer

We recommend that TelePresence SIP trunks are configured for Early Offer messaging (and this is *required* for WebEx Enabled TelePresence conferences and some third party services). See [Configuring Early Offer \(and fallback to Delayed Offer\) for SIP trunks \[p.41\]](#) for instructions. Skip this step for Cisco VCS-centric deployments, which always run in Early Offer mode.

Step 4. [Unified CM-centric deployments] Add latest normalization scripts to Unified CM

Unified CM-centric deployments that use encryption and TLS on SIP trunks for TelePresence must install the latest normalization scripts on the trunks. See [Appendix 3: Adding the Unified CM normalization scripts \[p.60\]](#) for instructions. Skip this step for Cisco VCS-centric deployments, unless a Unified CM exists in the enterprise.

Step 5. [Unified CM-centric deployments] Trunk scheduling bridges to Unified CM

In the previous Optimized Conferencing release, bridges used to host scheduled conferences were trunked to a Cisco VCS. In this release, bridges you use for scheduled conferencing should be trunked to the Unified CM. Skip this step for Cisco VCS-centric deployments.

Step 6. [Optional] Configure the Cisco Expressway / Cisco VCS for Microsoft Lync

If your deployment requires interoperability with Microsoft Lync, you need to configure the Cisco Expressway (Unified CM-centric deployments) or Cisco VCS (Cisco VCS-centric deployments) to support Lync.

- For details in Unified CM-centric deployments, see [Cisco Expressway and Microsoft Lync Deployment Guide \(X8.2\)](#)
- For details in Cisco VCS-centric deployments, see [Cisco VCS and Microsoft Lync Deployment Guide \(X8.2\)](#)

Step 7. [Optional] Configure iX protocol for ActiveControl support

To use ActiveControl in the Optimized Conferencing network, you need to enable the iX protocol, which by default is disabled in some devices. Detailed instructions are in [ActiveControl in Optimized Conferencing for Cisco Unified CM and Cisco VCS Deployment Guide](#).

CAUTION: If your Optimized Conferencing network connects to Unified CM systems running Version 8.x or earlier, or to third-party networks, before you enable ActiveControl you *must* first disable the iX protocol on all relevant trunks to isolate iX traffic from systems that do not support it. If you do not do this, the consequences may be unpredictable and include dropped calls.

Step 8. Configure Cisco TMS for scheduled conferencing

See [Cisco TelePresence Management Suite Administrator Guide 14.4](#) for guidelines on setting up scheduled conferences through Cisco TMS.

[Cisco WebEx Enabled TelePresence Configuration Guide](#) has guidelines on setting up scheduled conferences for participants to join from either WebEx or TelePresence (Unified CM-centric deployments)

Step 9. [Unified CM-centric deployments] Check external endpoints are registered to the enterprise Unified CM

In the previous Optimized Conferencing release, endpoints that were external from the local enterprise needed to be registered to a Cisco VCS. In this release they can be registered to the local Unified CM, through Cisco Expressway. Skip this step for Cisco VCS-centric deployments.

More information

Links to the relevant deployment guides and associated product documentation for all devices in your Optimized Conferencing network are available in [Related documentation \[p.52\]](#).

Related documentation

Title	Reference	Link
Optimized Conferencing for Cisco Unified Communications Manager and Cisco VCS Solution Release Notes 3.0	D15028	http://www.cisco.com/c/en/us/support/conferencing/telepresence-conductor/products-release-notes-list.html
Cisco TelePresence Conductor with Cisco Unified Communications Manager Deployment Guide XC2.3, CUCM 10.0 [see Appendix for 9.x]	D14998	http://www.cisco.com/c/en/us/support/conferencing/telepresence-conductor/products-installation-and-configuration-guides-list.html
Cisco TelePresence Management Suite Provisioning Extension with Cisco Unified CM Deployment Guide	D15110	http://www.cisco.com/c/en/us/support/conferencing/telepresence-management-suite-extensions/products-installation-guides-list.html
Cisco TelePresence Conductor with Cisco TelePresence VCS (B2BUA) Deployment Guide XC2.3, X8.1	D15014	http://www.cisco.com/c/en/us/support/conferencing/telepresence-conductor/products-installation-and-configuration-guides-list.html
Cisco TelePresence Management Suite Provisioning Extension with Cisco VCS Deployment Guide	D14941	http://www.cisco.com/c/en/us/support/conferencing/telepresence-management-suite-extensions/products-installation-guides-list.html
ActiveControl in Optimized Conferencing for Cisco Unified Communications Manager and Cisco VCS Deployment Guide	D15051	http://www.cisco.com/c/en/us/support/conferencing/telepresence-conductor/products-installation-and-configuration-guides-list.html
Provisioning Display Names in Optimized Conferencing for Cisco Unified Communications Manager and Cisco VCS Deployment Guide	D15127	http://www.cisco.com/c/en/us/support/conferencing/telepresence-conductor/products-installation-and-configuration-guides-list.html
Cisco TelePresence Conductor Administrator Guide XC2.3	D14826	http://www.cisco.com/c/en/us/support/conferencing/telepresence-conductor/products-maintenance-guides-list.html
Cisco Unified Communications Manager Administration Guide, Release 9.1n	OL-27945	http://www.cisco.com/c/en/us/support/unified-communications/unified-communications-manager-callmanager/products-maintenance-guides-list.html
Cisco Unified Communications Manager Administration Guide, Release 10.0(1)	OL-29000	http://www.cisco.com/c/en/us/support/unified-communications/unified-communications-manager-callmanager/products-maintenance-guides-list.html
Cisco Unified Communications Manager with Cisco Expressway (SIP Trunk) Deployment Guide, Cisco Expressway X8.2	D15062	http://www.cisco.com/c/en/us/support/unified-communications/expressway-series/products-installation-and-configuration-guides-list.html

Title	Reference	Link
Cisco Unified Communications Manager with Cisco VCS (SIP Trunk) Deployment Guide, Cisco VCS X8.2	D14602	http://www.cisco.com/c/en/us/support/unified-communications/telepresence-video-communication-server-vcs/products-installation-and-configuration-guides-list.html
Cisco TelePresence Multiway™ Deployment Guide, Cisco VCS, MCU, Conductor	D14366	http://www.cisco.com/c/en/us/support/conferencing/telepresence-conductor/products-installation-and-configuration-guides-list.html
Cisco Expressway Basic Configuration Deployment Guide X8.2	D15060	http://www.cisco.com/c/en/us/support/unified-communications/expressway-series/products-installation-and-configuration-guides-list.html
Cisco TelePresence Video Communication Server Basic Configuration (Control with Expressway) Deployment Guide Cisco VCS X8.2	D14651	http://www.cisco.com/c/en/us/support/unified-communications/telepresence-video-communication-server-vcs/products-installation-and-configuration-guides-list.html
Cisco TelePresence Management Suite Administrator Guide Version 14.4	D13741	http://www.cisco.com/c/en/us/support/conferencing/telepresence-management-suite-tms/products-maintenance-guides-list.html
Cisco WebEx Enabled TelePresence Configuration Guide	OL-21352	http://www.cisco.com/c/en/us/support/conferencing/telepresence-management-suite-tms/products-installation-and-configuration-guides-list.html
Cisco TelePresence Conductor Product Programming Reference Guide XC2.3 (includes Conductor Provisioning API reference)	D14948	http://www.cisco.com/c/en/us/support/conferencing/telepresence-conductor/products-programming-reference-guides-list.html
Cisco Expressway Administrator Guide X8.2	D15058	http://www.cisco.com/c/en/us/support/unified-communications/expressway-series/products-maintenance-guides-list.html
Cisco TelePresence Video Communication Server Administrator Guide X8.2	D14049	http://www.cisco.com/c/en/us/support/unified-communications/telepresence-video-communication-server-vcs/products-maintenance-guides-list.html

More product documentation on Cisco.com

Product	Link
TelePresence Conductor	http://www.cisco.com/c/en/us/support/conferencing/telepresence-conductor/tsd-products-support-series-home.html
Unified CM	http://www.cisco.com/c/en/us/support/unified-communications/unified-communications-manager-callmanager/tsd-products-support-series-home.html
MCU 5300 Series	http://www.cisco.com/c/en/us/support/conferencing/telepresence-mcu-5300-series/tsd-products-support-series-home.html
MCU 4500 Series	http://www.cisco.com/c/en/us/support/conferencing/telepresence-mcu-4500-series/tsd-products-support-series-home.html

Product	Link
MCU MSE Series	http://www.cisco.com/c/en/us/support/conferencing/telepresence-mcu-mse-series/tsd-products-support-series-home.html
TelePresence Server	http://www.cisco.com/c/en/us/support/conferencing/telepresence-server/tsd-products-support-series-home.html
Cisco Expressway	http://www.cisco.com/c/en/us/support/unified-communications/expressway-series/products-installation-and-configuration-guides-list.html
Cisco VCS	http://www.cisco.com/c/en/us/support/unified-communications/telepresence-video-communication-server-vcs/tsd-products-support-series-home.html

Appendix 1: Conferencing fundamentals

When three or more participants are involved in a call, the call becomes a conference. Optimized Conferencing supports the following conference types:

- Ad hoc (instant)
- Multiway (instant)
- Rendezvous and personal CMRs (permanent)
- Scheduled

Ad hoc (instant) conferences

Point-to-point calls hosted on a Unified CM can be escalated to an ad hoc conference hosted on a bridge. A third party calling one of the parties already in a point-to-point call can be added to the ad hoc conference. Alternatively, a third party can be added by one of the parties in the point-to-point call by putting the call on hold, dialing the third party and adding them to the conversation using the conference button on the phone. For details on the actual steps to escalate a point-to-point call, refer to the user documentation supplied with the endpoints. Only endpoints with the conference key can create an ad hoc conference.

Optionally an ad hoc conference can be further extended by adding more participants. As additional participant(s) leave, the conference is automatically returned to a point-to-point call when only two participants remain, without any disruption to the call.

The ability to escalate point-to-point calls into an ad hoc conference now includes Unified CM-managed endpoints which are located remotely from the enterprise Optimized Conferencing network and registered through Cisco Expressway to the Unified CM.

Multiway (instant) conferences

Cisco TelePresence Multiway conferences are conferences that escalate from a point-to-point call on a Cisco VCS Control to a three-party call, similar to the ad hoc call escalation on Unified CM.

Multiway enables endpoint users to introduce a third party into a call, or when the third party calls one of the parties already in the point-to-point call and the participants wish to include the third party in the call.

Rendezvous / personal(permanent) conferences

Rendezvous conferences can occur at any time spontaneously without the need for the conference to be scheduled. The administrator creates the conference number as a conference alias on TelePresence Conductor, the host is told this number and shares it with all participants of the conference. Rendezvous conferences are created when multiple participants dial the configured number. See [Cisco TelePresence Conductor Administrator Guide](#) for information about creating conference aliases.

Rendezvous conferences can be created as generic conferences or conferences with unique configuration for a specific user or group.

From Optimized Conferencing Release 3.0, permanent conferences can also be provisioned on TelePresence Conductor using Cisco TelePresence Management Suite Provisioning Extension (Cisco TMSPE) and the Conductor Provisioning API. You configure bridge pools and Service Preferences on TelePresence Conductor, and define group-level templates in Cisco TMSPE which allow end-users to define their own personal CMRs through the Cisco TMSPE user portal. For details, see [Cisco TelePresence](#)

[Management Suite Provisioning Extension with Cisco Unified CM Deployment Guide](#) and [Cisco TelePresence Conductor Product Programming Reference Guide XC2.3](#).

Scheduled conferences

Scheduled conferences are pre-booked conferences with a start and end time, and optionally a pre-defined set of participants. Participants for scheduled conferences can be configured to dial in or dial out.

Chained conferences

A chained conference occurs when a participant in an ad hoc conference (that is, managed by CUCM) is added into a rendezvous, Multiway, or scheduled conference, or vice versa. Because different call flows are involved, rather than the first conference simply being extended to include the new participants, a second conference is created and “chained” to the first. The result is a degraded conference experience because each of the conferences appears as a single participant in the other conference (so multiple participants will appear in a single video stream).

Auto-dialed participants (ADP)

Both TelePresence Conductor and Cisco TMSPE support auto-dialing participants for permanent conferences. This is particularly useful for conferences which need to be recorded or when senior management need to easily join a conference. Auto-dialed participants are addresses that are automatically dialed when a conference starts. The address can relate to a device such as an endpoint or recording device (multiscreen endpoints are not supported), or could be any dial-able ID.

Appendix 2: Understanding Locations, Pools and Service Preferences

Locations

The Locations feature in Unified CM enables administrators to implement call admission control and determine the maximum permitted bandwidth between and within Locations. To avoid overloading the network, administrators often configure Unified CM with different Locations for each office site or campus.

Note: If you do not use call admission control to limit the audio and video bandwidth on an IP WAN link, an unlimited number of calls can be active on that link at the same time. This can cause the audio quality of each audio call and the video and audio quality of each video call to degrade as the link becomes oversubscribed.

In Cisco VCS-centric deployments, a Location is used to allow the Cisco VCS to forward conference call requests directly to the TelePresence Conductor back-to-back user agent (B2BUA). A single Location can be set up for all traffic between any Cisco VCS (or Cisco VCS cluster) and the TelePresence Conductor.

Connecting Unified CM to bridges through TelePresence Conductor

TelePresence Conductor supports conferences from endpoints registered directly with Unified CM. Unified CM call admission control is supported by TelePresence Conductor if the TelePresence Conductor is configured with multiple IP addresses to emulate the connectivity Unified CM would expect.

The steps required to connect TelePresence Conductor to Unified CMs which are configured to support Locations are described in [Cisco TelePresence Conductor with Cisco Unified Communications Manager Deployment Guide](#). The end result of the configuration is:

- Unified CM sees TelePresence Conductor as one or more bridges in each Location.
- A SIP trunk is established between Unified CM and TelePresence Conductor for rendezvous calls.
- TelePresence Conductor is configured with Locations to support ad hoc, rendezvous or both types of conferences, according to the specific requirements of each Location.
- Locations are configured within TelePresence Conductor, and conference bridge pools and Service Preferences are assigned. These elements are associated with conferences indirectly through the conference template for ad hoc conferencing, and directly by selecting the appropriate Location per bridge pool for rendezvous conferencing.

Note: Unified CM delivers ad hoc and rendezvous conferences to different IP addresses on TelePresence Conductor. Multiple Unified CMs (from Version 8.6.2) can access the same IP address on TelePresence Conductor. The Unified CMs do not need to be in the same physical location.

Note: Bridge pools and Service Preferences configured in TelePresence Conductor should only contain bridges within the same physical location.

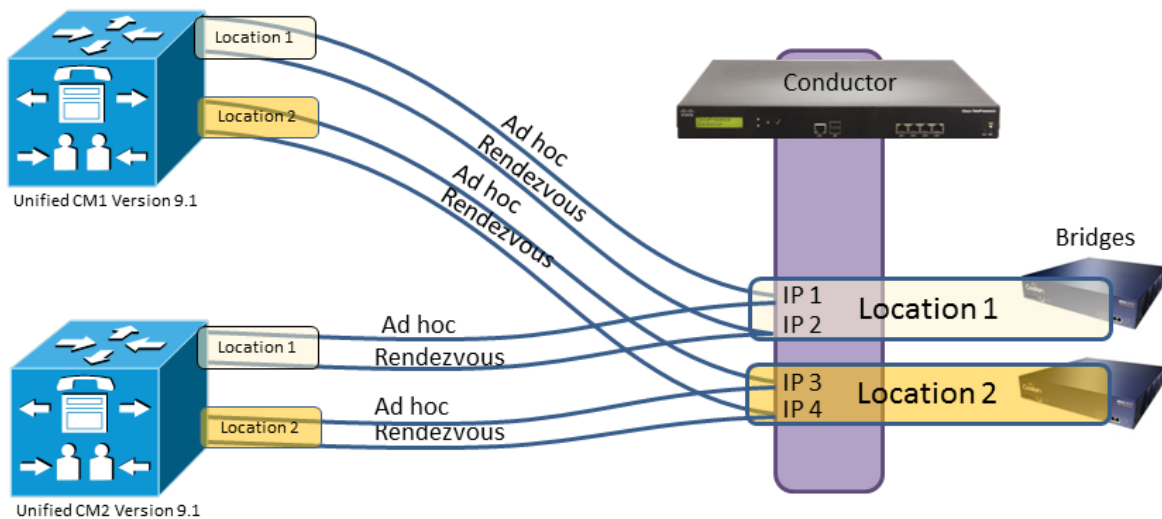
Outbound calls from conference bridges to participants registered on or available via Unified CM are supported. Bridge pools are assigned a Location within TelePresence Conductor and outbound calls use the same SIP trunk as incoming rendezvous calls. Outbound calls are typically used for automatic dialing of conference participants into a conference, or to add a participant to an existing conference via the Cisco TMS Conference Control Center, or to add a recording server or an audio bridge.

The conference administrator must ensure that aliases dialed from endpoints connected to Unified CM only use bridges in the Location expected by Unified CM. If bridges in a different Location are specified and used,

TelePresence Conductor will place the call on the bridge in a different Location from that expected by Unified CM. This means Unified CM will account for the call bandwidth in the wrong Location, and wrongly allocate the bandwidth to the expected Location with no bandwidth allocation to the actual Location.

Unified CM Version 9.1 extends Location handling, enabling multiple Unified CM clusters to support the same Location. The following illustration shows multiple Unified CM clusters communicating with specific IP addresses on a TelePresence Conductor. For example, both UCM1 and UCM2 route ad hoc calls to Location 1 using the same IP address on TelePresence Conductor. UCM1 and UCM2 route ad hoc calls to Location 2 using another IP address. Similarly, rendezvous calls are routed from both UCM1 and UCM2 to a single IP for Location 1 and to a single IP for Location 2.

Figure 15: Using Locations with Unified CMs running 9.1



Pools

With the exception of conference bridges used for scheduling, each conference bridge in the deployment must be assigned to a conference bridge pool in TelePresence Conductor. A conference bridge can belong to only one pool. All bridges in a pool are configured with the same capabilities. Pools must reflect the bridge type (and location) of the bridge. For example, in [Figure 1: High-level view of the architecture \[p.10\]](#) Pool 1 could be a group of TelePresence Servers located in the London office, Pool 2 a group of MCUs with HD ports in New York, and Pool 3 a group of TelePresence Servers with SD ports, also in New York.

All conference bridges configured in a TelePresence Conductor pool must be in the same physical location and of the same type (MCU or TelePresence Server).

Service Preferences

A Service Preference is a prioritized list of conference bridge pools set up through TelePresence Conductor, which defines the order to use pools if conference resources are limited. For any particular conference the administrator can determine the order of preference for the pools that TelePresence Conductor will attempt to use to host that conference. If no conference bridges in the first pool can be used to host a conference (for example insufficient resources are available to meet the conference requirements), TelePresence Conductor will check whether the second pool in the list can be used.

A Service Preference can contain anywhere between 1 and 30 conference bridge pools. A single conference bridge pool can be used in any number of Service Preferences.

Note: If Unified CM call admission control is implemented to control bandwidth usage, each Service Preference must only contain pools of bridges for a single location.

As with pools, all conference bridges configured in a TelePresence Conductor Service Preference must be in the same physical location and of the same type (MCU or TelePresence Server).

More information

See the appropriate deployment guide:

- [Cisco TelePresence Conductor with Unified Communications Manager Deployment Guide](#) for Unified CM-centric deployments
- [Cisco TelePresence Conductor with Cisco VCS \(B2BUA\) Deployment Guide](#) for Cisco VCS-centric deployments

Appendix 3: Adding the Unified CM normalization scripts

If your deployment uses encryption and TLS on SIP trunks used for TelePresence, you must add one or more of the normalization scripts to Unified CM, as follows:

Table 10: Normalization scripts for Unified CM

Script	Install on ...
telepresence-conductor-interop	SIP trunks that directly interface with a TelePresence Conductor as the next hop peer.
vcs-interop	SIP trunks that directly interface with a Cisco VCS Control or Cisco Expressway-C as the next hop peer.
telepresence-mcu-ts-direct-interop	SIP trunks that directly interface with a TelePresence Server or MCU as the next hop peer.

To add the scripts:

1. Download the scripts that you need from the [Cisco website](#) (go to the relevant Unified CM software version and select **SIP Normalization and Transparency Scripts > Scripts**).
2. On Unified CM, go to **Device > Device Settings > SIP Normalization Script**.
3. Click **Add new**.
4. Click **Import File**.
5. Select the script that you downloaded.
6. Click **Import File**.
7. Enter or change the following details:

Name	Enter the script name. For example, <code>telepresence-conductor-interop</code>
Description	Enter a description. For example, <code>Provides interoperability for calls through the TelePresence Conductor</code>
Memory Threshold	Enter 1000
Lua Instruction Threshold	Enter 2000

8. Click **Save**.
9. Repeat these steps until all the scripts you need are added.
10. To install the scripts onto the SIP trunks:
 - a. On the Unified CM go to **Device > Trunk** [or **Media Resources > Conference Bridge** for ad hoc conference bridges in Unified CM Version 9.1(2)SU2] and select the relevant trunk / bridge.
 - b. In the **Normalization script** area of the **SIP Information** section, from the drop-down list select the appropriate script for the trunk / bridge.
 - c. Click **Save**.
 - d. Click **Reset**.

Appendix 4: Migration paths to Optimized Conferencing Release 3.0

This appendix describes how to migrate previous Optimized Conferencing deployments and non-Optimized Conferencing deployments to the Release 3.0 preferred architecture. This release of Optimized Conferencing has two recommended deployment architectures for deploying conferencing infrastructure:

- Conferencing infrastructure connected to Unified CM. This is the preferred architecture.
- Conferencing infrastructure connected to Cisco VCS.

For new deployments the Unified CM-connected deployment should be implemented.

For existing audio and video deployments which do not match either of the two scenarios, we recommend that deployments are migrated to the Optimized Conferencing Release 3.0 deployment using the Release 3.0 recommended code levels, as this is the tested architecture on top of which new feature developments are being planned.

To move to the Optimized Conferencing Release 3.0 deployment ("Release 3.0"):

1. Start by moving the infrastructure to the Release 3.0 standard.
2. Then, if endpoints are currently registered to the Cisco VCS, move the endpoints that can register to Unified CM to Unified CM.

Prerequisites

Release 3.0 makes use of endpoint caller IDs, displaying them in Roster lists and, if enabled, on-screen in conferences in TS Active presence mode. We recommended reviewing the dial plan to ensure that displayed caller IDs are meaningful.

Release 3.0 software versions

Table 11: Required software versions

Product	Recommended	Minimum	Notes
TelePresence Server	4.0	4.0	When connected to TelePresence Conductor, TelePresence Server must be configured in remotely managed mode. When connected to call control for assured scheduling TelePresence Server must be configured in locally managed mode.
TelePresence Conductor	XC2.3	XC2.3	
MCU	4.5	4.5	

Table 11: Required software versions (continued)

Cisco VCS	X8.2	X8.1.1 (X8.2 required for Microsoft Lync)
Cisco VCS—for H.323 registration	X8.2	X7.2.3
Cisco Expressway	X8.2	X8.1.1 (X8.2 required for Microsoft Lync)
Cisco TMS	14.4	14.4
Cisco TMSPE	1.2	1.2
Unified CM	10.5(1)	9.1(2)SU2

Unified CM only system to Release 3.0

1. Upgrade Unified CM to the recommended version for Optimized Conferencing Release 3.0.
2. Add TelePresence Conductor to Unified CM and deploy bridges trunked to TelePresence Conductor—these components support ad hoc (telephone button) conferences and CMR conferences.
3. Upgrade endpoint software to the version supplied with Unified CM.
4. Only if assured scheduling is required, deploy bridges directly trunked to Unified CM and control them using Cisco TMS.
5. If WebEx participants are to be included in calls, ensure that Unified CM is running at least code version 9.1(2)SU2 and update Unified CM configuration to support Early Offer.
6. To allow participants external to the company network to join conferences, deploy Cisco Expressway-C and Cisco Expressway-E for the firewall traversal.
7. If Lync interop is required add a Cisco Expressway-C / Cisco VCS Control to be the gateway to the Microsoft Lync infrastructure. Version X8.2 or later is required. (See the Cisco VCS / Cisco Expressway deployment guides to identify whether Cisco VCS Control or Cisco Expressway-C is most appropriate for your needs.)
8. In the unlikely event you wish to add Legacy and H.323 endpoints to the solution, add a Cisco VCS Control onto which those endpoints can register.

Separate audio-only endpoint Unified CM and video endpoint Unified CM to Release 3.0

Some Unified CM deployments use a Unified CM for audio-only endpoints and a separate Unified CM for video endpoints. The ideal solution is to run both systems at the same Unified CM version, and in that case you should follow the [Unified CM only system to Release 3.0 \[p.62\]](#) instructions above.

If there are reasons why audio and video endpoints need to register to separate Unified CMs and they need to run different versions, then, before proceeding, verify with your account manager that the two Unified CM versions are acceptable in the deployment. In this case follow the [Unified CM only system to Release 3.0 \[p.62\]](#) instructions above on the video Unified CM.

Cisco VCS only to Cisco VCS and Unified CM Release 3.0

1. Upgrade Cisco VCS to the recommended version for Optimized Conferencing Release 3.0.
2. Neighbor (SIP trunk) the Cisco VCS to a new Unified CM running code version 9.1(2) or 10.5(1) and configure it to support Early Offer.
3. Move the TelePresence Conductor to connect to Unified CM, and ensure that the search rules used to send calls to the TelePresence Conductor under Cisco VCS now send the calls to Unified CM, and that the Unified CM forwards these calls to TelePresence Conductor.

4. Only if assured scheduling is required, move or deploy bridges directly trunked to Unified CM and control them using Cisco TMS.
5. Migrate endpoints that can register to Unified CM to Unified CM, upgrading software to the [required versions](#) for this Optimized Conferencing release.

Unified CM and Cisco VCS to Release 3.0

1. Upgrade Cisco VCS to the recommended version for Optimized Conferencing Release 3.0.
2. Upgrade Unified CM to the recommended version for Optimized Conferencing Release 3.0.
3. Move / keep TelePresence Conductor connected to Unified CM with bridges (that are used to support ad hoc conferences and CMR conferences) trunked to TelePresence Conductor.
4. If the TelePresence Conductor is moved from Cisco VCS, ensure that the search rules that used to send calls to the TelePresence Conductor under Cisco VCS now send the calls to Unified CM and that the Unified CM forwards these calls to TelePresence Conductor.
5. Only if assured scheduling is required, deploy bridges directly trunked to Unified CM and control them using Cisco TMS—remove any bridges registering or trunked to Cisco VCS.
6. Cisco VCS architecture can remain as configured for firewall traversal, Lync interop and Legacy / H.323 endpoint registration.
7. Migrate endpoints that can register to Unified CM to Unified CM, upgrading software to the [required versions](#) for this Optimized Conferencing release.

Comparison of capabilities of endpoints registered to Unified CM and endpoints registered to Cisco VCS

Table 12: Comparison of capabilities of endpoints registered to Unified CM and endpoints registered to Cisco VCS

Capability	Registered to Unified CM	Registered to Cisco VCS
Phone books	User Data Services (UDS) phonebooks Non-hierarchical	TMS phone books Hierarchical directory
Management	Managed by Unified CM & Prime Collaboration suite Provisioned by Unified CM	Managed by Cisco TMS Provisioned by Cisco TMS
Conference scheduling	Managed by Cisco TMS	Managed by Cisco TMS
Firewall traversal	Using Cisco Expressway-C and Cisco Expressway-E	Using Cisco VCS Expressway
Conference escalation	Ad hoc	Multiway

Release 3.0 features and version dependencies

Table 13: Release 3.0 features and version dependencies

Feature	Versions required
Segment switching	TS 4.0 and XC2.3, TMS 14.4, TMSPE 1.2
BE6000	XC2.3, vTS 4.0, TMS 14.4, TMSPE 1.2
MS Lync interoperability	VCS X8.2, Expressway-C 8.1.1, Unified CM 9.1 (2)SU2 or 10.5(1) Early Offer configuration
Increased TelePresence Server call limit (200)	TS 4.0 and XC2.3
CMR provisioning and user portal	XC2.3, TMS 14.4, TMSPE 1.2

Table 13: Release 3.0 features and version dependencies (continued)

Cisco TMS direct scheduling	TMS 14.4, TS 4.0, MCU 4.5
New TelePresence Server optimization	TS 4.0, TMS 14.4, TMSPE 1.2, Conductor XC2.3 Optimization configured in JSON on TMS for provisioned conferences, or in JSON in the TelePresence Conductor template.
The iX protocol (XCCP) can be enabled in the local Unified CM and Cisco VCS network and can be configured to be blocked from transmission at network boundaries	Unified CM 9.1(2)SU2 or 10.5(1), VCS X8.1.1, Expressway X8.1.1

Associated products, versions and features

Table 14: Associated products, versions and features

Product	Version	Features
MCU	4.5	Minimum version for Release 3.0 operation. Adds: <ul style="list-style-type: none"> ■ ClearPath (Flux 1) ■ Separate content channel for encrypted SIP participants ■ Domain added for out dial requests without a domain—needed for WebEx out dial (for TSP conferenced audio) when the MCU is trunked to Unified CM.
Unified CM	Unified CM 9.1(2)SU2	Minimum version for Release 3.0 operation
	10.5(1)	Ad hoc bridge now configured as data connection and explicit SIP trunk
Cisco VCS	X8.1.1	Minimum version for Release 3.0 operation (X7.2.3 for H.323 registration)
	X8.2	Minimum version for Lync gateway operation in Release 3.0
Cisco Expressway	X8.1.1	Minimum version for Release 3.0 operation

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The Voluntary Product Accessibility Template (VPAT) for Optimized Conferencing for Cisco Unified Communications Manager and Cisco Video Communication Server is available here:

http://www.cisco.com/web/about/responsibility/accessibility/legal_regulatory/vpats.html#telepresence

You can find more information about accessibility here:

www.cisco.com/web/about/responsibility/accessibility/index.html

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