



Cisco HCS Basic Call Flow Overview

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Intrasite Call Between Cisco Unified IP Phones

Within a site, users can make calls to their neighbors by using only the extension part of their directory number. Although the lines are registered with SLC + extension number (or simply extension in case of flat dial plan),

when the user dials only a subset of this length of digits (extension), the dial plan treats the call as an intrasite call, and prefixes the called number with the SLC to route the call. The calling party display is SLC+Extension or simply extension in the case of flat dial plan.

Intrasite calls are made by dialing only the extension of the other phone. For Intrasite call routing, the signaling stays within the Unified Communications Manager cluster. Media flows directly between the two Cisco Unified IP Phones.

Figure 1: Intrasite Calling



Intersite Call Between Cisco Unified IP Phones

Cisco HCS supports multiple sites with overlapping extensions and intersite calling by dialing the site location codes, and supports the following dialing capabilities:

- Variable length extensions between sites with no postdialing delay (PDD) caused by timeout (that is, there should be a positive translation pattern match on a given extension length per site so that the call completes without delay).
- Intersite dialing should be provided between Unified Communications Manager controlled Unified IP Phones, Cisco TDM PBX controlled phones, and Cisco Unified Communications Manager Enterprise (CME)/UC500 controlled phones.

Intrasite calls are made by dialing <Site Location Code><Extension> or simply the extension in case of flat dial plan. When the user dials a directory number of another user, the leaf cluster first examines the site code,

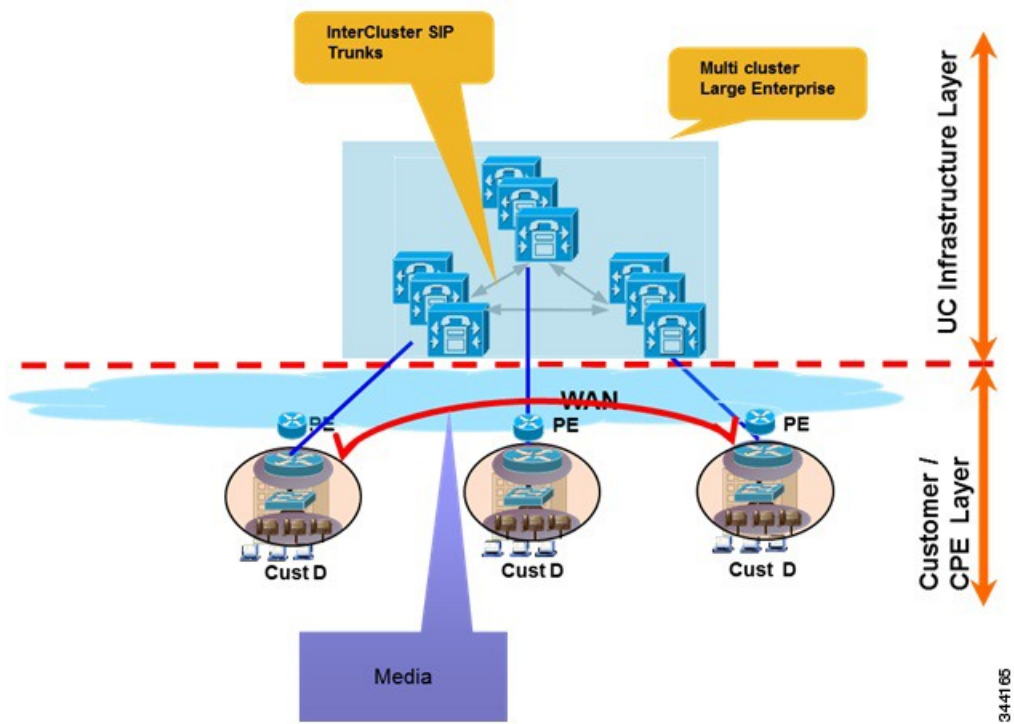
and determines if the site code is for a site on the same cluster or another cluster. If the site is on the same cluster, the call is routed to the correct location and delivered to the phone.

Figure 2: Intersite/Intracuster Calling



If the internal DN is for a site on a different cluster, the call is routed to the correct cluster over Intercluster Trunk (ICT).

Figure 3: Intercluster Calling



Intrasite and Intersite Call Between IP Phones (Flat Dial Plan)

When a user dials an Intrasite or an Intersite number in the same cluster, the dialed digits match the extension (same as internal DN) defined in the InterSiteRoutingPT. These extensions are added to the InterSiteRoutingPT when the extensions (phones) are registered.

Table 1: Intersite Call Routing

Unified Communications Manager Data Element	Unified Communications Manager Data Element Value	Unified Communications Domain Manager Transaction	Description
Line CSS DN=2221111 Dials 3331234	Local24HrsEnh-CSS<site id>	AddLocation	CSS based on the Class of Service assigned to the Line/DN
Partition	InterSiteRoutingPT	InitIPPBX	Partition where DN and devices are associated

For the Shared Instance (G3) Dial Plan, internal calls are routed based on the Line CSS which contains the customer-specific site partition. All the DNs for a customer reside in this partition.

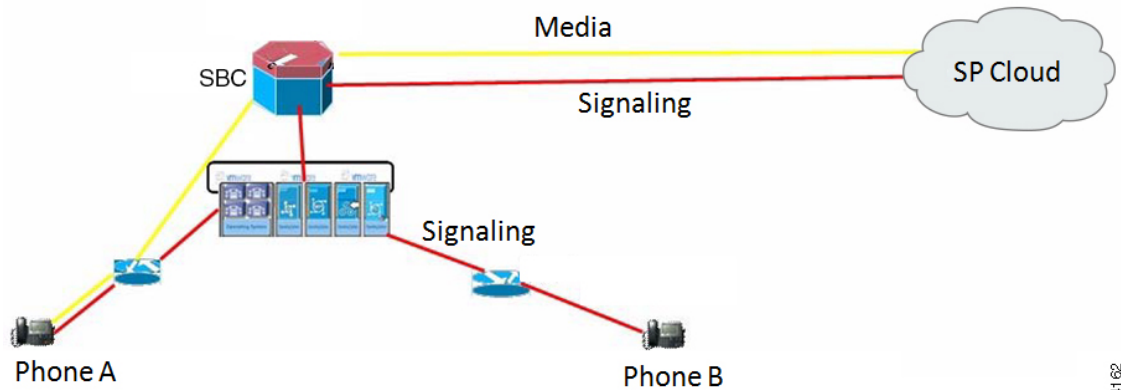
Table 2: Extension Dialing for G3 Dial Plan

Calling Search Space	Partition	Transaction	Description
Line CSS	Site	AddCustomer	Internal DNs for a customer are provisioned in the customer-specific "Site" partition. The Site partition is created by the "AddCustomer" transaction. Each line-specific CSS contains the customer-specific Site partition which allows for extension dialing within a customer.

Incoming Call to and from Aggregation to a Cisco Unified IP Phone

When an aggregation layer is used to route a call, it is also referred to as Central Breakout (CBO). CBO provides centralized trunks toward the aggregation device. In the following figure, the aggregation layer comprises only a Session Border Controller (SBC).

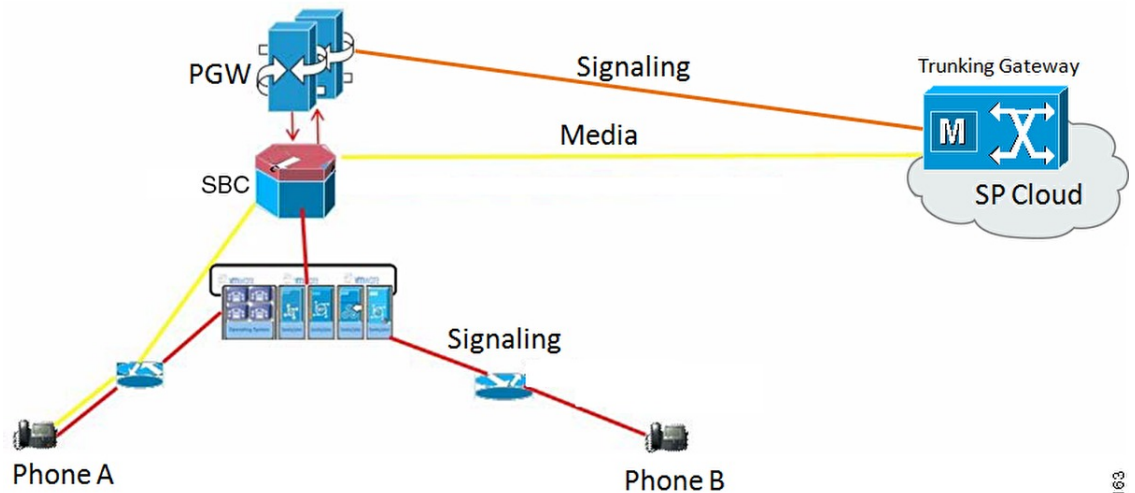
Figure 4: SBC Aggregation Layer



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In the following figure, the aggregation layer comprises SBC and Cisco PGW or Cisco vPGW. The interconnection to PSTN can be a SIP trunk toward the PSTN or TDM trunks toward the PSTN.

Figure 5: SBC and Cisco PGW/vPGW Aggregation Layer

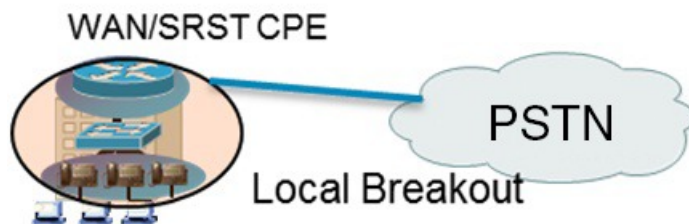


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Local Breakout

In addition to centralized breakout using the aggregation layer, customers can also connect to PSTN through a local gateway. This local gateway is also referred to as Local Breakout (LBO). For LBO, each site or location requiring LBO is equipped with a local gateway. When a local gateway is added to a location, the administrator defines the call types that can be routed through the local gateway. For example, you can select national calls to be routed through the local gateway. By default if the call type is not selected to be routed by local gateway, the call is routed by CBO.

Figure 6: Local Breakout



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Cisco HCS Detailed Call Routing

To understand the Cisco HCS Dial Plan Model, you must understand call routing in terms of the data flow within the Cisco Unified Communications Manager. Several call types are used as examples to understand the Cisco HCS call routing architecture.

Cisco Unified Communications Domain Manager architecture uses class of service to assign calling restrictions to an end user. The class of service is mapped by Cisco HCS Dial Plan Model to a calling search space and partitions that are understood by Cisco Unified Communications Manager. The following class of service/calling search spaces are supported by Cisco HCS:

Note The following table is based on Cisco HCS Software Release 8.6(2) and may not include all Calling search spaces. Refer to the latest Dial Plan model for a complete list of available CSSs.

Table 3: Class of Service/Calling Search Spaces Supported by Cisco HCS

Class of Service	Calling Search Space	Description
TempOutOfService	TempOutOfService-CSS	Temporary out of service class of service <ul style="list-style-type: none"> • Only allows emergency dialing
International24Hrs-Enhanced	Intl24HrsEnh-CSS	International 24 hours enhanced <ul style="list-style-type: none"> • No restrictions

Class of Service	Calling Search Space	Description
International24Hrs-Standard	Intl24HrsStd-CSS	International 24 hours standard. Following calls are blocked: <ul style="list-style-type: none"> • Premium rate calls personal • Personal Communication Service (PCS) calls
InternationalWrkHrs-Enhanced	IntlWrkHrsEnh-CSS	International working hours enhanced. There are no restrictions during working hours
InternationalWrkHrs-Standard	IntlWrkHrsStd-CSS	International working hours standard. Following calls are blocked during working hours: <ul style="list-style-type: none"> • Premium rate calls personal • Personal Communication Service (PCS) calls
National24Hrs-Enhanced	Natl24HrsEnh-CSS	National 24 hours enhanced. International calls are blocked.
National24Hrs-Standard	Natl24HrsStd-CSS	National 24 hours standard. Following calls are blocked: <ul style="list-style-type: none"> • Premium rate calls • Personal Communication Service (PCS) calls • International calls
National24Hrs-Restricted	Natl24HrsRst-CSS	National 24 hours restricted. Following calls are blocked: <ul style="list-style-type: none"> • Premium rate calls • Personal Communication Service (PCS) calls • International calls, Mobile calls
NationalWrkHrs-Enhanced	NatlWrkHrsEnh-CSS	National working hours enhanced. International calls are blocked during working hours.

Class of Service	Calling Search Space	Description
NationalWrkHrs-Standard	NatlWrkHrsStd-CSS	National working hours standard. Following calls are blocked during working hours: <ul style="list-style-type: none"> • Premium Rate Calls Personal • Personal Communication Service (PCS) calls • International calls
NationalWrkHrs-Restricted	NatlWrkHrsRst-CSS	National working hours restricted. Following calls are blocked during working hours: <ul style="list-style-type: none"> • Premium rate calls • Personal Communication Service (PCS) calls • International calls, Mobile calls
Local24Hrs-Enhanced	Local24HrsEnh-CSS	Local 24 hours enhanced. Following calls are blocked: <ul style="list-style-type: none"> • Premium rate calls personal • Personal Communication Service (PCS) calls • International calls • Mobile calls • National calls
Internal Only	Internal-CSS	Internal Only. Only on-net calls are allowed.
Internal CLIR	InternalCLIR-CSS	Internal calls with Calling Line Identification Restriction. Only on-net calls with CLIR are allowed.
NationalWrkHrs-Enhanced	NatlWrkHrsEnh-CSS	National working hours enhanced. International calls are blocked during working hours.
CF-National24Hrs-Standard	Natl24HrsStd-CSS	National 24 hours standard with Call Forwarding. Following calls are blocked: <ul style="list-style-type: none"> • Premium rate calls • Personal Communication Service (PCS) calls • International calls

Class of Service	Calling Search Space	Description
CF-National24Hrs-Restricted	Natl24HrsRst-CSS	National 24 hours restricted with Call Forwarding. Following calls are blocked: <ul style="list-style-type: none"> • Premium rate calls • Personal Communication Service (PCS) calls • International calls, Mobile calls
CF-BlockAll	BlockAllCF-CSS	Block All Call Forwarded
Voicemail	Voicemail-CSS	Voicemail
AnalogGWCSS	AnalogGWCSS	Analog Gateway calling search space
National24Hrs-Standard-wCC	Natl24HrsStdwCC-CSS	National 24 hours standard with Unified Contact Center Enterprise. Following calls are blocked: <ul style="list-style-type: none"> • Premium rate calls • Personal Communication Service (PCS) calls • International calls
UCCE	UCCE	Unified Contact Center Enterprise calls
CLIRInternational24Hrs-Enhanced	CLIRIntl24Hrs-Enh-CSS	International 24 hours enhanced with Calling Line Identification Restriction. There are no restrictions.
CLIRInternational24Hrs-Standard	CLIRIntl24Hrs-Std-CSS	International 24 hours standard with Calling Line Identification Restriction. Following calls are blocked: <ul style="list-style-type: none"> • Premium rate calls personal • Personal Communication Service (PCS) calls
CLIRNational24Hrs-Enhanced	CLIRNatl24Hrs-Enh-CSS	National 24 hours enhanced with Calling Line Identification Restriction. International calls are blocked.

Class of Service	Calling Search Space	Description
CLIRNational24Hrs-Standard	CLIRNatl24Hrs-Std-CSS	National 24 hours standard with Calling Line Identification Restriction. Following calls are blocked: <ul style="list-style-type: none"> • Premium rate calls • Personal Communication Service (PCS) calls • International calls
CLIRNational24Hrs-Restricted	CLIRNatl24Hrs-Rst-CSS	National 24 hours restricted with Calling Line Identification Restriction. Following calls are blocked: <ul style="list-style-type: none"> • Premium rate calls • Personal Communication Service (PCS) calls • International calls, Mobile calls
CLIRInternationalWrkHrs-Enhanced	CLIRIntlwrkHrs-Enh-CSS	International working hours enhanced with Calling Line Identification Restriction. There are no restrictions during working hours.
CLIRInternationalWrkHrs-Standard	CLIRIntlwrkHrs-Std-CSS	International working hours standard with Calling Line Identification Restriction. Following are blocked during working hours: <ul style="list-style-type: none"> • Premium rate calls personal • Personal Communication Service (PCS) calls
CLIRNationalWrkHrs-Enhanced	CLIRNatlwrkHrs-Enh-CSS	National working hours enhanced with Calling Line Identification Restriction. International calls are blocked during working hours.
CLIRNationalWrkHrs-Standard	CLIRNatlwrkHrs-Std-CSS	National working hours Standard with Calling Line Identification restriction. Following are blocked during working hours: <ul style="list-style-type: none"> • Premium Rate Calls Personal • Personal Communication Service (PCS) calls • International calls

Class of Service	Calling Search Space	Description
CLIRNationalWrkHrs-Restricted	CLIRNatlwrkHrs-Rst-CSS	National working hours restricted with Calling Line Identification Restriction. Following are restricted during working hours: <ul style="list-style-type: none"> • Premium rate calls • Personal Communication Service (PCS) calls • International calls, Mobile calls
International24Hrs-FAC	Intl24HrsFAC-CSS	International 24 hours with Forced Authorization Codes
National24Hrs-FAC	Natl24HrsFAC-CSS	National 24 hours with Forced Authorization Codes

The following table lists the partitions supported by the Cisco HCS Dial Plan Model:

Note The following table is based on HCS Software Release 8.6(2) and may not include all partitions. Refer to the latest dial plan model for a complete list of available partitions.

Table 4: Cisco HCS Supported Partitions

Partition	Transaction	Description
E.164LookUp	InitIPPBX	Plus* E.164 DID to DN partition
FMCLookUp	InitIPPBX	Plus* E.164 FMC to DN
InterSiteRoutingPT	InitIPPBX	InterSiteRouting partition - For customer that owns the cluster
NullPartition	InitIPPBX	Null Partition
IncomingFromCisco Unity	InitIPPBX	Partition to handle incoming calls from Cisco Unity
RouteSelPT-#COUNTRY#	AddProviderCountryIPPBXs	Country specific - PSTN Route Selection Partition
BlkIntl-#COUNTRY#	AddProviderCountryIPPBXs	Blocking Partitions - International Calls
BlkNatl-#COUNTRY#	AddProviderCountryIPPBXs	Blocking Partitions - National Calls
BlkMobl-#COUNTRY#	AddProviderCountryIPPBXs	Blocking Partitions - Mobile Calls
BlkPRS-#COUNTRY#	AddProviderCountryIPPBXs	Blocking Partitions - Premium Rate Service

Partition	Transaction	Description
BlkFPH-#COUNTRY#	AddProviderCountryIPPBXs	Blocking Partitions - Freephone
BlkPCS-#COUNTRY#	AddProviderCountryIPPBXs	Blocking Partitions - Personal Communication Service (PCS)
BlkSVC-#COUNTRY#	AddProviderCountryIPPBXs	Blocking Partitions - Service Calls except Emergency
BlkSPR-#COUNTRY#	AddProviderCountryIPPBXs	Blocking Partitions - Special Rate
AllowIntl24Hr-#COUNTRY#	AddProviderCountryIPPBXs	Partition for Handling International Dialing
AllowMobl24Hr-#COUNTRY#	AddProviderCountryIPPBXs	Partition for Handling Mobile Calls
AllowNatl24Hr-#COUNTRY#	AddProviderCountryIPPBXs	Partition for Handling National Dialing except for Emergency
AllowSVC24Hr-#COUNTRY#	AddProviderCountryIPPBXs	Partition for Service Calls - for example 100 123 1471 except for Emergency
AllowIntlStd-#COUNTRY#	AddProviderCountryIPPBXs	Partition for Handling International Dialing
AllowMoblStd-#COUNTRY#	AddProviderCountryIPPBXs	Partition for Handling Mobile Calls
AllowNatlStd-#COUNTRY#	AddProviderCountryIPPBXs	Partition for Handling National Dialing except for Emergency
AllowSVCStd-#COUNTRY#	AddProviderCountryIPPBXs	Partition for Service Calls - for example 100 123 1471 except for Emergency
SNRRRPT	AddSNR	SNR Feature
AllowEmerCalls	AddLocation§	Allow emergency calls
EmerCalls	AddLocation§	Emergency calls Partition for a route pattern to handle +02 calls
AllowInternal	AddLocation§	Allow Internal Dialing
InternalCallsCLIR	AddLocation§	Allow Internal Dialing with CLIR
Site	AddLocation§	Site Partition where all the devices within a site are registered
OutOfService	AddLocation§	Out Of Service
AllowLocal24Hr-#COUNTRY#	AddLocation§	Allow Local Dialing

Partition	Transaction	Description
AllowLLBO24Hr-#COUNTRY#	AddLocation§	Allow Local Dialing through Local Breakout (LBO)
AllowILBO24Hr-#COUNTRY#	AddLocation§	Allow International Dialing through LBO
AllowMLBO24Hr-#COUNTRY#	AddLocation§	Allow Mobile Dialing through LBO
AllowNLBO24Hr-#COUNTRY#	AddLocation§	Allow National Dialing through LBO
AllowSLBO24Hr-#COUNTRY#	AddLocation§	Allow Service Calls through LBO
AllowLocalStd-#COUNTRY#	AddLocation§	Allow Local Dialing
AllowLLBOStd-#COUNTRY#	AddLocation§	Allow Local Dialing through LBO
AllowILBOStd-#COUNTRY#	AddLocation§	Allow International Dialing through LBO
AllowMLBOStd-#COUNTRY#	AddLocation§	Allow Mobile Dialing through LBO
AllowNLBOStd-#COUNTRY#	AddLocation§	Allow National Dialing through LBO
AllowSLBOStd-#COUNTRY#	AddLocation§	Allow Service Calls through LBO
AllowVMCalls	AddLocation§	Common for all voice mail services - partitions
RouteSelPT-LBO	AddLocationLocalGateway	PSTN Route Selection Partition through LBO
AddPlus	AddLocationLocalGateway	Add International Escape character (+)
PlusIntl24Hrs-Enh#COUNTRY#	AddLocation§	Plus Dialing* for International Calls
PlusIntl24Hrs-Std#COUNTRY#	AddLocation§	Plus Dialing* for International Calls
PlusNatl24Hrs-Enh#COUNTRY#	AddLocation§	Plus Dialing* for National Calls
PlusNatl24Hrs-Std#COUNTRY#	AddLocation§	Plus Dialing* for National Calls
PlusNatl24Hrs-Rst#COUNTRY#	AddLocation§	Plus Dialing* for National Calls
PlusIntlWrkHrs-Enh#COUNTRY#	AddLocation§	Plus Dialing* for International Calls
PlusIntlWrkHrs-Std#COUNTRY#	AddLocation§	Plus Dialing* for International Calls
PlusNatlWrkHrs-Enh#COUNTRY#	AddLocation§	Plus Dialing* for National Calls
PlusNatlWrkHrs-Std#COUNTRY#	AddLocation§	Plus Dialing* for National Calls
PlusNatlWrkHrs-Rst#COUNTRY#	AddLocation§	Plus Dialing* for National Calls

Partition	Transaction	Description
CustSC-RLSel-PT	InitIPPBX	Partition for Handling Short Code Routing - Customer Level (for example DP customization)
CustSCode24Hrs-PT	AddCustomer	Partition for Handling Short Code Dialing - Customer Level (for example DP customization)
CustSCodeWrkHrs-PT	AddCustomer	Partition for Handling Short Code Dialing - Location Level (for example DP customization)
LocSCode24Hrs-PT	AddLocation§	Partition for Handling Short Code Dialing - Location Level (for example DP customization)
LocSCodeWrkHrs-PT	AddLocation§	Partition for Handling Short Code Dialing - Location Level (for example DP customization)
BlockAllCF-CSS	AddLocation§	Call Forwarding CSS to disallow Call Forwarding
CPUG-CSS	AddLocation§	CSS used for Call Pickup Group feature
IMSClientDevRouting-CSS**	AddLocation§	CSS used to route PSTN calls received over inbound trunks from IMS networks
IMSClientDevice-CSS**	AddLocation§	CSS associated to the inbound trunk from IMS networks
<p>* Plus dialing uses the international prefix symbol (+) to indicate that the dialed number is a complete international number and treats the number the same no matter what country you are in when you dial the number.</p> <p>** IMS is not available to Shared Instance Dial Plan (G3) subscribers.</p> <p>§All partitions that are created using the AddLocation transaction are appended with the Location ID. Location ID is an internal number generated by Cisco Unified Communications Domain Manager.</p>		

Intrasite Call Between Unified IP Phones

When a user dials an extension within the site, the dialed digits match the intrasite translation pattern. Cisco Unified Communications Manager prefixes SLC to the dialed digits converting it to a DN and routes the call to IncomingToSite-CSS. The following calling search spaces and partitions are involved in the call:



Note The following table applies to the Generic Dial Plan (G1) only.

Table 5: Intrasite Call Routing

Unified CM Data Element	Unified CM Data Element	Unified CM Data Element Value	Description
Line CSS SLC=822, DN=8221111 dials 1234	Local24HrsEnh-CSS<siteid>	AddLocation	CSS based on the Class of Service assigned to the line or DN. <site id> is assigned by Unified Communications Domain Manager
Partition	AllowInternal<siteid>	AddLocation	Partition that contains translation pattern to handle intrasite calls from the line
Translation Pattern	IntraSite<siteid>=[^#FIRSTSLCDIGIT##EXT#]#SITEMASKMINUSONE# TP=[^89]xxxpxfx=822 SLC,after prefixing SLC, called # = 8221234 calling # = 8221111	AddLocation	Translation pattern for intrasite calls. Cisco Unified Communications Manager prefixes dialed number with SLC and re-routes the call to the IncomingToSite CSS Prefix #SITECODE##SITE MASK# to Called Number
CSS	IncomingToSite-CSS<siteid>	AddLocation	CSS that contains the partition where all devices are configured
Partition	Site<siteid> called # = 8221234	AddLocation	Site partition where DN and devices are associated

Intersite Call Between Unified IP Phones Within the Same Cluster

When a user dials an intersite number that is in the same cluster, the dialed digits match the intersite translation pattern. The call is then routed to IncomingToSite-CSS based on the dialed SLC. The following calling search spaces and partitions are involved in the call:



Note The following table applies to the Generic Dial Plan (G1) only.

Table 6: Intersite Call Routing

Unified CM Data Element	Unified CM Data Element Value	Unified Communications Domain Manager Transaction	Description
Line CSS SLC=822, DN=8221111 dials 8331234	Local24HrsEnh-CSS<site id>	AddLocation	CSS based on the Class of Service assigned to the Line/DN.
Partition	InterSiteRoutingPT	InitIPPBX	Intersite routing partition that contains translation patterns to route call to the correct IncomingToSite CSS for directory number that resides in the same cluster as in this example and route patterns to route call to other clusters if the directory number is not local
Translation Pattern	InterSite<site id>= #SITECODE##SITEMASK# TP=822XXXX	AddLocation	Translation pattern for intrasite calls.
CSS	IncomingToSite-CSS<siteid>	AddLocation	CSS that contains the partition where all devices are configured
Partition	Site<siteid> called # = 8221234	AddLocation	Site partition where DN and devices are associated

Incoming PSTN Call from Aggregation to a Unified IP Phone

When an inbound PSTN call is received at the aggregation layer, the called number is converted to an E.164 format and sent to the Cisco Unified Communications Manager. Cisco Unified Communications Manager performs an E.164 to a DN lookup and converts the called number to an internal DN. The following calling search spaces and partitions are involved in the call:

Table 7: Inbound PSTN Call Through Aggregation

Unified CM Data Element	Unified CM Data Element Value	Unified Communications Domain Manager Transaction	Description
Trunk	Trunk	AddConnection	Generic SIP trunk feature

Unified CM Data Element	Unified CM Data Element Value	Unified Communications Domain Manager Transaction	Description
Trunk CSS Called # = +19722221111	IncomingFromAggreg	InitIPPBX	CSS associated with the aggregation layer trunk
Partition	E.164LookUp	InitIPPBX	Partition containing all the DID to DN mapping translation patterns.
Translation Pattern	DDI2DNMapping= \ + #COUNTRY##NATCODE##FNN# E.164= +19722221111 maps to DN=8221111	AssociateFNN	Translation pattern for DDI to DN mapping
CSS	InterSiteRouting-CSS	InitIPPBX	CSS containing intersite routing partition
Partition	InterSiteRoutingPT	InitIPPBX	Intersite routing partition that contains translation patterns to route call to the correct IncomingToSite CSS for directory number that resides in the same cluster as in this example and route patterns to route call to otherclusters if the directory number is not local
Translation Pattern	InterSite<site id>= #SITECODE##SITEMASK# TP=822xxxx TP=833xxxx	AddLocation	Translation pattern for intersite calls
CSS	IncomingToSite-CSS<site id>	AddLocation	CSS that contains the partition where all devices are configured
Partition	Site<site id> DN=8221111 DN=8221234 calling #="+12123455555	AddLocation	Site partition where DN and devices are associated

Table 8: Inbound PSTN Call Through Aggregation (Shared Instance Dial Plan (G3) Model)

Unified CM Data Element	Unified CM Data Element Value	Unified Communications Domain Manager Transaction	Description
Trunk	IncomingFromAggreg	InitIPPBX	CSS associated with the aggregation layer trunk
Partition	E.164LookUp	InitIPPBX	All the +E.164 are provisioned in this global partition. This partition contains Translation Patterns that converts +E.164 numbers to internal DN. The Translation Pattern points to the per-customer InterSiteRoutingCSS.
CSS	InterSiteRoutingCSS	AddCustomer	Per-customer InterSiteRoutingCSS. The Translation Patterns in the e164Lookup partition points to this CSS as the next CSS. It contains the InterSiteRoutingPT partition which contains a wildcard (!) Translation Pattern pointing to IncomingToSite-CSS.
CSS	IncomingToSite-CSS	AddCustomer	Per-Customer IncomingToSite-CSS. Contains per-customer Site Partition.
Partition	Site	AddCustomer	The Site partition contains DN corresponding to the received +E.164 number.

Outbound PSTN Call Through Aggregation

Outbound PSTN calls are converted to E.164 format before routing them toward the aggregation layer.

The following calling search spaces and partitions are involved in the call:

**Note**

The default transformation CSS when using the ToAggregation trunk model type is the CallingT2AggregCSS.

Table 9: Outbound PSTN Call Through Aggregation

Unified CM Data Element	Unified CM Data Element Value	Unified Communications Domain Manager Transaction	Description
Line CSS SLC=822, CC=1, NATCODE=972, FN=2221111 dials 912123455555	Intl24HrsEnh-CSS<site id>	AddLocation	CSS based on the Class of Service assigned to the Line or DN (see Note below)
Partition	AllowNat124Hr-#COUNTRY# AllowNat124Hr-1	AddCountry	Partition containing translation patterns
Translation Pattern	US-Allow-Nat124Hr= #EXT#.1[2-9]XX[2-9]XXXXXX TP=9.1[2-9]XX[2-9]XXXXXX remove 9 and prefix +Called #+=+12123455555 calling #+=+19722221111	AddCountry	Translation pattern for a national call in US. The national number is converted to an E.164 number
CSS	RouteSelCSS-#COUNTRY# RouteSelCSS-1	AddCountry	Country-specific PSTN route selection CSS
Partition	RouteSelPT-#COUNTRY# RouteSelPT-1	AddCountry	Partition containing a route pattern for a national call
Route Pattern	Nat1Call-#COUNTRY#=\+#COUNTRY#. Nat1Call-1RP: \+1.!	AddConnection	Per-country route pattern for a national call. Example for a national call in United States
Route List	PSTNNAT#COUNTRY# PSTNNAT1	AddConnection	Per-country route list for a national call
Route Group	RG-AGGR	AddConnection	Route group toward aggregation for a national call
Trunk	Trunk Called #+=+12123455555 calling #+=+19722221111	AddConnection	Trunk toward aggregation for a national call

**Note**

When all phones have DID numbers at a customer location, but you want only the main number for the location to show when an outbound call is made, you can map a DN to DID in one of two ways: 1) use the External Calling Phone Mask and ensure that the route pattern is provisioned through GSIP with Use External Phone Mask, or 2) configure the Calling Transformation CSS on the trunk. Make sure that you use either External Calling Phone Mask, or Calling Transformation CSS, but not both. If both are set, the Calling Transformation CSS takes precedence. Also, note that if you are using External Calling Phone Mask and it is not using Plus E.164 numbers, make sure the cluster is not supporting multicountry locations (in other words, all locations must be in the same country) or you will experience problems with Call Forward.

**Note**

For customer-to-customer calls within the same cluster using the Shared Instance Dial Plan (G3): Even if two customers are on the same cluster, the routing requirements are that the calls from one customer should be routed to aggregation toward the PSTN, and then the calls should be routed back as inbound PSTN calls.

Outbound Service Call Through Aggregation

Outbound service calls are prefixed with +01#COUNTRY# before routing it toward the aggregation layer. The prefix +01 identifies the call as a service call to the routing logic. The prefixed digits +01#COUNTRY# are removed at the aggregation layer and the call is routed toward PSTN as dialed. The following calling search spaces and partitions are involved in the call:

Table 10: Outbound Service Call Through Aggregation

Cisco Unified Communications Manager Data Element	Cisco Unified Communications Manager Data Element Value	Unified Communications Domain Manager Transaction	Description
Line CSS SLC=822, NATCODE=972 dials 9611	Intl24HrsEnh-CSS<site id>	AddLocation	CSS containing intersite routing partition (see Note in Outbound PSTN Call Through Aggregation , on page 18)
Partition	AllowSVCStd-#COUNTRY# AllowSVCstd-1	AddCountry	Partition containing translation patterns
Translation Pattern	US-Allow-SVCStd1#EXT#[2-8]11 Remove Predot and Prefix+011 TP=9.[2-8]11 Called #+=+011611	AddCountry	Translation pattern for a service call in United States. The dialed number is prefixed with +011
CSS	RouteSelCSS-#COUNTRY# RouteSelCSS-1	AddCountry	Country-specific PSTN route selection CSS

Cisco Unified Communications Manager Data Element	Cisco Unified Communications Manager Data Element Value	Unified Communications Domain Manager Transaction	Description
Partition	RouteSelPT-#COUNTRY# RouteSelPT-1	AddCountry	Partition containing a route pattern for a service call
Route Pattern	SERVICE#COUNTRY#= \+01#COUNTRY#! RP=\+011!	AddConnection	Route pattern for a service call
Route List	SERVICE#COUNTRY# SERVICE1	AddConnection	Route list for a service call
Route Group	RG-AGGR	AddConnection	Route group toward aggregation for a service call
Trunk	Trunk Called #+=+011611	AddConnection	Trunk toward aggregation for a service call. +011 is stripped off at aggregation.

Outbound Emergency Call Through Aggregation

The following call flow is to route an emergency call through aggregation. The table in this section is for the North American Dial Plan. Cisco Unified Communications Manager uses Device Calling Search Space instead of Line Calling Search Space to translate and route an emergency call. When the call matches the translation pattern for an emergency call, the routing logic prefixes the emergency number with +02#COUNTRY# digits. Prefix +02 identifies the call as an emergency call to the routing logic. Prefixed digits +02#COUNTRY# are removed at the aggregation layer.

The calling party number is prefixed with LRID. Before the call is routed, Cisco Unified Communications Manager checks if the calling party is within the home location or if the user is remotely logged in. If the caller dials an emergency call from the home location, then the caller's DID number is conveyed in the call. If the caller calls remotely, the site published number is conveyed in the call.

Table 11: Outbound Emergency Call Through Aggregation

Cisco Unified Communications Manager Data Element	Cisco Unified Communications Manager Data Element Value	Unified Communications Domain Manager Transaction	Description
Device CSS SLC=822, CC=1, NATCODE=972 FNN=2221111, dials 9911	EmergencyOnly-CSS<site id>	AddLocation	Device CSS. For emergency calls, Cisco Unified Communications Manager uses Device CSS and not Line CSS
Partition	AllowEmerCalls<site id>	AddLocation	Partition to route emergency calls
Translation Pattern	US-Allow-EmerCalls911<site id> Remove 9 and prefix +021 Called #+=+021911 Calling Party Prefix=*#LRID#	AddLocation	Translation pattern for an emergency call. The called # is prefixed with +02 and country code
CSS	EmergencyCalls-CSS<site id>	AddLocation	Emergency CSS to route emergency calls
Partition	EmerCalls<site id>	AddLocation	Partition pointing to a route pattern for emergency calls
Route Pattern	USEmerCalls911<site id>= \+021.911	AddConnection	Route pattern for an emergency call through aggregation
Route List	EMERGENCY#COUNTRY# EMERGENCY1	AddConnection	Route list for an emergency call through aggregation
Route Group	RG-AGGR	AddConnection	Route group for an emergency call through aggregation
Trunk	Trunk	AddConnection	Trunk toward aggregation
Trunk CSS	CallingT2AggregCSS	IntIPPBX	Calling party transformation CSS for an emergency call
Partition	CallingT4EmerCallPTC	IntIPPBX	Partition containing transformation pattern for an emergency call
Transformation Pattern	DN2DDI4EmerCallsP= *#LRID##SITECODE##EXTENSION#	AssociateFNN	Transformation pattern for an emergency call (see Note in Outbound PSTN Call Through Aggregation, on page 18)

Inbound Call From Local Gateway

When an inbound PSTN call is received at the local gateway, the called number is converted to an E.164 format and sent to the Cisco Unified Communications Manager. Cisco Unified Communications Manager performs an E.164 to DN lookup and converts the called number to an internal DN. The following calling search spaces and partitions are involved in the call:

Table 12: Inbound Call from Local Gateway

Unified CM Data Element	Unified CM Data Element Value	Unified Communications Domain Manager Transaction	Description
Called # = +19722221111	Local Gateway	AddLocationLocalGateway	When an inbound PSTN call is received at the local gateway, the called number is converted to E.164 and sent to the Cisco Unified Communications Manager.
Gateway CSS	IncomingFromLGW-CSS	AddLocationLocalGateway	CSS associated with the local gateway
Partition	AddPlus	AddLocationLocalGateway	Partition to convert called number to E.164 number
Translation Pattern	#EXT##NAT#!	AddLocationLocalGateway	Removes PSTN prefix and National Prefix and adds +CC to the called number. The call is rerouted using IncomingFromLGW-CSS.
Partition	E.164LookUp	InitIPPBX	Partition containing all the DID to DN mapping translation patterns. Another possibility is to have a per-country partition instead of a global partition
Translation Pattern	DDI2DNMapping= \ + #COUNTRY##NATCODE##FNN# E.164= +19722221111 maps to DN=8221111	AssociateFNN	Translation pattern for DDI to DN mapping
CSS	InterSiteRouting-CSS	InitIPPBX	CSS containing intersite routing partition

Unified CM Data Element	Unified CM Data Element Value	Unified Communications Domain Manager Transaction	Description
Partition	InterSiteRoutingPT	InitIPPBX	Partition containing all the DID-to-DN mapping translation patterns. Another possibility is to have a per-country partition instead of a global partition
Translation Pattern	InterSite<site id>= #SITECODE##SITEMASK# TP=822xxxx TP=833xxxx	AddLocation	Translation pattern for DDI-to-DN mapping
CSS	IncomingToSite-CSS<site id>	AddLocation	CSS containing intersite routing partition
Partition	Site<site id> DN=8221111 DN=8221234 calling #="+1212345555	AddLocation	Partition containing all the DID-to-DN mapping translation patterns. Another possibility is to have a per-country partition instead of a global partition.

Call Forwarding

Call Forwarding is very similar to a line-originated call, except that the Call Forwarding-related CSS is used for Call routing. There are no Call Forwarding-specific CSSs, but any of the line CSSs can be assigned to Call Forwarding features. If the call is forwarded to PSTN, the call will be routed using Local Breakout or Central Breakout, depending on the Translation and Route Patterns provisioned in the Cisco Unified Communications Manager.

Outbound PSTN Call Through LBO

An outbound PSTN call is converted to E.164 format before routing it toward the local gateway. The following calling search spaces and partitions are involved in the call:

Table 13: Outbound PSTN Call Through LBO

Cisco Unified Communications Manager Data Element	Cisco Unified Communications Manager Data Element Value	Unified Communications Domain Manager Transaction	Description
Line CSS	Intl24HrsEnh-CSS<site id>	AddLocation	CSS containing intersite routing partition

Cisco Unified Communications Manager Data Element	Cisco Unified Communications Manager Data Element Value	Unified Communications Domain Manager Transaction	Description
Partition	AllowNLBO24Hr-#COUNTRY#<site id>	AddLocation	Site specific partition to allow national calls through LBO
Translation Pattern	US-Allow-Natl24Hr<site id> =#EXT#.1[2-9]XX[2-9]XXXXXXTP =9.1[2-9]XX[2-9]XXXXXX remove 9 and prefix + Called #+=+12123455555 Calling #+=+19722221111	AddLocationLocalGateway	Translation pattern for a national call in United States. The national number is converted to an E.164 number
CSS	RouteSelCSS-LBO<site id>	AddLocationLocalGateway	Country-specific PSTN route selection CSS through LBO
Partition	RouteSelPT-LBO<site id>	AddLocationLocalGateway	Partition containing a route pattern for a national call
Route Pattern	NatlCall-#COUNTRY#<site id>=\+#COUNTRY#! RP=\+1.!	AddLocationLocalGateway	Route pattern for a national call
Route List	PSTNNAT-LBO-#LOCATION-ID#	AddLocationLocalGateway	Route list for a national call through LBO
Route Group	RG-LGW-#LOCATION-ID#	AddLocationLocalGateway	Route group for a national call through LBO
	Local Gateway Called #+=+12123455555 Calling #+=+19722221111	AddLocationLocalGateway	Local gateway

Outbound Service Call Through LBO

An Outbound Service call is prefixed with +01#COUNTRY# before routing it toward the local gateway. The prefix +01 identifies the call as a service call to the routing logic. The prefixed digits +01#COUNTRY# are removed at the local gateway and the call is routed toward PSTN as dialed. The following calling search spaces and partitions are involved in the call:

Table 14: Outbound Service Call Through LBO

Unified CM Data Element	Unified CM Data Element Value	Unified Communications Domain Manager Transaction	Description
Line CSS SLC=822, CC=1, NATCODE=972, FNN=2221111 dials 9611	Intl24HrsEnh-CSS<site id>	AddLocation	CSS containing intersite routing partition
Partition	AllowSLBO24Hr-#COUNTRY#<site id>	AddLocation	Site specific partition to allow service calls through LBO
Translation Pattern	US-Allow-SLBO24Hr1<site id> #EXT#[2-8]11 TP=9.[2-8]11 Called #+=011611 Prefix "+011"	AddLocationLocalGateway	Translation pattern for a service call in the United States. The national number is converted to an E.164 number
CSS	RouteSelCSS-LBO<siteid>	AddLocationLocalGateway	Country-specific PSTN route selection CSS through LBO
Partition	RouteSelPT-LBO<siteid>	AddLocationLocalGateway	Partition containing a route pattern for a service call
Route Pattern	SVCCall-#COUNTRY#<site id>= \+01#COUNTRY#. RP=\+011.!	AddLocationLocalGateway	Route pattern for a service call
Route List	SERVICE-LBO-#LOCATION-ID#	AddLocationLocalGateway	Route list for a service call through LBO
Route Group	RG-LGW-#LOCATION-ID#	AddLocationLocalGateway	Route group for a service call through LBO
	Local Gateway Called #+=011611	AddLocationLocalGateway	Local gateway

Outbound Emergency Call Through LBO

The following call flow is to route an emergency call by Local Breakout (LBO). The table in this section is for the United States. The Cisco Unified Communications Manager uses Device Calling Search Space instead of Line Calling Search Space to translate and route an emergency call. When the call matches the translation pattern for an emergency call, the routing logic prefixes the emergency number with +02#COUNTRY# digits. Prefix +02 identifies the call as an emergency call to the routing logic. Prefixed digits +02#COUNTRY# are removed at the local gateway.

Table 15: Outbound Emergency Call Through LBO

Unified Communications Manager Data Element	Unified Communications Manager Data Element Value	Unified Communications Domain Manager Transaction	Description
Device CSS SLC=822, CC=1, NATCODE=972, FNN-2221111 dials 9911	EmergencyOnly-CSS<site id>	AddLocation	Device CSS. For emergency call, Cisco Unified Communications Manager uses Device CSS and not Line CSS.
Partition	AllowEmerCalls<siteid>	AddLocation	Partition to route emergency calls.
Translation Pattern	US-Allow-EmerCalls911<site id> remove 9 and prefix +021 Called #+=+021911 Calling Party Prefix=*#LRID#	AddLocation	Translation pattern for an emergency call. The Called # is prefixed with +02 and country code.
CSS	EmergencyCalls-CSS<site id>	AddLocation	Emergency CSS to route emergency calls
Partition	EmerCalls<siteid>	AddLocation	Partition pointing to a route pattern for emergency calls.
Route Pattern	USEmerCalls911<site id>= \\+021.911	AddLocation	Route pattern for an emergency call via LBO
Route List	EMERGENCY-LBO-#LOCATION-ID	AddLocationLocalGateway	Route list for an emergency call through LBO
Route Group	RG-LGW-#LOCATION-ID#	AddLocationLocalGateway	Route group for an emergency call through LBO
	Local Gateway	AddLocationLocalGateway	Local gateway
Trunk Css	CallingT2LGW-CSS<site id>	AddLocationLocalGateway	Calling party transformation CSS for an emergency call

Unified Communications Manager Data Element	Unified Communications Manager Data Element Value	Unified Communications Domain Manager Transaction	Description
Partition	CallingT4EmerCallPT	InitIPPBX	Partition containing Transformation pattern for an emergency call
Transformation Pattern	LBODN2DDI4EmerCallsP<site id>= *#LRID##SITECODE##EXTENSION#	AssociateFNN	Transformation pattern for an emergency call

Intercluster and Intersite Calls to Unmanaged PBX

The Cisco HCS Dial Plan supports Intercluster calls over SIP-based Intercluster Trunks (ICT). In addition, the Cisco HCS Dial Plan also supports provisioning toward unmanaged PBXs. The following protocols toward unmanaged PBXs are supported:

- Legacy PBX (MGCP)
- Unmanaged PBX (H.323)
- Unmanaged PBX (SIP)

Table 16: Intercluster and Intersite Calls to Unmanaged PBXs

Unified CM Data Element	Unified CM Data Element Value	Unified Communications Domain Manager Transaction	Description
Line CSS	Local24HrsEnh-CSS<site id>	AddLocation	CSS based on the Class of Service assigned to the line/DN
Partition	InterSiteRoutingPT	InitIPPBX	Intersite routing partition contains translation patterns to route the call to the correct IncomingToSite CSS if the call is intracluster and contains route patterns to route the call to the correct cluster if the call is intercluster.
Route Pattern	Refer to the following Intercluster Trunk Calls table #SITECODE##SITEMASK#	Refer to the following Intercluster Trunk Calls table	Route patterns for Intercluster or intersite calls toward unmanaged PBX

Unified CM Data Element	Unified CM Data Element Value	Unified Communications Domain Manager Transaction	Description
Route List	Refer to the following Intercluster Trunk Calls table	Refer to the following Intercluster Trunk Calls table	Route list for Intercluster or intersite calls toward unmanaged PBX
Route Group	Refer to the following Intercluster Trunk Calls table	Refer to the following Intercluster Trunk Calls table	Route group for Intercluster or Intersite calls toward unmanaged PBX
Trunk	Refer to the following Intercluster Trunk Calls table	Refer to the following Intercluster Trunk Calls table	Intercluster trunk or trunk toward unmanaged PBX

Table 17: Intercluster Trunk Calls

Protocol	Unified CM Data Element	Transaction	Name	Value
MGCP	Route Pattern	AddLocationLegacyGateway	AllowLegacyCalls-#LOCATION-ID#	#SITECODE# #SITEMASK#
	Route List	AddLocationLegacyGateway	RL-UNMANPBX-MGCP-#LOCATION-ID#	—
	Route Group	AddLocationLegacyGateway	RG-LEGACY-#LOCATION-ID#	—
	Trunk	—	—	—
H.323	Route Pattern	AddLocationICTSiteCodes-Unmanaged-H.323	AddLocationICTSiteCodes-Unmanaged-H.323-#SITECODE#	#SITECODE# #SITEMASK#
	Route List	ConnectIPPBXIPPBX-Unmanaged	RL-UNMANPBX-H.323-#RICPID#	—
	Route Group	ConnectIPPBXIPPBX-Unmanaged	RG-UNMANPBX-H.323-#RICPID#	—
	Trunk	ConnectIPPBXIPPBX-Unmanaged	TR-UNMANPBX-H.323-#RICPID#	—

Protocol	Unified CM Data Element	Transaction	Name	Value
SIP	Route Pattern	AddLocationICTSiteCodes-Unmanaged-SIP	AddLocationICTSiteCodes-Unmanaged-SIP-#SITECODE#	#SITECODE# #SITEMASK#
	Route List	ConnectIPPBXIPPBX-Unmanaged	RL-UNMANPBX-SIP-#RICPID#	—
	Route Group	ConnectIPPBXIPPBX-Unmanaged	RG-UNMANPBX-SIP-#RICPID#	—
	Trunk	ConnectIPPBXIPPBX-Unmanaged	TR-UNMANPBX-SIP-#RICPID#	—
InterCluster (ICT)	Route Pattern	AddLocationICTSiteCodes	ConnectedClusterSite-#SITECODE#	#SITECODE# #SITEMASK#
	Route List	ConnectIPPBXIPPBX	RL-IPPBX-SIP-#RICPID#	—
	Route Group	ConnectIPPBXIPPBX	RG-IPPBX-SIP-#RICPID#	—
	Trunk	ConnectIPPBXIPPBX	ICT-SIP-#RICPID#	—

Bulk-Loading Unmanaged-PBX Locations

An unmanaged Location is a customer location that resides on a third-party PBX not directly managed by Cisco Unified Communications Domain Manager as part of the HCS solution design. Unmanaged locations provide the context to allow H323 and SIP trunks to be configured from a Unified CM cluster to these locations. SLCs can then be assigned to these locations for intersite routing and E164 numbers and internal extensions can be assigned. ENT translation patterns can also be configured to route calls to these Unmanaged locations. The Unmanaged-PBX location reference bulk loader provides a worked example for:

- Defining the Unmanaged location in an input sheet #CUSTOMER-LOCATIONS-INPUT
- Adding Unmanaged PBX Servers
- Adding Unmanaged PBX Hardware Groups
- Associating Customer Hardware Groups
- Adding Site Codes
- Adding Unmanaged locations (alongside Managed locations)



Note

Internal Extensions and PSTN Numbers can also be assigned to an Unmanaged location as for a Managed location. IOS Local Gateway ports can also be assigned to Unmanaged locations.

Call to Voicemail

The following calling search spaces and partitions are involved in a call to voicemail:

Table 18: Call to Voicemail

Unified CM Data Element	Unified CM Data Element Value	Unified Communications Domain Manager Transaction	Description
CSS Local24HrsEnh-CSS822	Local24HrsEnh-CSS<site id>	AddLocation	Call Forwarding CSS based on the Call Forwarding Type assigned to the line or DN
Partition	AllowVMCalls	AddLocation	Partition containing Route Pattern toward Cisco Unity
Route Pattern	#VMSLC##CMEXTENSION#	AddLocationVM	Route Pattern toward Cisco Unity
Route List	RL-UNITY#VMCPID#		Route List toward Cisco Unity
Route Group	RG-UNITY#VMCPID#		Route Group
Trunk	VMAIL-#VMCPID#		Trunk toward Cisco Unity

Call from Voicemail

The following calling search spaces and partitions are involved in a call from voicemail:

Table 19: Call from Voicemail

Unified CM Data Element	Unified CM Data Element Value	Unified Communications Domain Manager Transaction	Description
CSS	IncomingFromUnity	InitlPPBX	Call Forwarding CSS based on the Call Forwarding Type assigned to the line or DN
Partition	InterSiteRoutingPT	InitlPPBX	Partition containing Route Pattern toward Cisco Unity
Translation Pattern	InterSite<site id>#SITECODE##SITEMASK#		Translation patterns for Intersite calls

Unified CM Data Element	Unified CM Data Element Value	Unified Communications Domain Manager Transaction	Description
CSS	IncomingToSite-CSS<site id>		CSS that contains the partition where all devices are configured
Partition	Site<site id>		Site partition where DN and devices are associated