



CHAPTER 3

Deployment Models for the Cisco MXE Video Interoperability Solution

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This chapter identifies the existing Cisco TelePresence System and deployment models into which you can deploy the Cisco MXE Video Interoperability Solution, describes the basic design models that you can use to deploy video interoperability in your network, and provides design criteria and guidelines for choosing the best model.

- [Supported Cisco TelePresence System Deployment Models, page 3-1](#)
- [Supported Videoconferencing Deployment Models, page 3-2](#)
- [Design Guidelines for Cisco MXE Video Interoperability, page 3-2](#)
- [Intra-Campus Single Zone Model, page 3-4](#)
- [Intra-Campus Multi-Zone Model, page 3-6](#)
- [Intra-Enterprise Single Zone Model, page 3-8](#)
- [Intra-Enterprise Multi-Zone Model, page 3-10](#)



Note

These definitions apply to all deployment models:

- A zone is a collection of H.323 endpoints, gateways, and MCUs that a single gatekeeper manages.
- A campus is a collection of buildings or sites that are connected via a high-speed network (1 Gigabit or higher).
- An enterprise is a collection of campuses or remote sites that are connected via a WAN (up to 1 Gigabit).

Supported Cisco TelePresence System Deployment Models

This solution supports video interoperability with the following basic Cisco TelePresence System network deployment models:

- **Intra-Campus Model**—This deployment model limits Cisco TelePresence Systems to a single enterprise campus or between sites interconnected via a high-speed (1 Gigabit or higher) Metropolitan Area Network (MAN).

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- Intra-Enterprise Model—This deployment model connects not only buildings within a campus but also geographically separated campus sites and branch offices, and it expands on the intra-campus model to include sites that are connected via a Wide Area Network (< 1 Gigabit).

For more information about these deployment models, see the *Cisco TelePresence Network Systems 2.0 Design Guide* at this URL:

<http://www.cisco.com/en/US/docs/solutions/Enterprise/Video/tpdeploy.html>

Supported Videoconferencing Deployment Models

This solution supports video interoperability with the following basic videoconferencing network deployment models:

- Campus Single Zone Model—This deployment model is the most basic design model to implement and is used in pilot installs and smaller video environments.
- Campus Multizone Model—This deployment model is most often implemented in an enterprise campus network, and it enables administrators to create different zones for security reasons.
- WAN Multizone Model— This deployment model is used in large enterprise, government, and educational networks, and it enables administrators to create multiple zones to manage network resources and assure video quality across low-speed WAN links.

For more information, see the *Cisco Unified Videoconferencing Solution Reference Network Design* at this URL:

<http://www.cisco.com/en/US/docs/video/cuvc/design/guides/srnd/vidmodel.html>

Design Guidelines for Cisco MXE Video Interoperability

Video interoperability deployment models share the following design criteria and guidelines with Cisco TelePresence System and videoconferencing deployment models:

H.323/Gatekeeper Guidelines

- All H.323 videoconferencing endpoints support high definition (HD) or standard definition (SD) resolutions.
- Each H.323 videoconferencing endpoint registers with a gatekeeper.
- The gatekeeper manages zone bandwidth when calls are placed between H.323 videoconferencing endpoints and a Cisco MXE 5600.
- For H.323 calls that do not involve Cisco TelePresence Systems, H.323 IDs may be used for call routing.
- Cisco Unified Communications Manager registers with the gatekeeper that is responsible for each zone. Cisco Unified Communications Manager can also use a directory gatekeeper.

Zone Guidelines

- One or more pools of MCUs is used for multiparty calls that involve only H.323 videoconferencing endpoints.
- One or more pools of Cisco MXE 5600s is used for video interoperability calls. Typically, a pool of Cisco MXE 5600s is allocated for each campus and potentially for each zone, depending on the distribution of video interoperability calls.

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- Each device that participates in video interoperability calls is associated with a Cisco MXE 5600 pool: video interoperability calls involving that device are handled by Cisco MXE 5600s within that pool.
- (Optional) One or more pools of Cisco TelePresence Multipoint Switches is used for multiparty calls that involve a combination of Cisco TelePresence Systems and videoconferencing endpoints.

High Availability Guidelines

For environments that require high availability, you can deploy redundant Cisco Unified Communications Managers, Cisco Media MXE 5600s, optional Cisco TelePresence Multipoint Switches, and H.323 gatekeepers.

Call Routing Guidelines

- Cisco Unified Communications Manager is configured with calling search spaces and partitions to route video interoperability calls from videoconferencing endpoints to Cisco TelePresence Systems or Cisco TelePresence Multipoint Switches through a Cisco MXE 5600 instead of directly to the Cisco TelePresence Systems or Cisco TelePresence Multipoint Switches. For an H.323 endpoint, Cisco Unified Communications Manager converts the call signaling from H.323 to SIP when routing calls to a Cisco MXE 5600.
- Cisco Unified Communications Manager is configured with calling search spaces and partitions to route video interoperability calls from Cisco TelePresence Systems to the videoconferencing endpoints through a Cisco MXE 5600 instead of directly to the videoconferencing endpoints. For an H.323 endpoint, Cisco Unified Communications Manager converts the call signaling from SIP to H.323 when routing to H.323 videoconferencing endpoints.
- For the H.323 endpoints, the gatekeeper is configured as an H.225 trunk on Cisco Unified Communications Manager and is accessible by using one or more route patterns.
- Each Cisco TelePresence Multipoint Switch is configured as a SIP trunk on a Cisco Unified Communications Manager cluster and is accessible by using one or more route patterns.
- Ensure that audio-only calls do not go through a Cisco MXE 5600.

Cisco Unified Communications Manager Guidelines

- There are one or more Cisco Unified Communications Manager clusters.
- If there are multiple Cisco Unified Communications Manager clusters in a deployment, the Cisco Unified Communications Manager that manages the SIP/H.323 interworking must be the same Cisco Unified Communications Manager that hosts the Cisco MXE 5600 that is used in the video interoperability call.
- Each Cisco TelePresence System codec registers with a Cisco Unified Communications Manager cluster.
- Cisco Unified Communications Manager is configured with a partition for each of the following solution components:
 - The Cisco TelePresence Systems and Cisco TelePresence Multipoint Switches that are associated with each pool of Cisco MXE 5600s
 - The Cisco MXE 5600s in each pool, including the route patterns that correspond to the Cisco TelePresence Systems, Cisco TelePresence Multipoint Switches, and videoconferencing endpoints that are associated with the pool
 - The gatekeepers that are associated with each pool of Cisco MXE 5600s
- Cisco Unified Communications Manager is configured with a calling search space for calls from each partition.

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- Each Cisco Unified Communications Manager calling search space gives preference to Cisco MXE 5600s within the same campus as the Cisco TelePresence System or optional Cisco TelePresence Multipoint Switch to minimize the bandwidth required between zones and WAN traffic. Optionally, preference can be given to Cisco MXE 5600s that are associated with the zone of the H.323 videoconferencing endpoint.

Intra-Campus Single Zone Model

This section includes the following topics:

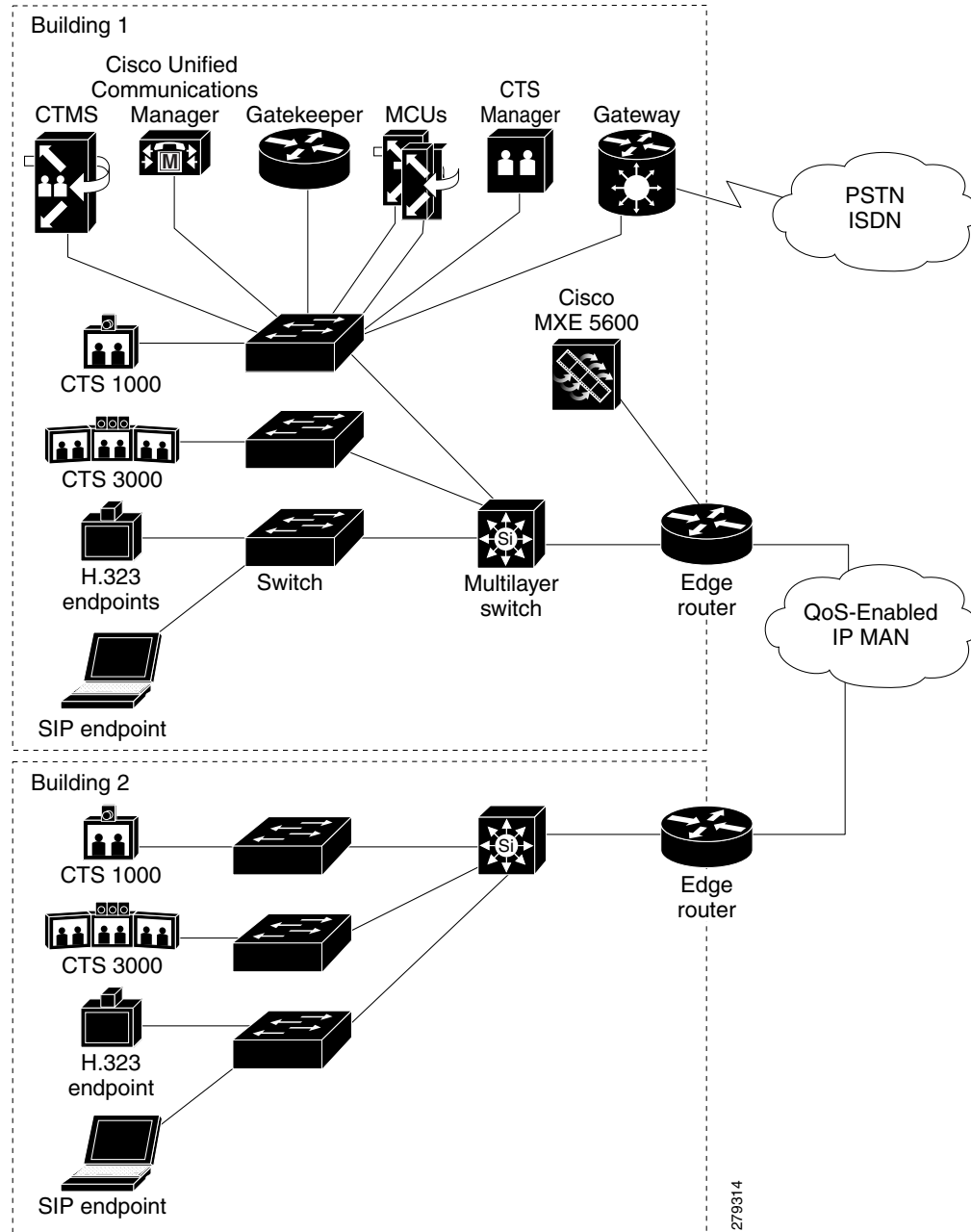
- [Intra-Campus Single Zone Model Topology, page 3-4](#)
- [Intra-Campus Single Zone Model Design Characteristics, page 3-5](#)

Intra-Campus Single Zone Model Topology

[Figure 3-1](#) illustrates an interoperability deployment for a local campus network environment that is configured with a single zone that is managed by a single gatekeeper and a single CUCM cluster. This is the most basic design model to implement and is used in pilot installs and smaller video environments with a limited number of Cisco TelePresence Systems and videoconferencing endpoints.

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Figure 3-1 Intra-Campus Single Zone Model



Intra-Campus Single Zone Model Design Characteristics

This deployment model has the following design characteristics:

- All Cisco TelePresence Systems are registered with a single Cisco Unified Communications Manager cluster.
- There is a single pool of Cisco MXE 5600s.
- There is a single pool of Cisco TelePresence Multipoint Switches.

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Intra-Campus Multi-Zone Model

This section includes the following topics:

- [Intra-Campus Multi-Zone Model Topology, page 3-6](#)
- [Intra-Campus Multi-Zone Model Design Characteristics, page 3-7](#)

Intra-Campus Multi-Zone Model Topology

Figure 3-2 illustrates an interoperability deployment topology for an intra-campus multi-zone environment. Depending on business requirements, administrators may choose to create different zones within the same campus for security reasons. For example, company executives and their traditional videoconferencing endpoints may be registered in a single zone that is separate from other users to allow administrators to limit access to those video endpoints. Bandwidth and QoS support can be different from other rooms where traditional videoconferencing endpoints are deployed for non-executive users. In addition, as a video network grows, a single zone may not be manageable because of the number of users or the ability to manage network resources.

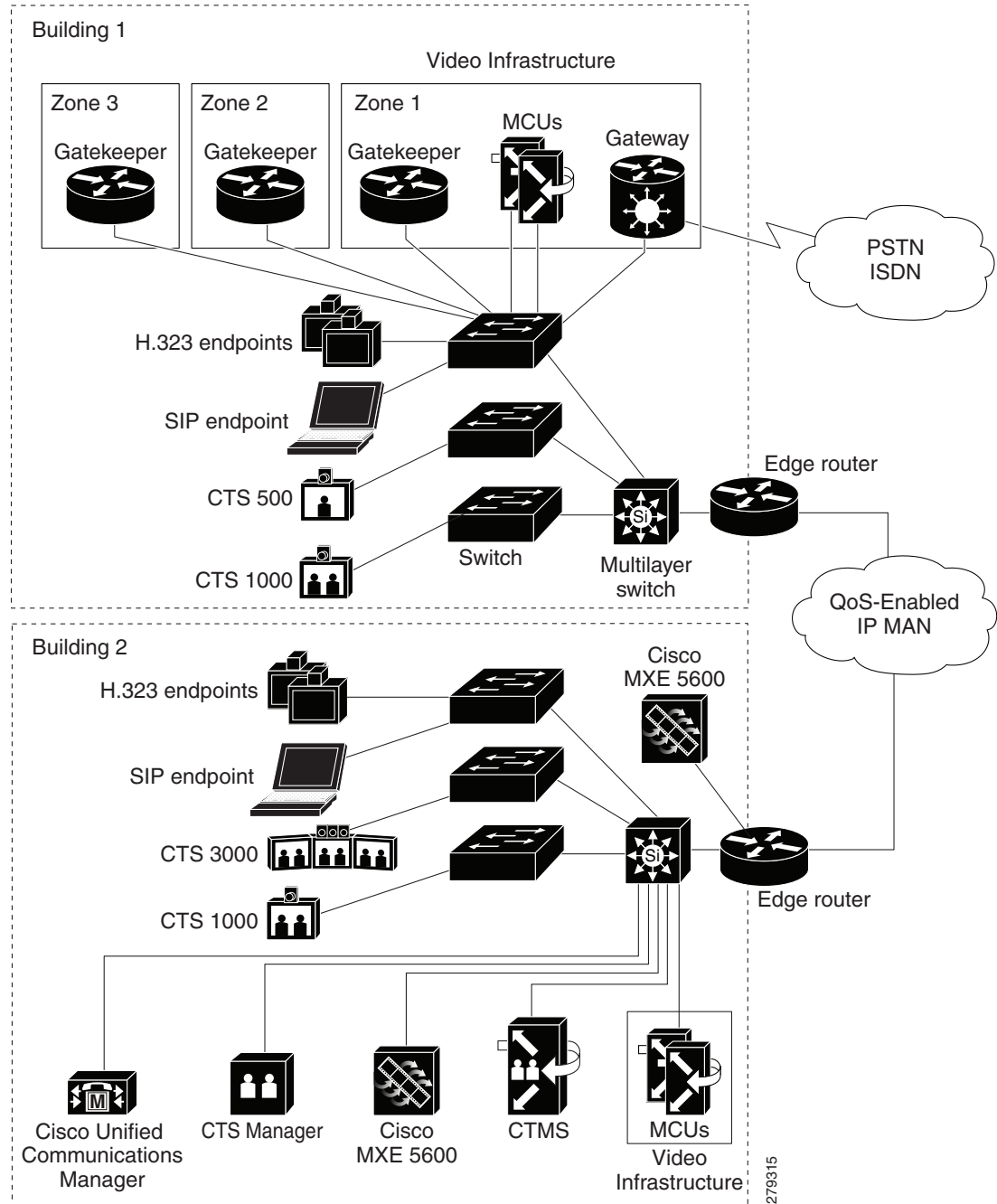


Note

You can configure multiple zones for traditional H.323 videoconferencing endpoints on a gatekeeper. If you configure multiple local zones on a gatekeeper, and MCUs or gateways or both are registered with the zones, you must add hopoff statements for each service prefix when you configure call routing within an H.323 environment. For interoperability calls, the H.323 gatekeeper will be directly trunked to the Cisco Unified Communications Manager cluster where Cisco TelePresence Systems are registered. If hopoffs are not added for each service prefix, the video endpoint will not be able to access MCUs or gateways outside its local zone. Such configuration does not affect video interoperability calls.

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Figure 3-2 Intra-Campus Multi Zone Model



Intra-Campus Multi-Zone Model Design Characteristics

This deployment model has the following design characteristics:

- All Cisco TelePresence Systems are registered with a single Cisco Unified Communications Manager cluster.
- Multiple gatekeepers exist supporting multiple administrative zones for the H.323 videoconferencing endpoints.

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- Each gatekeeper is configured as a H.225 trunk on the single Cisco Unified Communications Manager cluster.
- There is a single pool of Cisco TelePresence Multipoint Switches. Note that in this case, the same pool of Cisco TelePresence Multipoint Switches is shared for all zones.
- There is a single pool of Cisco MXE 5600s. Note that in this case, the same Cisco MXE 5600 pool is shared for all zones. Optionally, a Cisco MXE 5600 pool could be defined for each zone or for subsets of zones.

Intra-Enterprise Single Zone Model

This section includes the following topics:

- [Intra-Enterprise Single Zone Model Topology, page 3-8](#)
- [Intra-Enterprise Single Zone Model Design Characteristics, page 3-9](#)

Intra-Enterprise Single Zone Model Topology

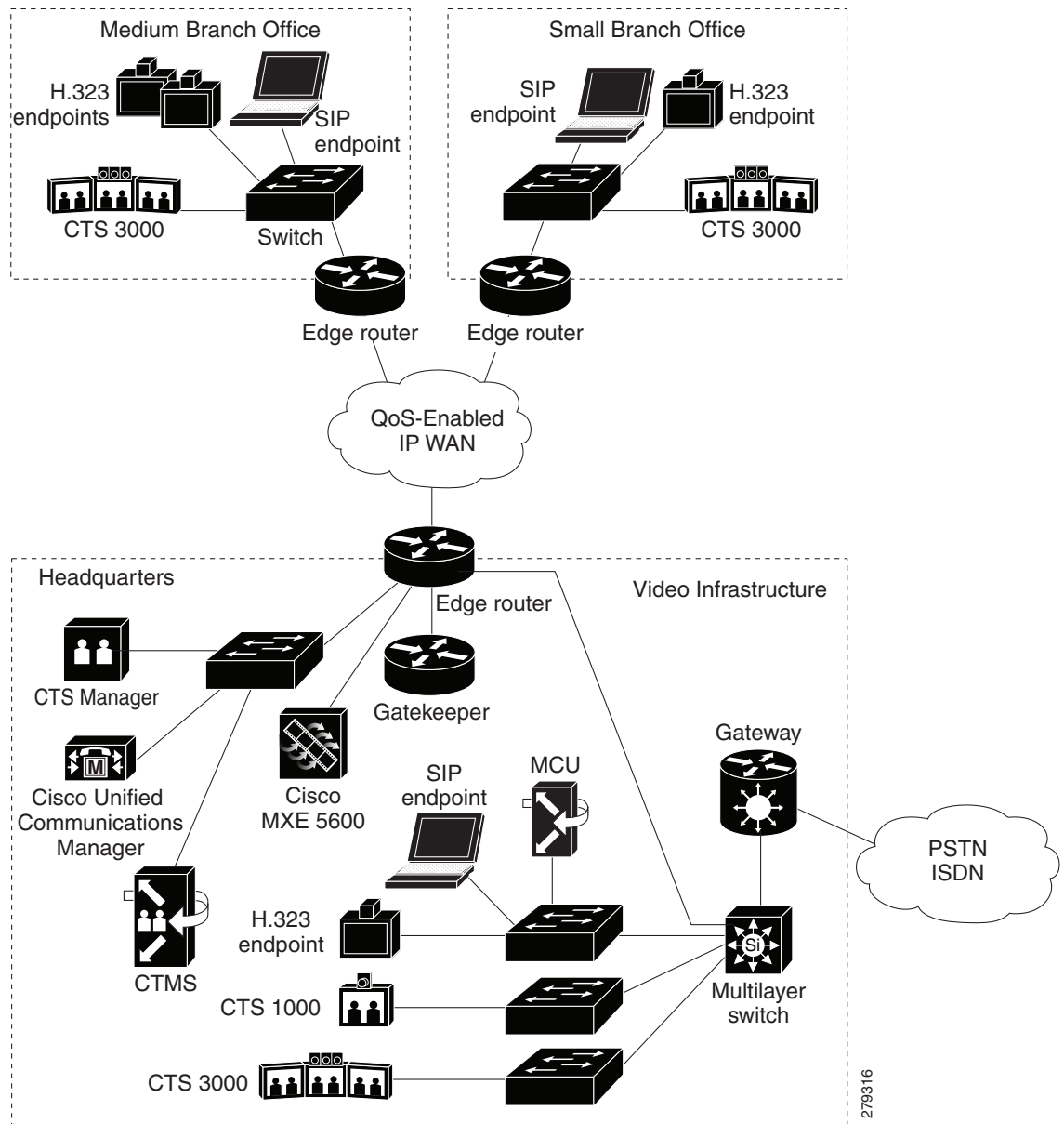
Figure 3-3 illustrates an interoperability topology consisting of Cisco TelePresence Systems and single zone videoconferencing endpoints in a WAN environment. This deployment model is most often used when remote sites have a small number of video endpoints, usually no more than one or two videoconferencing endpoints at each remote site over a T1 WAN link, or an individual Cisco TelePresence System 500 (CTS-500) exists at the remote site. From a management or economic standpoint, it might not make sense to create a zone for each remote site for only one or two videoconferencing endpoints. Call admission control across the WAN is not usually an issue with few video endpoints at each remote site, but it is an issue when the number of simultaneous calls across the WAN from remote endpoints exceeds the provisioned video bandwidth. Therefore, when a CTS-500 or other Cisco TelePresence Systems are deployed at a remote site along with videoconferencing endpoints, bandwidth provisioning needs to be addressed and a different model may be appropriate.

In the absence of a gatekeeper, to support appropriate bandwidth allocation for Cisco TelePresence Systems and videoconferencing endpoints, you can implement QoS on the WAN ports by using one of the following methods:

- Priority queuing on traffic classification using differentiated services code point (DSCP) CS3 for call signaling and DSCP CS4 for media (Cisco TelePresence Systems).
- Access control list (ACL) for each Cisco TelePresence System or videoconferencing endpoint at the remote site to direct the video streams to the appropriate priority queue.

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Figure 3-3 Intra-Enterprise Single Zone Model



Intra-Enterprise Single Zone Model Design Characteristics

This deployment model has the following design characteristics:

- All Cisco TelePresence Systems are registered with a single Cisco Unified Communications Manager cluster at the headquarters, supporting the entire Cisco Telepresence System deployment.
- Each gatekeeper required for an H.323 endpoint is configured as an H.225 trunk on the single Cisco Unified Communications Manager cluster.

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- There is a single pool of Cisco MXE 5600s, and the same Cisco MXE 5600 pool is shared for the entire enterprise. Optionally, a pool of Cisco MXE 5600s could be defined for each campus or for subsets of campuses.
- There is a single pool of Cisco TelePresence Multipoint Switches, and the same pool of Cisco TelePresence Multipoint Switches is shared for the entire enterprise. Optionally, a pool of Cisco TelePresence Multipoint Switches could be defined for each campus or for subsets of campuses.

Intra-Enterprise Multi-Zone Model

This section includes the following topics:

- [Intra-Enterprise Multi-Zone Model Topology, page 3-10](#)
- [Intra-Enterprise Multi-Zone Design Characteristics, page 3-11](#)

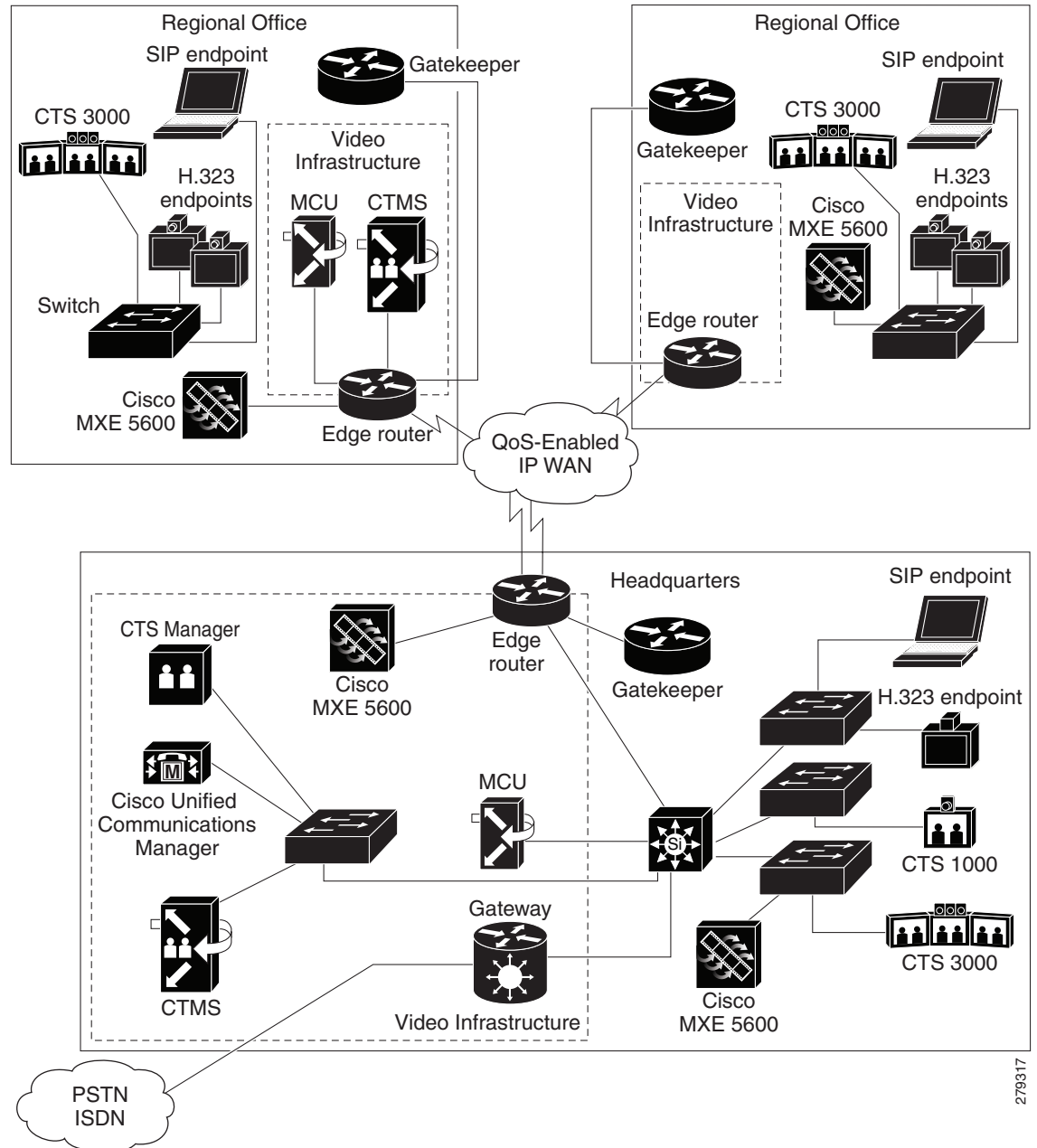
Intra-Enterprise Multi-Zone Model Topology

[Figure 3-4](#) illustrates a Cisco TelePresence System and multi-zone videoconferencing endpoints in a WAN environment. This deployment model is typically used in large enterprise, government, and educational networks. QoS can be implemented using the border element and priority queuing (PQ) features in Cisco IOS, traffic classification by the video endpoints, and/or Layer 3 switches in conjunction with priority queuing on the WAN ports of the routers.

Creating multiple zones in a WAN environment allows administrators to manage network resources and assure video quality across the lower-speed WAN links. Call admission control is very important in a large WAN environment. With multiple zones enabled, a gatekeeper can manage the total amount of H.323 video bandwidth allowed across a particular network link for a particular zone. For example, you could limit the total H.323 video bandwidth across a T1 WAN link to 768 kbps, and the gatekeeper would then reject any call requests that exceeds this limit of 768 kbps.

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Figure 3-4 Intra-Enterprise Multi Zone Model



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Intra-Enterprise Multi-Zone Design Characteristics

This deployment model has the following design characteristics:

- All Cisco TelePresence Systems are registered with a single Cisco Unified Communications Manager cluster at the headquarters, supporting the entire Cisco Telepresence System deployment.
- Each gatekeeper required for an H.323 endpoint is configured as an H.225 trunk on the single Cisco Unified Communications Manager cluster.

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- Multiple gatekeepers exist, supporting multiple administrative zones for H.323 videoconferencing endpoints.
- There are multiple pools of Cisco TelePresence Multipoint Switches. Optionally, a pool can be defined for each campus or subset of campuses.
- There is a pool of Cisco MXE 5600s for each campus. Optionally, a pool can be defined for each subset of campuses.
- Distributed services are available at larger branch sites to conserve bandwidth.
- Priority queuing (PQ) based on traffic classification is implemented on the WAN ports or a border element at each site with PQ on the WAN.
- (Optional) Bandwidth management is available in each zone and across the WAN by using a gatekeeper at each site.