

% 5.0 Describe and Configure a Multi-site Dial Plan for Cisco Unified Communications Manager

5.1 Describe the issues with multi-site dial plans

Overlapping numbers: Users located at different sites can have the same directory numbers assigned. Because directory numbers usually are unique only within a site, a multisite deployment requires a solution for overlapping numbers.

Nonconsecutive numbers: Contiguous ranges of numbers are important to summarize call-routing information, analogous to contiguous IP address ranges for route summarization. Such blocks can be represented by one or a few entries in a call-routing table, such as route patterns, dial peer destination patterns, and voice translation rules, which keep the routing table short and simple. If each endpoint requires its own entry in the call-routing table, the table gets too big, lots of memory is required, and lookups take more time. Therefore, nonconsecutive numbers at any site are not optimal for [efficient call routing](#).

Variable-length numbering: Some countries, such as the U.S. and Canada, have fixed-length numbering plans for PSTN numbers. Others, such as Mexico and England, have variable-length numbering plans. A problem with variable-length numbers is that the complete length of the number dialed can be determined only by the CUCM route plan by waiting for the interdigit timeout.

Waiting for the interdigit timeout, known as the T.302 timer, adds to the post-dial delay, which may annoy users.

5.2 Describe the differences between the various gateways and trunk types supported by Cisco Unified Communication Manager

Cisco Analog Gateways

There are two categories of Cisco analog gateways, station gateways and trunk gateways.

- Analog station gateways

Analog station gateways connect Unified CM to Plain Old Telephone Service (POTS) analog telephones, interactive voice response (IVR) systems, fax machines, and voice mail systems. Station gateways provide Foreign Exchange Station (FXS) ports.

- Analog trunk gateways

Analog trunk gateways connect Unified CM to PSTN central office (CO) or PBX trunks. Analog trunk gateways provide Foreign Exchange Office (FXO) ports for access to the PSTN, PBXs, or key systems, and E&M (receive and transmit, or ear and mouth) ports for analog trunk connection to a legacy PBX. Analog Direct Inward Dialing (DID) and Centralized Automatic Message Accounting (CAMA) are also available for PSTN connectivity.

Cisco analog gateways are available on the following products and series:

- Cisco Voice Gateways VG204, VG224, and VG350
- Cisco Integrated Services Routers Generation 2 (ISR G2) 1900, 2900, 3900, and 4000 Series with appropriate PVDMs and service modules or cards

Cisco Digital Trunk Gateways

A Cisco digital trunk gateway connects Unified CM to the PSTN or to a PBX via digital trunks such as Primary Rate Interface (PRI), Basic Rate Interface (BRI), serial interfaces (V.35, RS-449, and EIA-530), or T1 Channel Associated Signaling (CAS). Digital T1 PRI and BRI trunks can be used for both video and audio-only calls.

Cisco digital trunk gateways are available on the following products and series:

- Cisco Integrated Services Routers Generation 2 (ISR G2) 1900, 2900, 3900, and 4000 Series with appropriate PVDMs and service modules or cards
- Cisco TelePresence ISDN GW 3241 and MSE 8321
- Cisco TelePresence Serial GW 3340 and MSE 8330

Cisco TelePresence ISDN Link

The Cisco TelePresence ISDN Link is a compact appliance for in-room ISDN and external network connectivity supporting Cisco TelePresence EX, MX, SX, and C Series endpoints. While traditional voice and video gateways are shared resources that provide connectivity between the IP network and the PSTN for many endpoints, each Cisco

ISDN Link is paired with a single Cisco endpoint. For more information, refer to Cisco TelePresence ISDN Link documentation available at

http://www.cisco.com/en/US/products/ps12504/tsd_products_support_series_home.html

5.3 Implement trunks to VCS

Configuration summary

The configuration on Unified CM contains the following tasks:

- Configuring the SIP Profile for Expressway (already exists if using version 9.x)
- Configuring the region with an appropriate session bit rate for video calls
- Configuring a SIP Profile for phone devices
- Adding a phone device: add the new phone device to the list of supported endpoints on Unified CM
- Configuring the device directory number: specify the telephone number that will cause this phone to ring
- Configuring the SIP Trunk security profile
- Configuring the SIP Trunk device
- Configuring the Cluster Fully Qualified Domain Name
- Allowing numeric dialing from Cisco phones to Expressway
- Allowing dialing to Expressway domain from Cisco phones
- Checking the message size limit on Unified CM

These tasks are explained in detail below.

5.4 Describe globalized call routing based on URI dial plans and ILS

Global Dial Plan Replication (GDPR) uses the Intercluster Lookup Service (ILS) to share dial plan information between participating ILS-enabled clusters. GDPR allows each cluster to distribute information about its associated URIs, +E.164 numbers, enterprise numbers, +E.164 patterns, enterprise patterns, and PSTN failover numbers. Each participating cluster shares a common Global Dial Plan catalogue, which contains every number and URI advertised with GDPR and a corresponding route string that identifies in which cluster (or end Unified Communications system) the number or URI resides.

With GDPR, each cluster advertises its dial plan information (numbers and URIs) with a location attribute, known as a *route string*. When a call is placed to a number or URI, Unified CM checks to see whether the number or URI is associated to a device within the cluster. If it is not, Unified CM searches its GDPR catalogue for the number or URI.

If a match is found in the Global Dial Plan catalogue, GDPR returns the route string that corresponds to the cluster where the number or URI resides. Unified CM uses the returned route string as a candidate to match to an existing SIP route pattern and corresponding SIP trunk.

Benefits of ILS and GDPR

Using GDPR is significantly different from using a standard dial plan with numeric route patterns. Instead of requiring a route pattern for each unique number range within the Unified Communications network, GDPR distributes the numbers, number patterns, and URIs, and only a single SIP route pattern is required for each cluster within the Unified Communications network. Numbers and URIs associated with third-party unified communications systems (and Unified CM clusters that do not support ILS and GDPR) can be imported as catalogues into GDPR and distributed through ILS with a route string that corresponds to each unified communications system. Because both individual numbers and route patterns corresponding to groups of numbers can be advertised with GDPR, this abstraction of numbers and number ranges away from numeric route patterns allows GDPR to simply and easily support highly fragmented dial plans with many number ranges. Each cluster using ILS and GDPR can block and purge individual numbers and number ranges advertised from other participating clusters.

Each GDPR number type (+E.164 number, enterprise number, +E.164 pattern, or enterprise pattern) is placed into a specific partition when learned through ILS, allowing per-user or per-device class of service to be applied based on number type partitions and calling search spaces.

Cisco Unified Border Element also supports number and URI call routing using dial peers that match on a GDPR route string value, which is sent to Cisco Unified Border Element during call setup over a Unified CM SIP trunk. GDPR route string matching with Cisco IOS dial peers is supported with Cisco IOS releases 15.3(3)M, 15.4(1)T (ISR), 15.3(3)S (ASR), and later releases.

5.5 Implement a numbering plan for multi-site topologies