



Cisco Unity Integration with Multiple Clusters of Cisco Unified Communications Manager (All Versions of Cisco Unity)

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This document describes the structure of a multiple-cluster configuration of Cisco Unified Communications Manager (CM) (formerly known as Cisco Unified CallManager), how Cisco Unity integrates with Cisco Unified CM, and the integration features that are available in this environment.

Contents

This document contains the following sections:

- [Description of Cisco Unified Communications Manager Clusters, page 1](#)
- [Description of an Integration with Cisco Unified Communications Manager Clusters and Cisco Unity, page 5](#)
- [Description of an Integration with a Circuit-Switched Phone System, Cisco Unified Communications Manager Clusters, and Cisco Unity, page 9](#)

Description of Cisco Unified Communications Manager Clusters

A Cisco Unified CM cluster is a set of two or more Cisco Unified CM servers that share the same database and resources. For example, a cluster might consist of three Cisco Unified CM servers that you set up as a cluster. You specify the servers, each of which can perform more than one function, as follows:

- Database publisher server
- TFTP (Trivial File Transfer Protocol) server
- Application software server
- Primary call-processing server



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- Secondary call-processing server

With clusters, you can extend call processing across an IP network to provide call processing at a remote location.

Clusters provide:

- Redundancy. When a primary Cisco Unified CM server in a cluster fails, a failover server can take over the call-processing functions. After the problem with the primary server has been resolved, it resumes its call-processing functions.
- Sharing of resources and features. A cluster has only one database publisher and one TFTP server, while all other servers subscribe to the publisher database and maintain their own copies of it. The Cisco Unified CM servers in the cluster read data from and write data to the publisher database and periodically update the subscriber copies of the database from the publisher database.
- System scalability. As a company expands, clusters can be added to provide call processing at multiple sites, yet remain linked through the IP WAN and the PSTN to form a seamless phone system. Or clusters may be added to a single site to provide more voice messaging ports (or sessions) and more call processing for additional extensions.

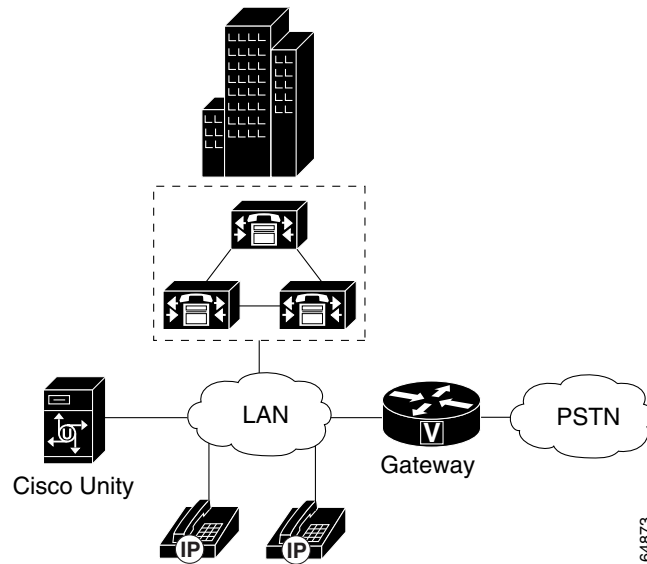
Single Cluster

A single cluster provides centralized call processing for all locations on the IP telephony network or LAN. The Cisco Unified CM cluster usually resides at a central location (for example, a main office), along with other devices such as phones and gateways. Calls using the public switched telephone network (PSTN) are sent through the gateway. Cisco Unity provides voice messaging through its connection on the LAN to the cluster.

The Cisco Unified CM servers in the cluster monitor the network resources to provide call admission control (CAC). Before a call is established, the cluster determines whether the required network resources are available to provide a minimum level of voice quality for the new call. If network resources are not available (for example, on the IP WAN), the call is directed to another route (for example, to the PSTN).

Figure 1 shows a single cluster providing centralized call processing at a single location.

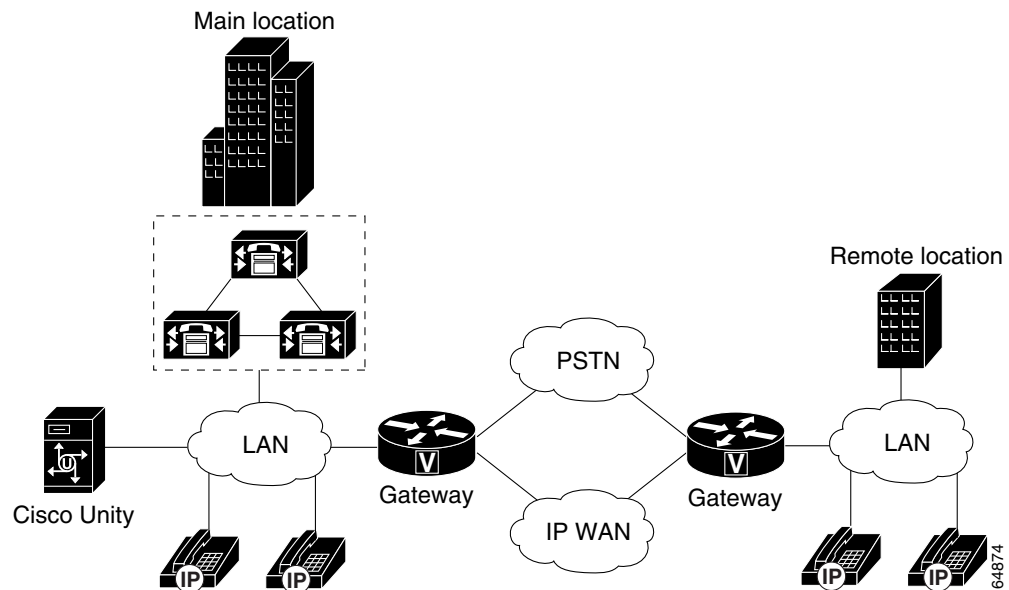
Figure 1 *Single Cisco Unified Communications Manager Cluster Serving One Location*



A single cluster can provide call processing and voice messaging to remote locations (for example, a branch office). The remote location contains additional devices, such as phones and gateways, but no Cisco Unified CM servers. An IP WAN connects the remote location to the main location through gateways on each side. Cisco Unity provides voice messaging for subscribers at all locations through its connection on the LAN to the cluster.

Figure 2 shows a single cluster providing centralized call processing at two locations.

Figure 2 *Single Cisco Unified Communications Manager Cluster Serving Two Locations*



Multiple Clusters

While multiple clusters provide distributed call processing over one or more sites just as a single cluster can, multiple clusters provide greater call-processing power than a single cluster is able to. Each cluster handles call processing for a certain set of devices. For example, extensions belong to only one cluster. However, calls from extensions in one cluster to extensions in another cluster are handled seamlessly as if they were located in the same cluster.

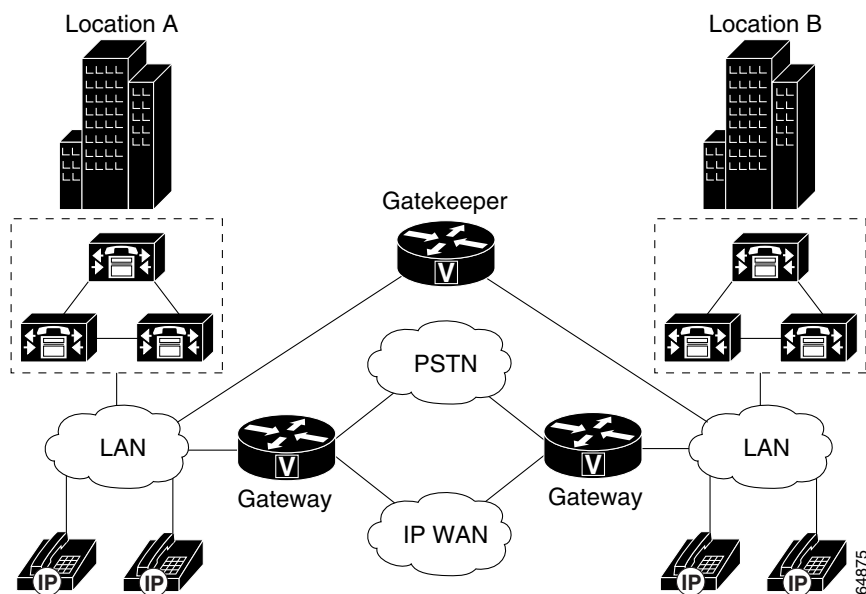
When multiple clusters are in a single site and they interconnect over a single LAN, communication between clusters is achieved using H.323-based protocols.

When multiple clusters at separate sites are interconnected over an IP WAN, the network should be engineered to accommodate the required volume of voice traffic. Also required is a method of providing call admission control (CAC). To provide CAC, an IOS gateway should be added to act as gatekeeper.

Before a call is established, the gatekeeper uses CAC to determine whether the required network resources are available to provide a minimum level of voice quality for the new call. If network resources are not available on the IP WAN, the call is directed to, for example, the PSTN.

Figure 3 shows clusters at two locations using a gatekeeper to monitor the network resources between them.

Figure 3 Multiple Cisco Unified Communications Manager Clusters



Setup Requirements for Multiple Cisco Unified Communications Manager Clusters

The following components are necessary to set up multiple Cisco Unified CM clusters:

- Cisco Unified CM servers configured as two or more clusters
- An H.323-enabled network connection between the clusters
- An H.323 voice gateway for each cluster to connect to the IP WAN and PSTN

- An H.323 gatekeeper to provide call admission control
- IP WAN (needed only when clusters are at different locations)

Additional Setup Information

For additional information about setting up Cisco Unified CM clusters, refer to:

- *Installing Cisco Unified Communications Manager* at http://www.cisco.com/en/US/products/sw/voicesw/ps556/prod_installation_guides_list.html
- *Cisco Unified Communications Manager System Guide* at http://www.cisco.com/en/US/products/sw/voicesw/ps556/prod_maintenance_guides_list.html
- *Cisco Unified Communications Manager Administration Guide* at http://www.cisco.com/en/US/products/sw/voicesw/ps556/prod_maintenance_guides_list.html
- *Cisco Unified Communications SRND* at http://www.cisco.com/en/US/products/sw/voicesw/ps556/products_implementation_design_guides_list.html
- *Configuring a Cisco IOS H.323 Gateway for Use with Cisco CallManager* at http://www.cisco.com/warp/customer/788/AVVID/config_h323_ccm.html
- *VoIP Call Admission Control* at http://www.cisco.com/en/US/tech/tk652/tk701/tech_white_papers_list.html

Description of an Integration with Cisco Unified Communications Manager Clusters and Cisco Unity

Cisco Unity can integrate with Cisco Unified CM clusters in two possible configurations:

- All clusters receive voice messaging services from one or a group of Cisco Unity servers. (All Cisco Unity servers are set up to connect to all clusters.) [Figure 4](#) shows this configuration.
- Each cluster receives voice messaging services from its own Cisco Unity servers. (Each Cisco Unity server is set up to connect to only one cluster).

In either configuration, the Cisco Unity server acts as another device to the Cisco Unified CM clusters. In Cisco Unified CM, each voice mail port is set up and assigned an extension. Cisco Unity receives information and calls through these ports. (In a Cisco Unified CM system, voice messaging ports are also known as “sessions.”)

The Number of Clusters Cisco Unified Communications Manager Can Integrate With

For Cisco Unity 4.2 and later, the number of clusters is not limited.

For Cisco Unity 4.0 and 4.1, configurations of up to 10 clusters are possible provided that there is a sufficient number of voice messaging ports to:

- Dedicate one voice messaging port for each cluster to send MWIs. For example, if there are four clusters in the configuration, there must be four voice messaging ports dedicated to send MWIs, one port for each cluster.

- Assign voice messaging ports for each cluster to meet the voice messaging needs of the subscribers in the cluster. For example, if there are four clusters in a configuration with 200 subscribers each for a total of 800 subscribers, the Cisco Unity server could assign 11 ports to each cluster for a total of 44 ports to handle calls and four ports to handle MWIs (48 ports in all).

Cisco Unity Servers Cannot Be Configured as Clusters

While Cisco Unity supports Cisco Unified CM clusters, Cisco Unity servers cannot be set up as one or more clusters. Multiple Cisco Unity servers can be integrated with a Cisco Unified CM, but the effect is not a cluster.

In one possible configuration, multiple Cisco Unity servers are integrated with Cisco Unified CM. Unlike a cluster, however, each Cisco Unity server is independent, having its own message store (Exchange or Domino server), its own unique pilot number, and its own set of subscribers.

In another configuration, multiple Cisco Unity servers can provide server redundancy, creating failover. For example, when the primary Cisco Unity server fails, the secondary server takes over all voice messaging functions.

This failover configuration of multiple Cisco Unity servers is not a cluster in that it does not combine the voice messaging ports of, for example, two 48-port Cisco Unity servers to provide 96 ports. In this example, the primary server functions with only its 48 ports. If a 48-port secondary server takes over, it functions with only its 48 ports.

Additional Information

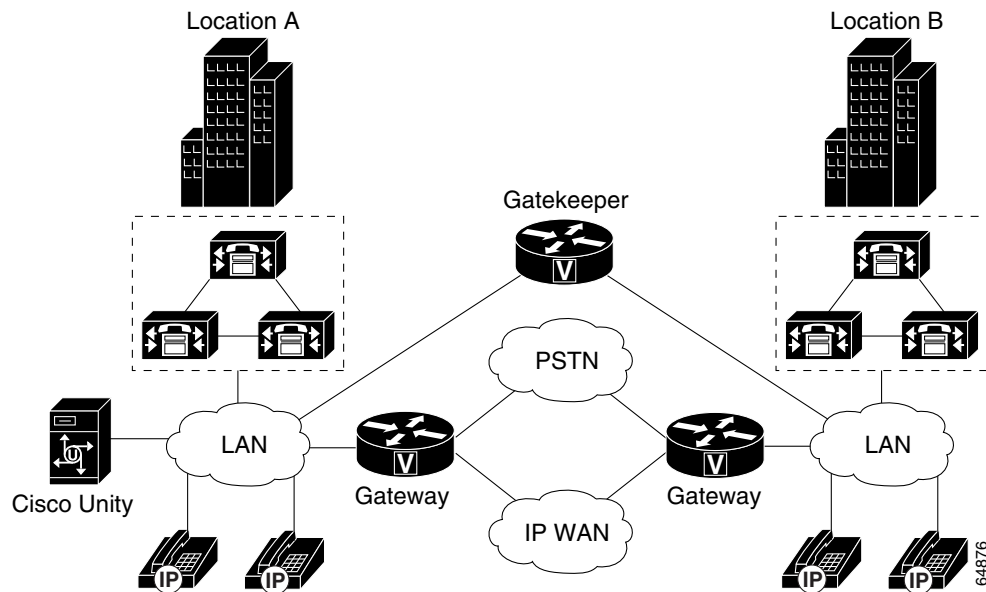
Cisco Unity supports configurations of multiple Exchange servers or multiple Domino servers as described in the applicable Cisco Unity installation guide. The Exchange or Domino servers communicate with Cisco Unity and do not impact the Cisco Unified CM clusters.

Support of MWIs among multiple clusters over an IP WAN is available in Cisco Unified CM 3.1(1) and later because of RDNIS support. The process is:

1. When a call from a remote cluster is forwarded to Cisco Unity and the caller leaves a message for a subscriber, the calling cluster uses RDNIS to send the forward ID over the IP WAN to Cisco Unity.
2. Cisco Unity sends a request to all clusters to turn on the MWI for the subscriber. The request uses the forward ID to direct the request.
3. The home cluster for the subscriber activates the MWI on the subscriber phone. However, clusters that do not have a subscriber with that extension ignore the MWI request.

Figure 4 shows one Cisco Unity server integrated with two clusters.

Figure 4 Cisco Unity Integrated with Multiple Cisco Unified Communications Manager Clusters



Setup Requirements

The following components are necessary to integrate Cisco Unity with multiple Cisco Unified CM clusters:

- Cisco Unified CM servers configured as a cluster at each location
- A network connection between the clusters
- An H.323 voice gateway for each cluster to connect to the IP WAN or PSTN
- An H.323 gatekeeper to provide call admission control
- Cisco Unity, set up and integrated with the clusters
- IP WAN

Additional Setup Information

For additional information about setting up Cisco Unity and integrating it with Cisco Unified CM, see:

- The applicable Cisco Unity installation guide at http://www.cisco.com/en/US/products/sw/voicesw/ps2237/prod_installation_guides_list.html.
- The applicable Cisco Unified CM integration guide for Cisco Unity at http://www.cisco.com/en/US/products/sw/voicesw/ps2237/products_installation_and_configuration_guides_list.html.

Available Integration Features

Table 1 lists the integration features and indicates whether they are available in single-cluster and multiple-cluster environments.

The availability of integration features requires that the gateways be set up to send the necessary packet information with the call (for example, sending the caller ID of the original caller and not the ID of the gateway). The Cisco Unified CM servers must be set up as indicated in the appropriate documentation, and the integration with Cisco Unity must be set up as indicated in the applicable Cisco Unified CM integration guide for Cisco Unity. Otherwise, the performance of the integration and the availability of the features may be affected.

The notes that follow the table provide additional information about the availability of the integration features.

Table 1 Available Integration Features for Cisco Unified Communications Manager

| Integration Feature | Calls Within a Single Cluster | Calls Between Clusters |
|---------------------------------------|-------------------------------|------------------------|
| Basic | | |
| Release transfer | Yes | Yes |
| Busy greeting | Yes | Yes |
| Call forward to personal greeting | Yes | Yes |
| Caller ID for internal calls | Yes | Yes (See note 1) |
| Caller ID for external calls | Yes | Yes (See note 1) |
| Easy message access | Yes | Yes |
| Identified subscriber messaging | Yes | Yes (See note 2) |
| Supervised Transfer | | |
| Supervised transfer | Yes | Yes |
| Automated attendant transfer | Yes | Yes |
| Call holding | Yes | Yes |
| Call screening | Yes | Yes |
| Notification and Dial-out | | |
| Message waiting indication (MWI) | Yes | Yes (See note 3) |
| Message delivery | Yes | Yes |
| Pager dial-outs (with “comma” pauses) | Yes | Yes |
| TRAP dial-outs | Yes | Yes |
| User Interface | | |
| Live record (via phone) | Yes (See note 4) | Yes (See note 4) |
| Volume on playback | Yes | Yes |
| G.729a support in wave driver | Yes | Yes |

Note 1

Caller ID works in all cases, except when a caller dials into Cisco Unity in one cluster (for example, to use the directory) and is transferred to an extension in another cluster. In this case, Cisco Unity receives the voice messaging port extension as the caller ID instead of the number of the actual caller. If the caller records a voice message, the sender is identified as the voice messaging port.

Note 2

The cross-server logon feature is available with Cisco Unity 4.0(4) or later.

Note 3

For Cisco Unity 4.0 and 4.1 only, Cisco Unity must have a voice messaging port dedicated to set MWIs for each cluster. For example, if there are three clusters, three voice messaging ports are dedicated to set MWIs, one for each cluster. For details, refer to the procedure “To set up MWI ports for multiple clusters of Cisco CallManager” in the applicable Cisco Unity integration guide at

http://www.cisco.com/en/US/products/sw/voicesw/ps2237/products_installation_and_configuration_guides_list.html.

Note 4

The live record feature is available with Cisco Unity 4.0(5) or later. For details, see the Cisco Unity Tools website at http://www.ciscounitytools.com/App_LiveRecord_405.htm.

Description of an Integration with a Circuit-Switched Phone System, Cisco Unified Communications Manager Clusters, and Cisco Unity

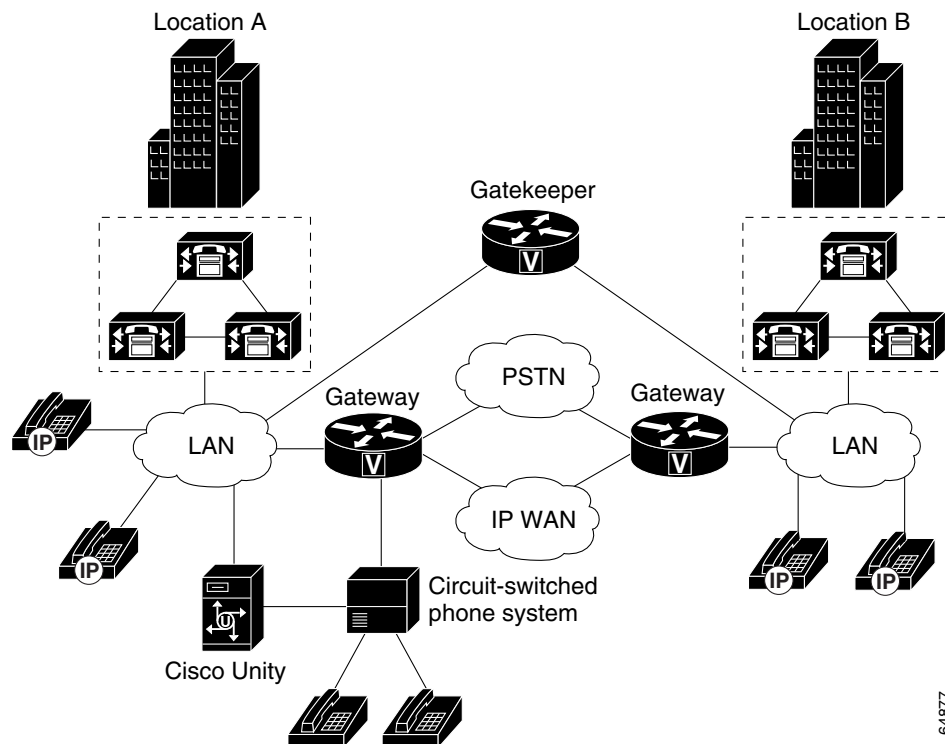
Cisco Unity can integrate simultaneously with a circuit-switched phone system through voice cards and with Cisco Unified CM. The maximum number of simultaneous integrations depends on the version of Cisco Unity. For details, refer to the applicable *Multiple Phone System Integration Guide* at http://www.cisco.com/en/US/products/sw/voicesw/ps2237/products_installation_and_configuration_guides_list.html.

The circuit-switched phone system communicates through the following methods:

- With the PSTN through an H.323 voice gateway
- With the Cisco Unity server through the cables attached from the voice ports on the phone system to the voice cards installed in the Cisco Unity server
- With the clusters through an H.323 voice gateway connected to the LAN

Figure 5 shows Cisco Unity integrated simultaneously with a circuit-switched phone system through voice cards and with two Cisco Unified CM clusters.

Figure 5 Cisco Unity Integrated with a Circuit-Switched Phone System Through Voice Cards and with Multiple Cisco Unified Communications Manager Clusters



Setup Requirements

The following components are necessary to integrate Cisco Unity with multiple Cisco Unified CM clusters:

- A circuit-switched phone system that is integrated through voice cards
- Cisco Unified CM servers configured as two or more clusters at one or more locations
- An H.323 voice gateway to connect the circuit-switched phone system and one cluster
- A network connection between the clusters
- A voice gateway for each cluster to connect to the IP WAN or PSTN
- An H.323 gatekeeper to provide call admission control
- Cisco Unity, set up and integrated with the clusters
- IP WAN

Additional Setup Information

For additional information about setting up Cisco Unity and integrating it with a circuit-switched phone system through voice cards, see the applicable Cisco Unity integration guide at http://www.cisco.com/en/US/products/sw/voicesw/ps2237/products_installation_and_configuration_guides_list.html.

Available Integration Functionality

The integration functionality that is available for a circuit-switched phone system integrated through voice cards can vary depending on the capabilities of the phone system. The integration functionality is generally the same whether within a single cluster or across multiple clusters. The integration functionality, however, depends on the following conditions:

- The circuit-switched phone system sends the call information (for example, caller ID) in a format that the H.323 voice gateway can interpret and use.
- The H.323 voice gateway is set up to send along the necessary call information in the format that the phone systems and Cisco Unity can correctly interpret and use.

When both conditions are met, the integration functionality for a circuit-switched phone system is generally available across multiple clusters.

When the conditions are not met or cannot be met, some integration functionality for a circuit-switched phone system is not available across multiple clusters.

Table 2 lists the integration functionality that may be available. The notes that follow the table provide additional information about the availability of the integration functionality.

Table 2 Available Integration Functionality for a Circuit-Switched Phone System Integrated Through Voice Cards

| Integration Feature | Calls Within a Single Cluster | Calls Between Clusters |
|-----------------------------------|-------------------------------|------------------------|
| Basic | | |
| Release transfer | Yes | Yes |
| Busy greeting | Yes | Yes |
| Call forward to personal greeting | Yes | Yes |
| Caller ID for internal calls | Yes | Yes (See note 1) |
| Caller ID for external calls | Yes | Yes (See note 1) |
| Easy message access | Yes | Yes |
| Identified subscriber messaging | Yes | Yes (See note 2) |
| Supervised Transfer | | |
| Supervised transfer | Yes | Yes |
| Automated attendant transfer | Yes | Yes |
| Call holding | Yes | Yes |
| Call screening | Yes | Yes |
| Notification and Dial-out | | |
| Message waiting indication (MWI) | Yes | Yes (See note 3) |

Table 2 Available Integration Functionality for a Circuit-Switched Phone System Integrated Through Voice Cards (continued)

| Integration Feature | Calls Within a Single Cluster | Calls Between Clusters |
|---------------------------------------|-------------------------------|------------------------|
| Message delivery | Yes | Yes |
| Pager dial-outs (with “comma” pauses) | Yes | Yes |
| TRAP dial-outs | Yes | Yes |
| User Interface | | |
| Live record (via phone) | Yes (See note 4) | Yes (See note 4) |
| Volume on playback | Yes | Yes |
| G.729a support in wave driver | Yes | Yes |

Note 1

Caller ID works in all cases, except possibly when a caller dials into Cisco Unity in one cluster (for example, to use the directory) and is transferred to an extension in another cluster. In this case, the circuit-switched phone system may pass along as Caller ID the extension of the voice messaging port through which the call was transferred, not the Caller ID of the actual caller. If the extension does not answer the call and the caller records a voice message, the sender is unknown.

Note 2

A subscriber homed on the Cisco Unity server at location A cannot log on to a another Cisco Unity server at location B. If the subscriber is temporarily at location B and wants to receive voice messages, the subscriber must dial the pilot number of the Cisco Unity server at location A to log on.

Integrations through voice cards do not support the cross-server logon feature.

Note 3

For Cisco Unity 4.0 and 4.1 only, Cisco Unity must have a voice messaging port dedicated to set MWIs for each Cisco Unified CM cluster. For example, if there are three clusters, three voice messaging ports are dedicated to set MWIs, one for each cluster. For details, refer to the procedure “To set up MWI ports for multiple clusters of Cisco CallManager” in the applicable Cisco Unity integration guide at http://www.cisco.com/en/US/products/sw/voicesw/ps2237/products_installation_and_configuration_guides_list.html.

Note 4

The live record feature is available with Cisco Unity 4.0(5) or later. For details, see the Cisco Unity Tools website at http://www.ciscounitytools.com/App_LiveRecord_405.htm.

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