



# CHAPTER 16

## Understanding Route Plans

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The Route Plan drop-down list on the menu bar allows you to configure Cisco Unified Communications Manager route plans by using route patterns, route filters, route lists, and route groups, as well as hunt pilots, hunt lists, and line groups.

This section describes the following route plan topics:

- [Automated Alternate Routing, page 16-2](#)
- [Route Plan Overview, page 16-4](#)
- [Route Groups and Route Lists, page 16-5](#)
- [Route Patterns, page 16-7](#)
- [Local Route Groups and Called Party Transformations, page 16-10](#)
- [Line Groups, page 16-11](#)
- [Hunt Lists, page 16-11](#)
- [Hunt Pilots, page 16-12](#)
- [Call Coverage, page 16-12](#)
- [Log Out of Hunt Groups, page 16-14](#)
- [Closest Match Routing, page 16-16](#)
- [Translation Patterns, page 16-18](#)
- [Static Digit Analysis, page 16-19](#)
- [Calling Party Normalization, page 16-21](#)
- [Special Characters and Settings, page 16-21](#)
- [Using the International Escape Character +, page 16-22](#)
- [Calling and Called Party Transformations, page 16-36](#)
- [Caller Identification and Restriction, page 16-43](#)
- [Route Plan Report, page 16-49](#)
- [Where to Find More Information, page 16-49](#)

# Automated Alternate Routing

Automated alternate routing (AAR) provides a mechanism to reroute calls through the PSTN or other network by using an alternate number. As a subset of the AAR feature, Cisco Unified Communications Manager automatically reroutes calls through the PSTN or other networks when Cisco Unified Communications Manager blocks a call due to insufficient location bandwidth. With automated alternate routing, the caller does not need to hang up and redial the called party.

When a call is made from the device of one location to the device of another location, location bandwidth gets deducted from the maximum available bandwidth that is available for the call at either location. If not enough location bandwidth for the call exists at either location, instead of blocking the call, Cisco Unified Communications Manager uses the table of AAR groups and the external number of the terminating directory number to supply the alternate number that is used to reroute the call through the PSTN or other network. The Cisco Unified IP Phone displays the message “Network congestion, rerouting.” (Configure this message by using Service Parameters Configuration for the Cisco CallManager service.) Cisco Unified Communications Manager automatically attempts to reroute the call by using the alternate number. If the reroute is successful, the caller connects to the called party.

AAR supports the following call scenarios for insufficient bandwidth:

- Call originates from a line or directory number (DN) of an IP phone within one location and terminates to a line or DN of another IP phone within another location. This scenario includes calls that terminate at the shared line with terminating IP phone devices that are resident in multiple locations and calls that terminate at the Cisco voice-mail port.
- Incoming call through a gateway device within one location terminates to a line or DN of an IP phone within another location. This scenario includes calls that terminate at the shared line with terminating IP phone devices that are resident in multiple locations and calls that terminate at the Cisco voice-mail port.

Cisco Unified Communications Manager automatically attempts to reroute calls, due to insufficient bandwidth, through the PSTN or other network only when the Automated Alternate Routing Enable enterprise parameter is set to true. Cisco Unified Communications Manager uses the device-based AAR calling search space, which is assigned to Cisco Unified IP Phone station devices and gateway devices, when it attempts to route the call to the gateway device that connects to the PSTN or other network. Cisco Unified Communications Manager uses the external phone number mask and the directory number of the line or DN and the Cisco voice-mail port to derive the alternate number that is used to reroute the call.

## Automated Alternate Routing Example

In the following scenario, line/DN 5000 in the Richardson AAR group calls line 5001 in the San Jose AAR group. If not enough location bandwidth exists, the call attempts to reroute through the PSTN or other network. To route the call from AAR group Richardson to AAR group San Jose, Cisco Unified Communications Manager needs to know the access digit(s) to dial out to the PSTN or other network, the long-distance dialing requirement, if any, and the alternate number. Cisco Unified Communications Manager retrieves the information from the AAR dial prefix matrix table, which is indexed by the originating line AAR group value and the terminating line AAR group value. [Table 16-1](#) shows how the AAR group field is data filled in the line/DN table:

**Table 16-1** Line/DN and AAR Group Association

Line/DN	AAR Group
5000	Richardson
5001	San Jose
5002	Dallas

Cisco Unified Communications Manager retrieves the prefix digits from the AAR dial prefix matrix table based on the AAR group value of the originating line/DN and gateway device and the AAR group value of the terminating line, and Cisco voice-mail port, to transform the derived alternate number. Table 16-2 shows an example of how the AAR dial prefix matrix table is data filled:

**Table 16-2 AAR Dial Prefix Matrix Table Example**

From AAR Group	To AAR Group	Prefix Digits
Richardson	San Jose	91
Richardson	Dallas	9
Richardson	Richardson	9
San Jose	Richardson	91
San Jose	Dallas	91
San Jose	San Jose	9
Dallas	Richardson	9
Dallas	San Jose	91
Dallas	Dallas	9

Cisco Unified Communications Manager prepends the prefix digits that are retrieved from the AAR dial prefix matrix table to the derived alternate number. Digit analysis uses the transformed digits, plus the AAR calling search space, to route the call to the PSTN or other network.

A much greater rate of success for automated alternate routing occurs when a gateway is located in the same location as the originating or terminating device. Therefore, a call that is outgoing to the PSTN or other network from a gateway that is located in the same location as the originating device and that is also incoming from a gateway located in the same location as the terminating device describes the best scenario. In other scenarios, the call remains subject to location bandwidth validation between the originating device and outgoing gateway, and between the terminating device and incoming gateway.

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Automated Alternate Routing Enable Service Parameter

Besides configuring AAR groups, ensure that the Automated Alternate Routing Enable clusterwide service parameter is set to *True*. (The default value for this service parameter specifies *False*.)

The Clusterwide Parameters (System - CCMAutomated Alternate Routing) section of the service parameters for the Cisco CallManager service includes the parameter.

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Automated Alternate Routing and Hunt Pilots

In previous Cisco Unified Communications Manager releases, if the voice-messaging system is in a central location and the user is in a remote location, when the remote user tries to reach the voice-messaging system and bandwidth is not available on the WAN link, Cisco Unified Communications Manager can reroute the call through the PSTN to the voice-messaging system.

In the current Cisco Unified Communications Manager release, AAR does not automatically work with hunt pilots. Because the fully qualified directory number (DN) of the remote agent is unknown, AAR cannot initiate the reroute.

To enable AAR to work with hunt pilots, two additional fields display in the Hunt Pilot Configuration window: AAR Group and External Number Mask. For each hunt pilot, you must configure these fields in the Hunt Pilot Configuration window for AAR groups to work with hunt pilots. See the [“\*\*Hunt Pilot Configuration\*\*”](#) chapter in the *Cisco Unified Communications Manager Administration Guide* for details.

### Additional Information

See the [“\*\*Where to Find More Information\*\*”](#) section on page 16-49.

## Automated Alternate Routing and Remote Gateways

AAR exhibits the limitation that calls routed over a remote gateway during a high-bandwidth situation fail, and the calls cannot be routed over the local gateway when AAR is used. This functionality is important to customers who use Tail-End Hop Off (TEHO) for toll bypass.

See the *Troubleshooting Guide for Cisco Unified Communications Manager* for details of a workaround to avoid the use of AAR in remote-gateway, high-bandwidth situations.

### Additional Information

See the [“\*\*Where to Find More Information\*\*”](#) section on page 16-49.

## Route Plan Overview

Cisco Unified Communications Manager uses route plans to route internal calls within a Cisco Unified Communications Manager cluster and external calls to a private network or the public switched telephone network (PSTN).

Route patterns, route filters, route lists, route groups, line groups, hunt lists, and hunt pilots provide flexibility in network design. Route patterns work in conjunction with route filters to direct calls to specific devices and to include or exclude specific digit patterns. Use route patterns to include and exclude digit patterns. Use route filters primarily to include digit patterns. Route lists control the selection order of the route groups. Route groups set the selection order of the gateway devices.

You can assign route patterns to gateways, to trunks, or to a route list that contains one or more route groups. Route groups determine the order of preference for gateway and trunk usage. Route groups allow overflows from busy or failed devices to alternate devices.

Route lists determine the order of preference for route group usage. If a route list is configured, you must configure at least one route group. One or more route lists can point to one or more route groups.

Route filters may restrict certain numbers that are otherwise allowed by a route pattern from being routed. Tags, or clauses, provide the core component of route filters. A tag applies a name to a portion of the dialed digits. For example, the North American Numbering Plan (NANP) number 972-555-1234 contains the LOCAL-AREA-CODE (972), OFFICE-CODE (555), and SUBSCRIBER (1234) tags.

**Note**

The NANP designates the numbering plan for the PSTN in the United States and its territories, Canada, Bermuda, and many Caribbean nations. NANP includes any number that can be dialed and is recognized in North America.

Route patterns represent all valid digit strings. Cisco Analog Access Trunk Gateways, Cisco Digital Access Trunk Gateways, Cisco MGCP gateways, H.323-compliant gateways, and trunks also use route patterns. Cisco gateways can route ranges of numbers with complex restrictions and manipulate directory numbers before the Cisco Unified Communications Manager passes them on to an adjacent system. The adjacent system can include a central office (CO), a private branch exchange (PBX), or a gateway on another Cisco Unified Communications Manager system.

A line group comprises a list of DNs. Line groups specify a distribution algorithm (such as Top Down) for the members of the line group. Line groups also specify the hunt options to use in cases where the line group members do not answer, are busy, or are not available. A directory number may belong to more than one line group.

Hunt lists comprise ordered groupings of line groups. A line group may belong to more than one hunt list. A hunt list must specify at least one line group before the hunt list can accept calls.

Hunt pilots represent route patterns that are used for hunting. A hunt pilot can specify a partition, numbering plan, route filter, and hunt forward settings. A hunt pilot must specify a hunt list.

**Additional Information**

See the [“Where to Find More Information”](#) section on page 16-49.

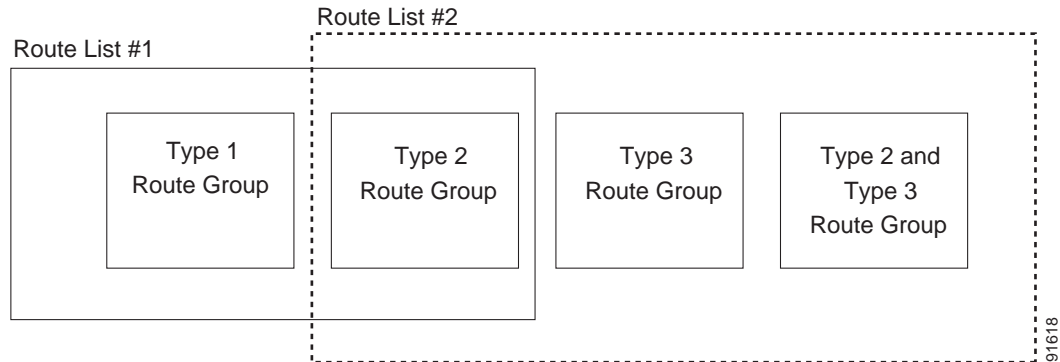
## Route Groups and Route Lists

Route groups contain one or more devices, and route lists contain one or more route groups. Cisco Unified Communications Manager may restrict the gateways that you can include in the same route group and the route groups that you can include in the same route list. For the purpose of route group and route list restrictions, Cisco Unified Communications Manager divides gateways into three types:

- Type 1—MGCP QSIG gateways and QSIG-enabled intercluster trunks
- Type 2—MGCP non-QSIG, Skinny, T1-CAS gateways; non-QSIG intercluster trunks
- Type 3—H.225 and H.323 gateways, and all other trunk types

Route lists can contain a mixture of route group types, although you cannot combine an H225 trunk with a Type 1 (QSIG) route group. Cisco Unified Communications Manager does not allow you to add route groups that contain gateways that use the H.323 or H.225 protocol (Type 3) and route groups that contain MGCP gateways that use a QSIG protocol (Type 1) to the same route list. You can create route lists with any combination of Type 1 route groups and Type 2 route groups as well as with any combination of Type 2 route groups and Type 3 route groups, as illustrated in [Figure 16-1](#).

Figure 16-1 Valid Route Lists Example



For more information on creating route groups, see the “[Route Group Configuration Settings](#)” section in the *Cisco Unified Communications Manager Administration Guide*. For more information on creating route lists, see the “[Route List Configuration Settings](#)” section in the *Cisco Unified Communications Manager Administration Guide*.

**Note**

You cannot combine route groups and line groups, and route lists and hunt lists become separate entities. Thus, route groups make up route lists, and line groups make up hunt lists. If an existing route/hunt list includes a line group as a member, Cisco Unified Communications Manager migrates the route/hunt list to a hunt list.

Route lists can simultaneously run on all nodes and Cisco Unified Communications Manager can randomly choose from any of the available route lists that can reach a given node. The system ensures that, over time and on average, all 16 nodes in the core cluster are used equally. This prevents system resources on some nodes from being idle while other nodes are dealing with an unsustainable call burden.

See the “[Local Route Groups](#)” chapter in the *Cisco Unified Communications Manager Features and Services Guide* for an explanation of local route groups and the details of provisioning route groups, device pools, route lists, partitions, route patterns, and calling search spaces in a local route group scenario.

**Related Topic**

- [Local Route Groups and Called Party Transformations, page 16-10](#)

**Additional Information**

See the “[Where to Find More Information](#)” section on page 16-49.

# Route Patterns

Cisco Unified Communications Manager uses route patterns to route or block both internal and external calls.

**Note**

Route group and route lists are part of route pattern configuration. Line groups and hunt lists are part of hunt pilot configuration. Route patterns and hunt pilots are configured separately. Route groups or route lists cannot be added to hunt pilot and line groups. Hunt lists cannot be added to route pattern. If an existing route pattern/hunt pilot associates with a hunt list, Cisco Unified Communications Manager migrates the route pattern/hunt pilot to a hunt pilot.

The simplest route pattern specifies a set of one or more digits. For example, the number 8912 specifies a route pattern.

Gateways and Cisco Unified IP Phones can also use more complex route patterns that can contain wildcards. A wildcard represents a range of numbers; for example, X represents any digit 0 through 9.

To classify a call as OnNet or OffNet, administrators can set the Call Classification field to OnNet or OffNet, respectively, on the Route Pattern Configuration window. Administrators can override the route pattern setting and use the trunk or gateway setting by checking the Allow Device Override check box on the Route Pattern Configuration window.

**Caution**

If a gateway has no route pattern that is associated with it, or it does not belong to a route group, it cannot route any calls.

You can use route patterns to invoke network-specific services/facilities on a call-by-call basis by configuring the fields in the ISDN Network-Specific Facilities Information Element section on the Route Pattern Configuration window. Cisco Unified Communications Manager uses the network-specific services/facilities when the user dials the route pattern.

**Note**

Cisco Unified Communications Manager only uses the network-specific information with PRI protocol gateways. H.323 gateways do not support network-specific facilities, but they support SDN when the dial peers are configured accordingly. Cisco Unified Communications Manager codes the bearer capability as Speech for the ACCUNET service.

See the “[Local Route Groups](#)” chapter in the *Cisco Unified Communications Manager Features and Services Guide* for an explanation of local route groups and the details of provisioning route groups, device pools, route lists, partitions, route patterns, and calling search spaces in a local route group scenario.

**Related Topic**

- [Local Route Groups and Called Party Transformations, page 16-10](#)

**Additional Information**

See the “[Where to Find More Information](#)” section on page 16-49.

## Route Pattern Usage

You can assign a route pattern directly to a Cisco Access Gateway, or you can assign it to a route list for more flexibility. For example, [Figure 16-2](#) shows Cisco Digital Access Gateway 1 designated as the first choice for routing outgoing calls to the PSTN when a matching route pattern is dialed.

**Tip**

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If a gateway does not have a route pattern, it cannot place calls to the PSTN or to a PBX. To assign a route pattern to an individual port on a gateway, you must assign a route list and a route group to that port.

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[Figure 16-2](#) shows the effects of using route patterns with Cisco Digital Gateways. This example assigns the route pattern to a route list, and that route list associates with a single route group. The route group supports a list of devices that are selected based on availability.

When the system initially presents a call to a member of a route list, Cisco Unified Communications Manager reroutes for all cause codes other than Out of Bandwidth, User Busy, and Unallocated Number. The value of the associated service parameters for the Cisco CallManager service determines the rerouting decision for those cause codes. The Clusterwide Parameters (Route Plan) grouping includes the Stop Routing on Out of Bandwidth Flag, Stop Routing on User Busy Flag, and Stop Routing on Unallocated Number Flag service parameters. You can set each service parameter to True or False.

After a route list locks onto a trunk, no rerouting occurs. The media connect time of the endpoints and the Stop Routing service parameters determine when a route list stops hunting for the next route group. When media negotiation begins, the route list or hunt list loses the ability to reroute.

The Stop Routing on Q.931 Disconnect Cause Code service parameter for the Cisco CallManager service determines routing behavior when a call that is being routed to a remote site through a route list gets released and a Q.931 cause code gets sent to Cisco Unified Communications Manager. If the cause code that is encountered in the message matches a cause code that this parameter specifies, a local Cisco Unified Communications Manager stops routing the call. (The call does not get sent to the next device in the route list).

**Note**

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If a route pattern is associated with a gateway, and all the resources of that gateway are used, then the call does not get routed.

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**Figure 16-2** Route Plan Summary Diagram for Cisco Digital Gateways

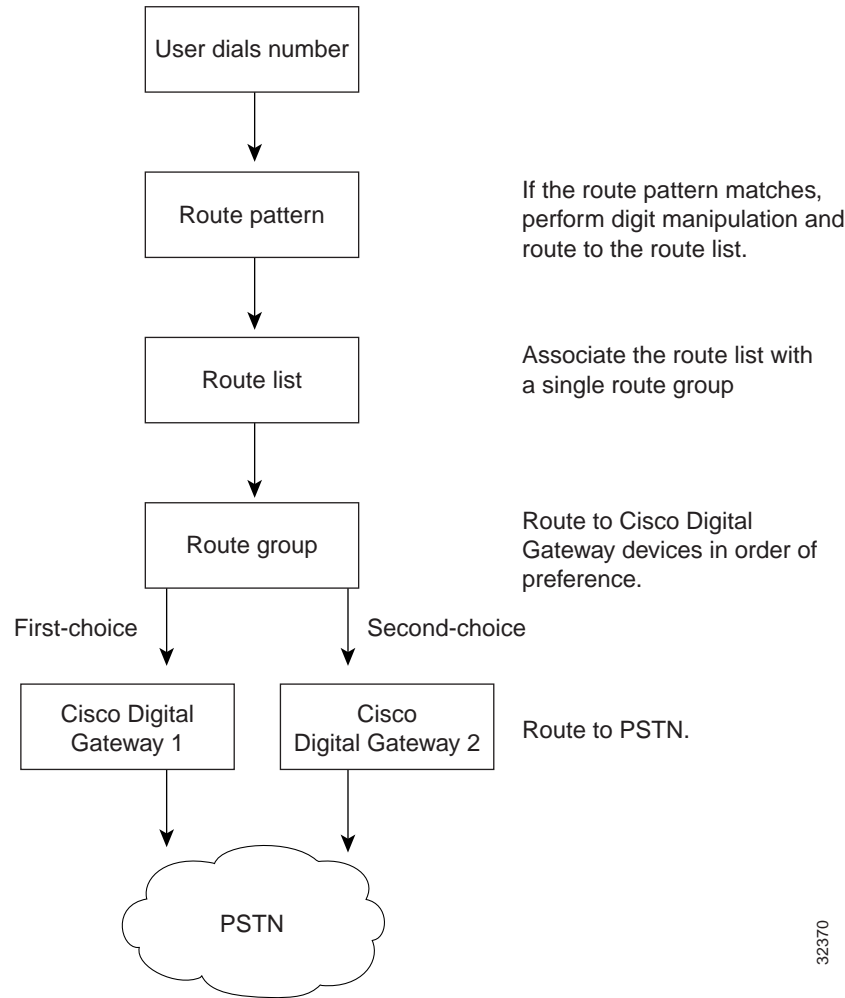
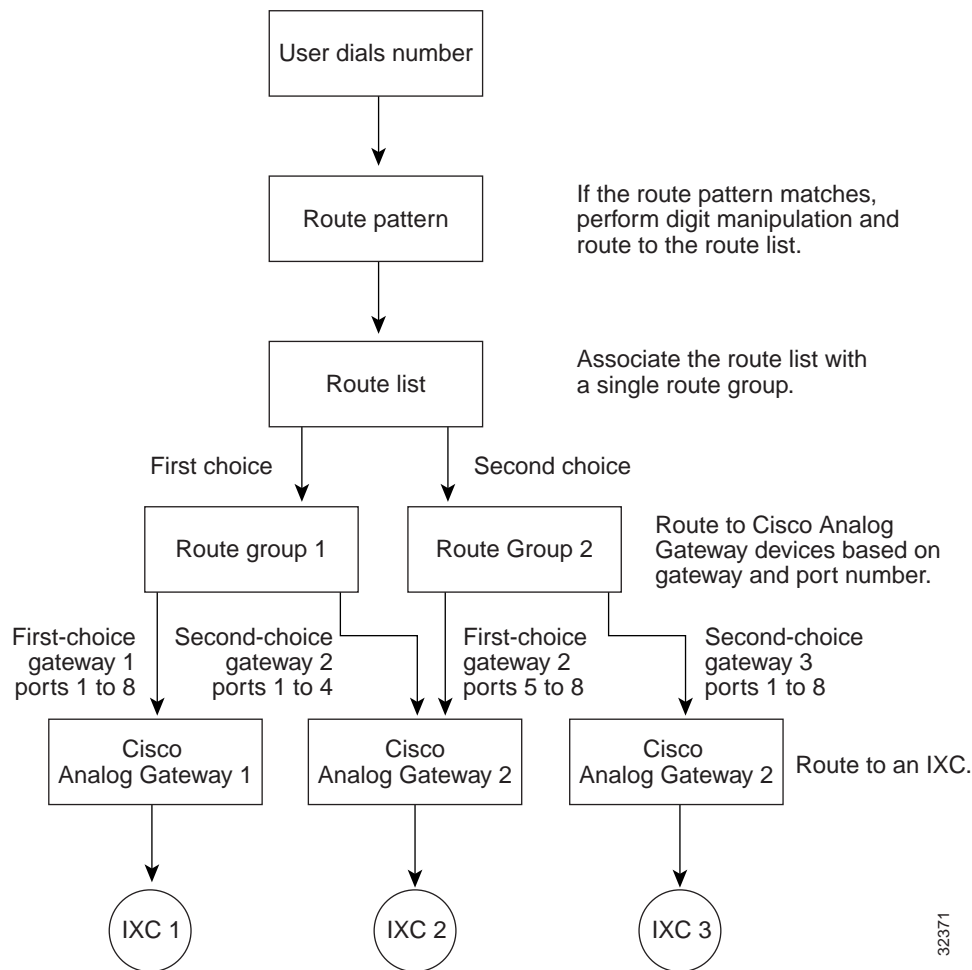


Figure 16-3 shows the effects of using route patterns with Cisco Analog Gateways. This example assigns the route pattern to a route list, and that route list associates with two route groups. Route group 1 associates with ports 1 through 8 on gateway 1, which routes all calls to interexchange carrier 1 (IXC 1). Route group 1 also associates with ports 1 through 4 on gateway 2. Route group 2 associates with ports 5 through 8 on gateway 2 and all ports on gateway 3.

Each route group supports a list of devices that are chosen on the basis of availability. For route group 1, if ports 1 through 8 on the first-choice gateway are busy or out of service, calls route to ports 1 through 4 on the second-choice gateway. If all routes in route group 1 are unavailable, calls route to route group 2. For route group 2, if ports 5 through 8 on the first-choice gateway are busy or out of service, calls route to ports 1 through 8 on the second-choice gateway. If no ports on any gateway in either route group are available, the call routes to an all trunks busy tone.

Figure 16-3 Route Plan Summary Diagram for Cisco Analog Access Gateways



See the “[Local Route Groups](#)” chapter in the *Cisco Unified Communications Manager Features and Services Guide* for an explanation of local route groups and the details of provisioning route groups, device pools, route lists, partitions, route patterns, and calling search spaces in a local route group scenario.

#### Related Topic

- [Local Route Groups and Called Party Transformations, page 16-10](#)

#### Additional Information

See the “[Where to Find More Information](#)” section on page 16-49.

## Local Route Groups and Called Party Transformations

The Local Route Group feature helps reduce the complexity and maintenance efforts of provisioning in a centralized Cisco Unified Communications Manager deployment that uses a large number of locations. The fundamental breakthrough in the Local Route Group feature comprises decoupling the location of a PSTN gateway from the route patterns that are used to access the gateway.

The Local Route Group feature provides the ability to reduce the number of route lists and route patterns that need to be provisioned for implementations of Cisco Unified Communications Manager where each of N sites needs to have access to the local gateways of the other N-1 remote sites. One such scenario occurs with Tail End Hop Off (TEHO).

See the “[Local Route Groups](#)” chapter in the *Cisco Unified Communications Manager Features and Services Guide* for a complete explanation of local route groups and the related configuration procedures.

#### Additional Information

See the “[Where to Find More Information](#)” section on page 16-49.

## Line Groups

Line groups contain one or more directory numbers. A distribution algorithm, such as Top Down, Circular, Longest Idle Time, or Broadcast, associates with a line group. Line groups also have an associated Ring No Answer reversion timeout value.

The following descriptions apply to the members of a line group:

- An *idle* member designates one that is not serving any call.
- An *available* member designates one that is serving an active call but can accept a new call(s).
- A *busy* member cannot accept any calls.

For information on configuring line groups, see the “[Line Group Configuration](#)” section in the *Cisco Unified Communications Manager Administration Guide*.

A directory number may belong to more than one line group.

#### Additional Information

See the “[Where to Find More Information](#)” section on page 16-49.

## Hunt Lists

Hunt lists comprise ordered groupings of line groups. A line group may belong to more than one hunt list. Hunt pilots associate with hunt lists. A hunt list may associate with more than one hunt pilot.

For information on configuring hunt lists, see the “[Hunt List Configuration](#)” section in the *Cisco Unified Communications Manager Administration Guide*.



#### Note

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Configuration of hunt lists and route lists occurs separately. If an existing route/hunt list has a line group as a member, Cisco Unified Communications Manager migrates the route/hunt list to a hunt list.

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#### Note

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TOD settings come into effect when the lines are included in a hunt list. The settings only apply to the hunt pilot and not to the lines within that hunt list.

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#### Additional Information

See the “[Where to Find More Information](#)” section on page 16-49.

# Hunt Pilots

Hunt pilots comprise sets of digits. They comprise lists of route patterns that are used for hunting. A hunt pilot can specify a partition, numbering plan, route filter, and hunt forward settings. A hunt pilot must specify a hunt list.

For information on configuring hunt pilots, see the [“\*\*Hunt Pilot Configuration\*\*”](#) chapter in the *Cisco Unified Communications Manager Administration Guide*.



**Note**

Configuration of hunt pilots and route patterns occurs separately. If an existing route pattern/hunt pilot associates with a hunt list, Cisco Unified Communications Manager migrates the route pattern/hunt pilot to a hunt pilot.



**Note**

TOD settings comes into effect when the lines are included in a hunt list. The settings only apply to the hunt pilot and not to the lines within that hunt list.

### Additional Information

See the [“\*\*Where to Find More Information\*\*”](#) section on page 16-49.

# Call Coverage

The Call Coverage feature comprises the following Cisco Unified Communications Manager capabilities:

- Forwarding provides separate configuration based on whether the call originator is an internal user or an external user. See the [“\*\*Internal and External Calls\*\*”](#) section on page 16-14.
- Hunting supports personal forwarding. See the [“\*\*Personal Preferences\*\*”](#) section on page 16-14.
- Route patterns and hunt pilots are separated in two different features.

### Additional Information

See the [“\*\*Where to Find More Information\*\*”](#) section on page 16-49.

# Hunting and Call Forwarding

The concept of hunting differs from that of call forwarding. Hunting allows Cisco Unified Communications Manager to extend a call to one or more lists of numbers, where each such list can specify a hunting order that is chosen from a fixed set of algorithms. When a call extends to a hunt party from these lists and the party fails to answer or is busy, hunting resumes with the next hunt party. (The next hunt party varies depending on the current hunt algorithm.) Hunting thus ignores the Call Forward No Answer (CFNA), Call Forward Busy (CFB), or Call Forward All (CFA) settings for the attempted party.

Call forwarding allows detailed control as to how to extend (*divert* and *redirect* represent equivalent terms for *extend*) a call when a called party fails to answer or is busy and hunting is not taking place. For example, if the CFNA setting for a line is set to a hunt-pilot number, a call to that line that is not answered diverts to the hunt-pilot number and thus begins hunting.

Cisco Unified Communications Manager offers the ability to redirect a call when hunting fails (that is, when hunting terminates without any hunt party answering, due either to exhausting the list of hunt numbers or to timing out). If used, this final redirection comprises a Call Forwarding action. Therefore, the Hunt Pilot Configuration window includes Call Forwarding configuration concepts that are similar to those found on the Directory Number Configuration window.

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Example of Call Hunting

Although hunting differs from forwarding, hunting often originates as a call that gets forwarded to a hunt-pilot number. The call coverage feature extends hunting to allow final forwarding after hunting either exhausts or times out.

A typical call that invokes hunting can include the following phases:

1. A call extends to the original called party.
2. The call forwards to hunting (for example, due to the Call Forward All [CFA], CFNA, or CFB setting for the original called line).
3. The call hunts through provisioned hunt groups according to provisioned algorithms for each group. Hunting either succeeds (if a hunt party answers), exhausts (if all hunt parties are attempted, but none answer), or times out (if the time specified in the Maximum Hunt Timer runs out before all parties are attempted, and none of the parties that were attempted answer).

For the purpose of this example, we assume that hunting does not succeed.

4. If some form of final forwarding is configured, the call forwards to a next destination; otherwise, the call gets released.

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Maximum Hunt Timer

The Maximum Hunt Timer field on the Hunt Pilot Configuration window allows the administrator to enter a value (in seconds) to limit the time for hunting through a hunt list. After the specified time lapses, if hunting has not succeeded, the call gets forwarded to a voice-messaging system, a specific dialed number, or some personal treatment (if configured), or the call gets released.

For more details about the Maximum Hunt Timer, see the field description in the [“\*Hunt Pilot Configuration\*”](#) chapter of the *Cisco Unified Communications Manager Administration Guide*.

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Show Line Group Member DN in finalCalledPartyNumber CDR Field Service Parameter

This service parameter for the Cisco CallManager service allows you to specify either the line group directory number (DN) that picks up a call to a hunt pilot number or the hunt pilot number as the final called party number in the Call Detail Record (CDR).

See the *Cisco Unified Communications Manager CDR Analysis and Reporting Administration Guide* document for the details of setting this service parameter.

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Internal and External Calls

Forwarding provides separate configuration based on whether the originator of a call is an internal user or an external user. This distinction applies to Call Forward Busy (CFB), Call Forward No Answer (CFNA), and Call Forward No Coverage (CFNC) cases.

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Personal Preferences

Hunting supports the capability to provide a final forwarding treatment to voice-messaging system, a specific dialed number, or some personal treatment (based on the original called party) when hunting either exhausts or times out. The capability to provide separate final forwarding treatment based on whether the call was internal or external also exists. Hunting supports a separate, configurable maximum hunt timer for each hunt-pilot number.

In the Hunt Pilot configuration settings, Use Personal Preferences, Destination fields are available to enable the Call Forward No Coverage (CFNC) settings for the original called number that forwarded the call to the hunt pilot. See the [“\*Hunt Pilot Configuration Settings\*”](#) section in the *Cisco Unified Communications Manager Administration Guide*.

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Log Out of Hunt Groups

The Log Out of Hunt Groups feature allows users of phones that are running SCCP and phones that are running SIP to log out their phones from receiving calls that get routed to directory numbers that belong to line groups to which the phone lines are associated.

Regardless of the phone status, the phone rings normally for incoming calls that are not calls to the line group(s) that are associated with the phone.

The phone provides a visual status of the login state, so the user can determine by looking at the phone whether they are logged in to their line group(s).

System administrators can configure phones to be automatically logged into hunt groups by using the Logged Into Hunt Group check box on the Phone Configuration window in Cisco Unified Communications Manager Administration. By default, this check box gets checked for all phones. Users log in and out of hunt groups by using the HLog softkey (see the [“\*Log Out of Hunt Groups Softkey\*”](#) section on page 16-15).

Log Out of Hunt Groups has the following limitations for phones that are running SIP:

- When a phone that is running SIP (7906, 7911, 7941, 7961, 7970, and 7971) is logged into hunt groups, and Call Forward All is activated, the call gets presented to the phone that is running SIP.
- When 7940 and 7960 phones that are running SIP are logged into hunt groups, and Call Forward All is activated, the phone will get skipped and the next phone in the line group will be rung.
- 7940 and 7960 phones that are running SIP and third-party phones that are running SIP can be logged into/out of hunt groups by using the Phone Configuration window, but no softkey support exists.
- 7940 and 7960 phones that are running SIP and third-party phones that are running SIP will not show “Logged out of hunt groups” on the status line.
- 7940 and 7960 phones that are running SIP and third-party phones that are running SIP will not play the hunt group logoff notification tone regardless of whether the tone is configured.

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Log Out of Hunt Groups Softkey

Cisco Unified Communications Manager provides the HLog softkey that allows a phone user to log a phone out of all line groups to which the phone directory numbers belong. The user uses the HLog softkey to toggle between logon and logoff. After the feature is enabled (logoff) on a phone, calls that come into line groups that are associated with this phone skip this phone and go directly to the next line in the hunt list.

Because the Log Out of Hunt Groups feature is device-based, when the user enables the feature by pressing the HLog softkey, the phone gets logged off from all associated line groups. If a phone has directory numbers that belong to multiple line groups, pressing the HLog softkey logs the phone out of all associated line groups. The default phone state specifies logon.

The HLog softkey does not get added to any standard softkey template, but the HLog softkey displays as a selectable softkey in the Connected, Off Hook, and On Hook states in the Cisco Unified Communications Manager Administration Softkey Layout Configuration window for a new softkey template. The HLog softkey displays on the phone when the phone is in the Connected, Off Hook, and On Hook states if the administrator adds the HLog softkey to the softkey template that the phone uses. If necessary, the softkey label gets translated to a different language.

A prompt status message displays the status of the feature when the softkey is pressed to log off, if the new softkey is selected in the Softkey Template that the device is currently using. If necessary, the prompt status message gets translated to a different language.

See the [“Softkey Template Configuration”](#) chapter in the *Cisco Unified Communications Manager Administration Guide* for the details of configuring softkey templates in Cisco Unified Communications Manager Administration.

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Hunt Group Logoff Notification Service Parameter

The Hunt Group Logoff Notification service parameter in the Clusterwide Parameters (Device - Phone) section of the Service Parameters Configuration window for the Cisco CallManager service provides the option to turn audible ring tones on or off when calls that come in to a line group arrive at the phone and the current status of the phone is logoff. The default value specifies None, which causes the phone not to ring.

### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Non-Shared-Line Operation

If a phone is logged out of a line group and an extension on the phone is not shared, the line group does not ring that directory number in the line group. When the line group would normally offer the call to the directory number, call processing skips the directory number and acts as if the directory number does not belong to the line group.

### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Shared-Line Operation

Because the Log Out of Hunt Group feature is device-based, when a user logs a phone out, the feature affects only the logged-out phone. Calls to a line group that contains a shared-line directory number (DN) behave as follows:

- The DN does not ring if all phones that share that DN are logged out.
- The DN does ring if one or more phone that is sharing the DN is logged in.
- The audible ring on a phone that is logged out gets turned off by default. Cisco Unified Communications Manager provides a system parameter that can be set, so a different ring tone plays when a call comes in to a logged-off hunt group member.

### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Closest Match Routing

Closest match routing process routes a call by using the route pattern that most closely matches the dialed number. When the Cisco Unified Communications Manager encounters a dialed number that matches multiple route patterns, it uses closest match routing to determine which route pattern most closely matches the number and directs the call by using that route pattern.

When two configured route patterns exactly match the same number of addresses in different partitions, Cisco Unified Communications Manager chooses the route pattern on the basis of the order in which the partitions are listed in the calling search space. (Cisco Unified Communications Manager chooses the route pattern from the partition that appears first in the calling search space.)



If two configured route patterns exactly match the same number of addresses in a partition, the Cisco Unified Communications Manager arbitrarily chooses one. The following paragraphs explain why such exact matches signify an unusual occurrence.

Several route patterns can match a single number. For instance, the number 8912 matches all the following route patterns: 8912, 89XX, and 8XXX.

In this example, the route pattern 8912 matches exactly one address. The route pattern 89XX matches 8912 plus 99 other addresses, and the route pattern 8XXX matches 8912 plus 999 other addresses.

If the user dials 8913, the call routes differently. Using the preceding example, this address matches only the routing patterns 89XX and 8XXX. Because 89XX matches a narrower range of addresses than 8XXX, the Cisco Unified Communications Manager delivers the call to the device that is assigned the routing pattern 89XX.

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Using the @ Wildcard Character in Route Patterns

Using the @ wildcard character in a route pattern provides a single route pattern to match all NANP numbers, and requires additional consideration.

The number 92578912 matches both of the following route patterns: 9.@ and 9.XXXXXXXXX. Even though both these route patterns seem to equally match the address, the 9.@ route pattern actually provides the closest match. The @ wildcard character encompasses many different route patterns, and one of those route patterns is [2-9][02-9]XXXXXX. Because the number 2578912 more closely matches [2-9][02-9]XXXXXX than it does XXXXXXXX, the 9.@ route pattern provides the closest match for routing.

When configuring route patterns, take the following considerations into account:

- When @ is used in a routing pattern, the system recognizes octothorpe (#) automatically as an end-of-dialing character for international calls. For routing patterns that do not use @, you must include the # in the routing pattern to be able to use the # character to signal the end of dialing.
- If the route pattern contains an at symbol (@), the Discard Digits field can specify any discard digits instructions (DDIs).

The [“Special Characters and Settings”](#) section on page 16-21 lists DDIs and describes the effects of applying each DDI to a dialed number.

#### Discard Digits Instructions

A discard digits instruction (DDI) removes a portion of the dialed digit string before passing the number on to the adjacent system. Portions of the digit string must be removed, for example, when an external access code is needed to route the call to the PSTN, but the PSTN switch does not expect that access code.



Note

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With non-@ patterns, you can use only Discard Digits instructions <None>, NoDigits, and PreDot.

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#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

# Translation Patterns

Cisco Unified Communications Manager uses translation patterns to determine how to route a call after it is placed. Configuring translation patterns allows Cisco Unified Communications Manager to manipulate calling and called digits as appropriate. During digit analysis when Cisco Unified Communications Manager identifies that a pattern match has occurred, Cisco Unified Communications Manager uses the calling search space that is configured for the translation pattern to perform the subsequent match.

Because Cisco Unified Communications Manager supports local route groups, calling party normalization, and the international escape character +, which allow you to globalize, route, and localize calling party numbers, you can configure translation patterns as urgent or non-urgent to ensure that Cisco Unified Communications Manager does not route the call before it should be routed.

For example, if a caller in the 408 area code dials 95551212, this number gets globalized to +14085551212 through the use of translation patterns; that is, digit analysis does a pattern match for that string to determine where to route the call. In this example, a translation pattern takes 9.[2-9]XXXXXX, translates that string to +1408XXXXXX, and then maps that value to a calling search space that contains the globalized patterns. This example works as long as you do not use variable length dialing, as is the case with international calls. If you want to route an international call, you need a translation pattern for 9011.! that disregards the predot and adds the prefix +. If you configure the translation pattern as urgent priority, 9011! matches with the first digit after the 9011 and Cisco Unified Communications Manager attempts to route the call without waiting to match more digits. As a result, international and any other variable length calls do not route correctly.

Because you can configure translation patterns as non-urgent in Cisco Unified Communications Manager, you can configure similar translation patterns in the same partition and ensure that digit analysis can accurately match the patterns. Even if digit analysis identifies a match with a translation pattern, Cisco Unified Communications Manager attempts to match more digits in other translation patterns if you configure the translation pattern as non-urgent.

**Tip**

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To route international and variable length calls correctly, make sure that you configure the translation patterns as non-urgent.

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In Cisco Unified Communications Manager Administration, you can configure any translation pattern as urgent priority or non-urgent priority. The Urgent Priority check box displays in the Translation Pattern Configuration (Call Routing > Translation Pattern) and Intercom Translation Pattern Configuration (Call Routing > Intercom > Intercom Translation Pattern) windows. If you do not check this check box and if the dial plan contains overlapping patterns, Cisco Unified Communications Manager does not route the call until the interdigit timer expires (even if it is possible to dial a sequence of digits to choose a current match). To interrupt interdigit timing when Cisco Unified Communications Manager must route a call immediately, check this check box.

After you install or upgrade Cisco Unified Communications Manager, the Urgent Priority check box in translation patterns displays as checked and enabled. Update your translation patterns, if necessary, to accommodate your dial plan.

**Additional Information**

See the [“Where to Find More Information”](#) section on page 16-49.

# Static Digit Analysis

Static digit analysis (DA) ensures that whether a phone is registered or not, the device remains in the DA table, and the directory number intercepts the call.

## Configuration Tip



Tip

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Cisco Unified Communications Manager Assistant does not use translation patterns for failover. Instead, set up Call Forward No Answer (CFNA) with the data that was in the translation pattern for all Unified CM Assistant failed route points, and these route points must be removed.

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The digit analysis process builds a static digit analysis engine with the patterns that are configured in the database during system initialization. This digit analysis engine reduces the propagation of patterns within a cluster of Cisco Unified Communications Managers and makes Cisco Unified Communications Manager more scalable.

In previous releases, the individual device control process read pattern information from the database and dynamically registered the patterns to the digit analysis process to build its digit analysis engine. Each pattern had a mapping to its control process ID in the digit analysis engine. The control process ID of a pattern got changed dynamically if its associated device was reset or if a Cisco Unified Communications Manager server restarted. If a change to the control process ID took place, the digit analysis engine had to be changed dynamically, and its contents required propagation to other Cisco Unified Communications Manager servers. During call processing, the digit analysis engine returned the control process ID of a matched pattern.

The digit analysis process reads the pattern information directly from the database to build the static digit analysis engine during Cisco Unified Communications Manager initialization. With the static digit analysis engine, each pattern has a mapping to its callable endpoint name, which is a NumPlanPkID of the pattern in the database, a unique identifier to a configured pattern in Cisco Unified Communications Manager. The static digit analysis engine no longer holds the control process ID of a pattern.

Static digit analysis integrates with the changes to the device manager to support all existing functions and features. The device manager includes a table where a NumPlanPkID shows a one-to-one mapping to the control process ID of a pattern. When processing a call, digit analysis asks the device manager to get the control process ID for a matched pattern.

## Feature Description

Cisco Unified Communications Manager includes these pattern types: Call Park, Call Forward, Meet-Me Conference, Device, Translation, Call Pickup Group, Route, and Message Waiting. The Device, Translation, and Route pattern types represent static patterns. The digit analysis process reads these patterns directly and inserts them into the static digit analysis engine during the initialization of a Cisco Unified Communications Manager. Other pattern types (Call Park, Call Forward, Meet-Me Conference, Call Pickup Group, and Message Waiting), which are intercept patterns, remain dynamic patterns. Their individual control process reads the pattern information from the database and then asks the digit analysis process to insert the pattern into the static digit analysis engine via registration messages.

All static patterns remain unchanged until their records are changed in the database. Static patterns do not require propagation because the database change notification is broadcast to the servers within a cluster. Dynamic patterns still use the existing propagating and updating mechanism to update the static digit analysis engines.

Regardless of its pattern type, each static pattern in the static digit analysis engine has a mapping to its PkID in the NumPlan table in the database. When a device registers its patterns to the device manager, the same PkID gets saved and mapped to its control process ID in the device manager. A new interface between the digit analysis and device manager retrieves the control process ID when a matched pattern is found in the static digit analysis engine during call processing.

#### Caveat 1

A potential loss of change notification exists in the current Cisco Unified Communications Manager release. This loss could cause a device that is registered with Cisco Unified Communications Manager to become unreachable by other devices. The following paragraphs provide troubleshooting for this potential problem.

The most common cause for this problem occurs when the DN that is assigned to the device belongs to a partition that is not contained in the calling search space of other devices. If the calling search space of other devices does contain the partition for that DN, other reasons may apply. For example, the DN changed only for that device, and the change notification from the database to Cisco Unified Communications Manager was lost. Resetting the device may not resolve the problem.

To resolve this problem, remove the DN and add the DN to the system again. Remove the DN from its device on the Directory Number Configuration window and on the Route Plan Report window. After you remove the DN, add it back in with the same partition, pattern, and other configuration information. The process should resolve the problem after you add the new DN to Cisco Unified Communications Manager again.

The same workaround applies to route patterns and translation patterns if similar problems exist.



#### Tip

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Be sure to document all configurations before removing the patterns.

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#### Caveat 2

Static digit analysis disables the configuration of several applications. These applications rely on the provision of duplicate patterns in the same calling search space. For example, the CTI application may be pattern 5000 in partition A, and a particular phone may be pattern 5000 in partition B. In previous releases, if the CTI route point is down, the phone will ring. With static digit analysis, however, the caller receives a busy tone. This limitation implies that the application failure does not get handled.

Administrators would normally use Call Forward No Answer and Call Forward on failure to handle application failure, but when the pattern on the CTI route point is 5XXX, you cannot configure a forward destination of 5XXX. To resolve this limitation, you can now perform configuration of X characters in Call Forward destinations.

The following example demonstrates the functionality of digit analysis for the Cisco Unified Communications Manager Assistant application.

#### Cisco Unified Communications Manager Assistant Example with Static Digit Analysis

You must make the following modification: configure *Ixxx* as a CFNA mask and CSS-E as a CFNA calling search space for the CTI route point to handle the CTI route point failure case.

When static digit analysis gets used, the following processing takes place:

- If the CTI route point (RP) is up, 1000/IPMA:Everyone calls 1001. The call routes through CTI route point *IPMA/IXXX*. (Routing does not change from previous releases.)
- If the CTI route point is down, 1000/IPMA:Everyone calls 1001. The call goes to the CTI route point, and its CFNA is triggered. The forwarding feature routes the call through the translation pattern *Everyone/Ixxx*, and the call reaches Manager/1001 after translation.

Without configuring the CFNA in the CTI route point, the translation pattern never gets matched, and the Cisco Unified Communications Manager Assistant application fails.

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Calling Party Normalization

In line with E.164 standards, calling party normalization, which adds the support of international escape character, +, to Cisco Unified Communications Manager, enhances the dialing capabilities of some phones and improves call back functionality when a call is routed to multiple geographical locations; that is, the feature ensures that the called party can return a call without having to modify the directory number in the call log directories on the phone. Additionally, calling party normalization allows you to globalize and localize phone numbers, so the appropriate calling number presentation displays on the phone.



#### Tip

Configuring calling party normalization alleviates issues with toll bypass where the call is routed to multiple locations over the IP WAN. In addition, it allows Cisco Unified Communications Manager to distinguish the origin of the call to globalize or localize the calling party number for the phone user.

For information on the international escape character, +, see the [“Using the International Escape Character +”](#) section on page 16-22.

For information on calling party normalization (globalizing and localizing the calling party number), see the [“Calling Party Normalization”](#) chapter in the *Cisco Unified Communications Manager Features and Services Guide*.

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Special Characters and Settings

Cisco Unified Communications Manager Administration allows you to use special characters and settings to perform the following tasks:

- Allowing a single route pattern or hunt pilot to match a range of numbers
- Removing a portion of the dialed digit string
- Manipulating the appearance of the calling party number for outgoing calls
- Manipulating the dialed digits, or called party number, for outgoing calls

For more information on how to use special characters and settings, see the following topics:

- [Using the International Escape Character +](#), page 16-22
- [Wildcards and Special Characters in Route Patterns and Hunt Pilots](#), page 16-27
- [Discard Digits Instructions](#), page 16-29

#### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Using the International Escape Character +

Configuring the international escape character, +, in Cisco Unified Communications Manager Administration allows your phone users to place calls without having to remember and enter the international direct dialing prefix/international escape code that is associated with the called party. Depending on the phone model, for example, dual-mode phones, your phone users can dial + on the keypad of the phone. In other cases, the phone user can return calls by accessing the call log directory entries that contain +. In addition, using the international escape character allows you to support globalization of calling party numbers, which is part of the calling party normalization feature; for information on the calling party normalization feature, see the “[Calling Party Normalization](#)” chapter in the *Cisco Unified Communications Manager Features and Services Guide*.

The international escape character, +, signifies the international access code in a complete E.164 number format. For example, NANP numbers have an E.164 global format in the format +1 214 555 1234. The + is a leading character that gets replaced by service providers in different countries with the international access code to achieve global dial plans.

In cases where you define a pattern with a dialable + digit in Cisco Unified Communications Manager Administration, a plus sign preceded by a backslash, that is, \+, indicates that you want to configure the international escape character +. In other cases in Cisco Unified Communications Manager Administration, for example, in prefix or mask fields, you can enter + to indicate the international escape character.

See the following sections for more information on the international escape character, +:

- [Configuring \+ for the International Escape Character +, page 16-22](#)
- [Configuring + for the International Escape Character, page 16-23](#)
- [Gateways and Trunks that Support International Escape Character +, page 16-24](#)
- [Phones that Support International Escape Character +, page 16-26](#)

### Configuring \+ for the International Escape Character +

To configure the international escape character, +, for patterns and directory numbers, you configure \+ in the windows in [Table 16-3](#):

**Table 16-3** Entering \+ in Cisco Unified Communications Manager Administration

Configuration Window	Fields that Support Entering \+ for International Escape Character
Route Pattern, Hunt Pilot, and Translation Pattern	Route Pattern, Hunt Pilot, and Translation Pattern
Directory Number	Directory Number
Intercom Translation Pattern	Intercom Translation Pattern
Calling Party Transformation	Pattern
Called Party Transformation	Pattern

Entering + in the windows in [Table 16-3](#) does not configure the international escape character; instead, entering the + in the pattern fields means that the system should match one or more of the previous characters during digit analysis, as described in the “[Wildcards and Special Characters in Route Patterns and Hunt Pilots](#)” section on page 16-27. Consider the following information for configuring the international escape character in the windows in [Table 16-3](#):

- To configure the international escape character for supported patterns, make sure that you enter \+ in the pattern or Directory Number field.

- For all patterns in [Table 16-3](#) except for the directory number, you can configure the international escape character, \+, at the beginning, in the middle, or at the end of a pattern. For example, you can configure \+91! or 0\+23! in the pattern fields.

For directory numbers, you can configure the international escape character, \+, at the beginning of the number only.

- You can configure \+ as a dialable character and a + wildcard within a single pattern; for example, you can configure a pattern like 1234\+56+, where \+ equals the dialable character and + serves as the wildcard.
- You can configure multiple international escape characters \+ in a single pattern; for example, you can configure a pattern like 147\+56\+89\+.


**Tip**

Meet-Me patterns, Call Park (and related call park features; for example, Directed Call Park) patterns, and Call Pickup patterns do not support the international escape character, +, so you cannot enter \+ in the pattern fields that are configured for these features.

### Configuring + for the International Escape Character

[Table 16-4](#) provides the configuration windows and fields where you can enter + to indicate the international escape character +.

**Table 16-4** *Configuring + for the International Escape Character in Cisco Unified Communications Manager Administration*

Configuration Window	Fields that Support Entering + for International Escape Character
Device Pool	Incoming Calling Party Settings (Prefix fields for Unknown, Subscriber, International Number, National Number) Incoming Called Party Settings (Prefix fields for Unknown, Subscriber, International Number, National Number)
Service Parameter	all Incoming Calling Party prefix service parameters and Incoming Called Party service parameters for H.323
Route Pattern, Hunt Pilot, Intercom Translation Pattern, and Translation Pattern	Calling Party Transform Mask, Called Party Transform Mask, and Prefix Digits (Outgoing Calls)
Directory Number	External Phone Number Mask and all Call Forwarding fields
Calling Party Transformation	Calling Party Transform Mask and Prefix Digits (Outgoing Calls)
Called Party Transformation	Called Party Transform Mask and Prefix Digits
Voice Mail Port and Voice Mail Port Wizard	External Number Mask
Message Waiting	Message Waiting Number
Voice Mail Pilot	Voice Mail Pilot Number

**Table 16-4** *Configuring + for the International Escape Character in Cisco Unified Communications Manager Administration (continued)*

Configuration Window	Fields that Support Entering + for International Escape Character
Gateway	<p>Incoming Calling Party Settings (Prefix fields for Unknown, Subscriber, International Number, National Number)</p> <p>Incoming Called Party Settings (Prefix fields for Unknown, Subscriber, International Number, National Number)—H.323 gateways</p> <p>Caller ID DN, and Prefix DN</p> <p><b>Tip</b> MGCP gateways support sending the international escape character + ; H.323 gateways do not support the +, so the gateway strips the + when a calling or called party offers it to the gateway.</p>
Trunk	<p>Incoming Calling Party Settings (Prefix fields for Unknown, Subscriber, International Number, National Number)</p> <p>Incoming Called Party Settings (Prefix fields for Unknown, Subscriber, International Number, National Number)—H.323 trunks</p> <p>Caller ID DN and Prefix DN</p>
Speed Dial and Abbreviated Dial	Number (allows the international escape character, +, to display as part of the speed dial number on the phone)

#### Gateways and Trunks that Support International Escape Character +

SIP and MGCP gateways can support sending the international escape character, +, for calls. H.323 gateways do not support the +. QSIG trunks do not attempt to send the +, but SIP trunks can support sending the +.

For outgoing calls through a gateway that supports +, Cisco Unified Communications Manager can send the + with the dialed digits to the gateway. For outgoing calls through a gateway that does not support +, the gateway strips the + when Cisco Unified Communications Manager sends the call information to the gateway.

When + is not supported but the global calling party number includes +, configure the called party transformations and route patterns to send the outdial digits in a format that the device supports.



#### Tip

If you want to do so, you can configure the Strip + on Outbound Calls service parameter, which supports the Cisco CallManager service. This parameter determines whether Cisco Unified Communications Manager strips the international escape character, +, from the calling and called parties for outgoing calls through MGCP gateways and SIP trunks. If your network or far-end gateway does not recognize the + as a digit, set this parameter to False; if you set this parameter to True and the + is not supported in network or by the receiving gateway, calls that use + may drop. Ensure that calls over QSIG trunks do not utilize + because QSIG does not send the +. This parameter does not impact H.323 outbound calls because H.323 gateways unconditionally strip the + when they route outbound calls.



If you set the Strip + on Outbound Calls service parameter to True, Cisco Unified Communications Manager strips the + for the calling and called parties for all outgoing calls through all MGCP gateways and SIP trunks. To ensure that Cisco Unified Communications Manager does not strip the + for outgoing calls through particular MGCP gateways and SIP trunks, configure the calling party and called party transformation patterns for outgoing gateways to include the + prefix for international calls.

The H.323 protocol does not support the international escape character, +. To ensure that correct prefixes, including the international escape character, +, get applied for inbound calls over H.323 gateways/trunks, you must configure the incoming called party settings in the service parameter, device pool, H.323 gateway, or H.323 trunk windows; that is, configuring the incoming called party settings ensures that when a inbound call comes from a H.323 gateway or trunk, Cisco Unified Communications Manager transforms the called party number back to the value that was originally sent over the trunk/gateway.

For example, to ensure that the correct DN patterns get used with SAF/call control discovery for inbound calls over H.323 gateways/trunks, you must configure the incoming called party settings in the service parameter, device pool, or H.323 (non-gatekeeper controlled) trunk window. See the following example for more information.

- A caller places a call to +19721230000 to Cisco Unified Communications Manager A.
- Cisco Unified Communications Manager A receives +19721230000 and transforms the number to 55519721230000 before sending the call to the H.323 trunk. In this case, your configuration indicates that the international escape character + should be stripped and 555 should be prepended for calls of International type.
- For this inbound call from the trunk, Cisco Unified Communications Manager B receives 55519721230000 and transforms the number back to +19721230000 so that digit analysis can use the value as it was sent by the caller. In this case, your configuration for the incoming called party settings indicates that you want 555 to be stripped and +1 to be prepended to called party numbers of International type.

The service parameters support the Cisco CallManager service. To configure the service parameters, click **Advanced** in the Service Parameter Configuration window for the Cisco CallManager service; then, locate the H.323 pane for the following parameters:

- Incoming Called Party National Number Prefix - H.323
- Incoming Called Party International Number Prefix - H.323
- Incoming Called Party Subscriber Number Prefix - H.323
- Incoming Called Party Unknown Number Prefix - H.323

These service parameters allow you to prefix digits to the called number based on the Type of Number field for the inbound offered call. You can also strip a specific number of leading digits before the prefix gets applied. To prefix and strip digits by configuring these parameter fields, use the following formula, x:y, where x represents the exact prefix that you want to add to called number and y represents the number of digits stripped; be aware that the colon separates the prefix and the number of stripped digits. For example, enter 91010:6 in the field, which means that you want to strip 6 digits and then add 901010 to the beginning of the called number. In this example, a national call of 2145551234 becomes 910101234. You can strip up to 24 digits and prefix/add up to than 16 digits.

### Phones that Support International Escape Character +

The following Cisco Unified IP Phones, which run SIP or SCCP unless noted otherwise, can display + on the phone screen, speed dials, directory numbers, and in call log (Redial, Missed Calls, and so on) directories on the phone.

- 7906 and 7911
- 7921 (SCCP only) and 7931
- 7941, 7942, 7945
- 7961, 7965
- 7970, 7971, 7975
- 7985 (SCCP only)

The Nokia S60, a dual-mode phone, also supports + dialing from the keypad on the phone. For example, a caller in the United States calls an international number in India. If the caller uses a dual-mode phone, the caller can directly dial + to represent the international number. The caller may call 0+91802501523 or +918025010523, depending on the outgoing route pattern settings. Dialing the + on the keypad assumes that the outgoing gateway can support the +; if the outgoing gateway does not support +, you must configure the route pattern like \+!, where Cisco Unified Communications Manager strips the \+ and prefixes 011 to transform the international number to 011 91 8025010523.

Consider the following information about + and the phone:

- If a phone displays the + in a call log directory entry on the phone, the end user can place a call without having to edit the entry in the call log directory. If the outgoing gateway does not support the +, configure the outgoing route pattern so that Cisco Unified Communications Manager can strip the international escape code and prefix the international access code to the directory number in the call log directory.
- If you do not configure transformation patterns to localize the calling party number, as described in [“Localizing the Calling Party Number”](#) section in the *Cisco Unified Communications Manager Features and Services Guide*, a called party may receive an international call that contains + in the calling party number, for example, 0+494692022002 or +4940692022002, depending on the configuration of the incoming gateway. If the called party does not answer the call, the calling party number gets stored with the + in the call log directories on the phone. The called party can return the call without having to edit the entry in the call log directory.
- A caller can place a call to a speed dial number that is configured as an E.164 number that contains the +.
- Cisco Unified IP Phones 7902, 7905, 7912, 7920, 7940, and 7960 that run SCCP can receive calls from directory numbers that contain the international escape character, +, although these phones do not display the + on the phone because Cisco Unified Communications Manager strips the + before the call completes.
- SRST does not work for phones that are running SIP that display the + in the call alerting pane or the call log directories on the phone; therefore, phones that are running SIP that display the + cannot register with SRST-enabled gateways, and calls to the SRST-enabled gateway fail if a directory number that is used for the call includes the +. SCCP phones that display the + on the phone can register with SRST.

### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.



**Table 16-5 Wildcards and Special Characters (continued)**

Character	Description	Examples
.	The dot (.) character, used as a delimiter, separates the Cisco Unified Communications Manager access code from the directory number.  Use this special character, with the discard digits instructions, to strip off the Cisco Unified Communications Manager access code before sending the number to an adjacent system.  Each route pattern can have only one dot (.) character.	The route pattern 9.@ identifies the initial 9 as the Cisco Unified Communications Manager access code in a NANP call.
*	The asterisk (*) character can provide an extra digit for special dialed numbers.	You can configure the route pattern *411 to provide access to the internal operator for directory assistance.
#	The octothorpe (#) character generally identifies the end of the dialing sequence.  Ensure the # character is the last character in the pattern.	The route pattern 901181910555# routes or blocks an international number that is dialed from within the NANP. The # character after the last 5 identifies this digit as the last digit in the sequence.
\+	A plus sign preceded by a backslash, that is, \+, indicates that you want to configure the international escape character +.  Using \+ means that the international escape character + is used as a dialable digit, not as a wildcard.  For more information on this character, see the <a href="#">“Using the International Escape Character +”</a> section on page 16-22.	For examples, see the <a href="#">“Using the International Escape Character +”</a> section on page 16-22.

Table 16-6 lists Cisco Unified Communications Manager Administration fields that require route patterns or hunt pilots and shows the valid entries for each field.

**Table 16-6 Field Entries**

Field	Valid entries
Call Park Number/Range	[ ^ 0 1 2 3 4 5 6 7 8 9 - ] X * #
Calling Party Transform Mask	0 1 2 3 4 5 6 7 8 9 X A B C D * # +
Called Party Transform Mask	0 1 2 3 4 5 6 7 8 9 X A B C D * # +
Caller ID DN (Gateways and Trunks)	0 1 2 3 4 5 6 7 8 9 X * # +
Directory Number	\+ [ ^ 0 1 2 3 4 5 6 7 8 9 - ] + ? ! X * # +
Directory Number (Call Pickup Group Number)	0 1 2 3 4 5 6 7 8 9
External Phone Number Mask	0 1 2 3 4 5 6 7 8 9 X * # +

**Table 16-6** *Field Entries (continued)*

Field	Valid entries
Forward All	0 1 2 3 4 5 6 7 8 9 * # +
Forward Busy	0 1 2 3 4 5 6 7 8 9 * # +
Forward No Answer	0 1 2 3 4 5 6 7 8 9 * # +
Meet-Me Conference Number	[ ^ 0 1 2 3 4 5 6 7 8 9 - ] X * #
Prefix Digits	0 1 2 3 4 5 6 7 8 9 A B C D * # +
Prefix DN (Gateways and Trunks)	0 1 2 3 4 5 6 7 8 9 * # +
Route Filter Tag Values	[ ^ 0 1 2 3 4 5 6 7 8 9 - ] X * #
Route Pattern	[ ^ 0 1 2 3 4 5 6 7 8 9 A B C D - ] + ? ! X * # + . @ \+
Translation Pattern	[ ^ 0 1 2 3 4 5 6 7 8 9 A B C D - ] + ? ! X * # + . @ \+
Hunt Pilot	[ ^ 0 1 2 3 4 5 6 7 8 9 A B C D - ] + ? ! X * # + . @ \+

**Additional Information**

See the [“Where to Find More Information”](#) section on page 16-49.

## Discard Digits Instructions

A discard digits instruction (DDI) removes a portion of the dialed digit string before passing the number on to the adjacent system. A DDI must remove portions of the digit string, for example, when an external access code is needed to route the call to the PSTN, but the PSTN switch does not expect that access code.

[Table 16-7](#) lists DDIs and describes the effects of applying each DDI to a dialed number.

**Table 16-7** *Discard Digits Instructions*

DDI	Effect	Example
10-10-Dialing	This DDI removes <ul style="list-style-type: none"> <li>IXC access code</li> </ul>	Route pattern: 9.@ Dialed digit string: 910102889728135000 After applying DDI: 99728135000
10-10-Dialing Trailing-#	This DDI removes <ul style="list-style-type: none"> <li>IXC access code</li> <li>End-of-dialing character for international calls</li> </ul>	Route pattern: 9.@ Dialed digit string: 9101028801181910555# After applying DDI: 901181910555

Table 16-7 Discard Digits Instructions (continued)

DDI	Effect	Example
11/10D->7D	<p>This DDI removes</p> <ul style="list-style-type: none"> <li>• Long-distance direct-dialing code</li> <li>• Long-distance operator-assisted dialing code</li> <li>• IXC access code</li> <li>• Area code</li> <li>• Local area code</li> </ul> <p>This DDI creates a 7-digit local number from an 11- or 10-digit dialed number.</p>	<p>Route pattern: 9.@</p> <p>Dialed digit string: 919728135000 or 99728135000</p> <p>After applying DDI: 98135000</p>
11/10D->7D Trailing-#	<p>This DDI removes</p> <ul style="list-style-type: none"> <li>• Long-distance direct-dialing code</li> <li>• Long-distance operator-assisted dialing code</li> <li>• IXC access code</li> <li>• Area code</li> <li>• Local area code</li> <li>• End-of-dialing character for international calls</li> </ul> <p>This DDI creates a 7-digit local number from an 11- or 10-digit dialed number.</p>	<p>Route pattern: 9.@</p> <p>Dialed digit string: 919728135000 or 99728135000</p> <p>After applying DDI: 98135000</p>
11D->10D	<p>This DDI removes</p> <ul style="list-style-type: none"> <li>• Long-distance direct-dialing code</li> <li>• Long-distance operator-assisted dialing code</li> <li>• IXC access code</li> </ul>	<p>Route pattern: 9.@</p> <p>Dialed digit string: 919728135000</p> <p>After applying DDI: 99728135000</p>
11D->10D Trailing-#	<p>This DDI removes</p> <ul style="list-style-type: none"> <li>• Long-distance direct-dialing code</li> <li>• Long-distance operator-assisted dialing code</li> <li>• End-of-dialing character for international calls</li> <li>• IXC access code</li> </ul>	<p>Route pattern: 9.@</p> <p>Dialed digit string: 919728135000</p> <p>After applying DDI: 99728135000</p>

Table 16-7 Discard Digits Instructions (continued)

DDI	Effect	Example
Intl TollBypass	This DDI removes <ul style="list-style-type: none"> <li>• International access code</li> <li>• International direct-dialing code</li> <li>• Country code</li> <li>• IXC access code</li> <li>• International operator-assisted dialing code</li> </ul>	Route pattern: 9.@ Dialed digit string: 901181910555 After applying DDI: 9910555
Intl TollBypass Trailing-#	This DDI removes <ul style="list-style-type: none"> <li>• International access code</li> <li>• International direct-dialing code</li> <li>• Country code</li> <li>• IXC access code</li> <li>• International operator-assisted dialing code</li> <li>• End-of-dialing character</li> </ul>	Route pattern: 9.@ Dialed digit string: 901181910555# After applying DDI: 9910555
NoDigits	This DDI removes no digits.	Route pattern: 9.@ Dialed digit string: 919728135000 After applying DDI: 919728135000
Trailing-#	This DDI removes <ul style="list-style-type: none"> <li>• End-of-dialing character for international calls</li> </ul>	Route pattern: 9.@ Dialed digit string: 901181910555# After applying DDI: 901181910555
PreAt	This DDI removes all digits prior to the NANP portion of the route pattern, including <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• PBX external access code</li> </ul>	Route pattern: 8.9@ Dialed digit string: 899728135000 After applying DDI: 9728135000
PreAt Trailing-#	This DDI removes all digits prior to the NANP portion of the route pattern, including <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• PBX external access code</li> <li>• End-of-dialing character for international calls</li> </ul>	Route pattern: 8.9@ Dialed digit string: 8901181910555# After applying DDI: 01181910555

Table 16-7 Discard Digits Instructions (continued)

DDI	Effect	Example
PreAt 10-10-Dialing	<p>This DDI removes all digits prior to the NANP portion of the route pattern, including</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• PBX external access code</li> <li>• IXC access code</li> </ul>	<p>Route pattern: 8.9@</p> <p>Dialed digit string: 8910102889728135000</p> <p>After applying DDI: 9728135000</p>
PreAt 10-10-Dialing Trailing-#	<p>This DDI removes all digits prior to the NANP portion of the route pattern, including</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• PBX external access code</li> <li>• IXC access code</li> <li>• End-of-dialing character for international calls</li> </ul>	<p>Route pattern: 8.9@</p> <p>Dialed digit string: 89101028801181910555#</p> <p>After applying DDI: 01181910555</p>
PreAt 11/10D->7D	<p>This DDI removes all digits prior to the NANP portion of the route pattern, including</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• PBX external access code</li> <li>• Long-distance direct-dialing code</li> <li>• Long-distance operator-assisted dialing code</li> <li>• IXC access code</li> <li>• Area code</li> <li>• Local area code</li> </ul> <p>This DDI creates a 7-digit local number from an 11- or 10-digit dialed number.</p>	<p>Route pattern: 8.9@</p> <p>Dialed digit string: 8919728135000 or 899728135000</p> <p>After applying DDI: 8135000</p>



Table 16-7 Discard Digits Instructions (continued)

DDI	Effect	Example
PreAt 11/10D->7D Trailing-#	<p>This DDI removes all digits prior to the NANP portion of the route pattern, including</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• PBX external access code</li> <li>• Long-distance direct-dialing code</li> <li>• Long-distance operator-assisted dialing code</li> <li>• IXC access code</li> <li>• Area code</li> <li>• Local area code</li> <li>• End-of-dialing character for international calls</li> </ul> <p>This DDI creates a 7-digit local number from an 11- or 10-digit dialed number.</p>	<p>Route pattern: 8.9@</p> <p>Dialed digit string: 8919728135000 or 899728135000</p> <p>After applying DDI: 8135000</p>
PreAt 11D->10D	<p>This DDI removes all digits prior to the NANP portion of the route pattern, including</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• PBX external access code</li> <li>• Long-distance direct-dialing code</li> <li>• Long-distance operator-assisted dialing code</li> <li>• IXC access code</li> </ul>	<p>Route pattern: 8.9@</p> <p>Dialed digit string: 8919728135000</p> <p>After applying DDI: 9728135000</p>
PreAt 11D->10D Trailing-#	<p>This DDI removes all digits prior to the NANP portion of the route pattern, including</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• PBX external access code</li> <li>• Long-distance direct-dialing code</li> <li>• Long-distance operator-assisted dialing code</li> <li>• IXC access code</li> <li>• End-of-dialing character for international calls</li> </ul>	<p>Route pattern: 8.9@</p> <p>Dialed digit string: 8919728135000</p> <p>After applying DDI: 9728135000</p>

Table 16-7 Discard Digits Instructions (continued)

DDI	Effect	Example
PreAt Intl TollBypass	<p>This DDI removes all digits prior to the NANP portion of the route pattern, including</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• PBX external access code</li> <li>• International access code</li> <li>• International direct-dialing code</li> <li>• Country code</li> <li>• IXC access code</li> <li>• International operator-assisted dialing code</li> </ul>	<p>Route pattern: 8.9@ Dialed digit string: 8901181910555 After applying DDI: 910555</p>
PreAt Intl TollBypass Trailing-#	<p>This DDI removes all digits prior to the NANP portion of the route pattern, including</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• PBX external access code</li> <li>• International access code</li> <li>• International direct-dialing code</li> <li>• Country code</li> <li>• IXC access code</li> <li>• International operator-assisted dialing code</li> <li>• End-of-dialing character</li> </ul>	<p>Route pattern: 8.9@ Dialed digit string: 8901181910555# After applying DDI: 910555</p>
PreDot	<p>This DDI removes</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> </ul>	<p>Route pattern: 8.9@ Dialed digit string: 899728135000 After applying DDI: 99728135000</p>
PreDot Trailing-#	<p>This DDI removes</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• End-of-dialing character for international calls</li> </ul>	<p>Route pattern: 8.9@ Dialed digit string: 8901181910555# After applying DDI: 901181910555</p>
PreDot 10-10-Dialing	<p>This DDI removes</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• IXC access code</li> </ul>	<p>Route pattern: 8.9@ Dialed digit string: 8910102889728135000 After applying DDI: 99728135000</p>

Table 16-7 Discard Digits Instructions (continued)

DDI	Effect	Example
PreDot 10-10-Dialing Trailing-#	This DDI removes <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• IXC access code</li> <li>• End-of-dialing character for international calls</li> </ul>	Route pattern: 8.9@ Dialed digit string: 89101028801181910555# After applying DDI: 901181910555
PreDot 11/10D->7D	This DDI removes <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• Long-distance direct-dialing code</li> <li>• Long-distance operator-assisted dialing code</li> <li>• IXC access code</li> <li>• Area code</li> <li>• Local area code</li> </ul> This DDI creates a 7-digit local number from an 11- or 10-digit dialed number.	Route pattern: 8.9@ Dialed digit string: 8919728135000 or 899728135000 After applying DDI: 98135000
PreDot 11/10D->7D Trailing-#	This DDI removes <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• Long-distance direct-dialing code</li> <li>• Long-distance operator-assisted dialing code</li> <li>• IXC access code</li> <li>• Area code</li> <li>• Local area code</li> <li>• End-of-dialing character for international calls</li> </ul> This DDI creates a 7-digit local number from an 11- or 10-digit dialed number.	Route pattern: 8.9@ Dialed digit string: 8919728135000 or 899728135000 After applying DDI: 98135000
PreDot 11D->10D	This DDI removes <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• Long-distance direct-dialing code</li> <li>• Long-distance operator-assisted dialing code</li> <li>• IXC access code</li> </ul>	Route pattern: 8.9@ Dialed digit string: 8919728135000 After applying DDI: 99728135000

Table 16-7 Discard Digits Instructions (continued)

DDI	Effect	Example
PreDot 11D->10D Trailing-#	This DDI removes <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• Long-distance direct-dialing code</li> <li>• Long-distance operator-assisted dialing code</li> <li>• IXC access code</li> <li>• End-of-dialing character for international calls</li> </ul>	Route pattern: 8.9@ Dialed digit string: 8919728135000 After applying DDI: 99728135000
PreDot Intl TollBypass	This DDI removes <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• International access code</li> <li>• International direct-dialing code</li> <li>• Country code</li> <li>• IXC access code</li> <li>• International operator-assisted dialing code</li> </ul>	Route pattern: 8.9@ Dialed digit string: 8901181910555 After applying DDI: 9910555
PreDot Intl TollBypass Trailing-#	This DDI removes <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager external access code</li> <li>• International access code</li> <li>• International direct-dialing code</li> <li>• Country code</li> <li>• IXC access code</li> <li>• International operator-assisted dialing code</li> <li>• End-of-dialing character</li> </ul>	Route pattern: 8.9@ Dialed digit string: 8901181910555# After applying DDI: 9910555

**Additional Information**

See the [“Where to Find More Information”](#) section on page 16-49.

## Calling and Called Party Transformations

Cisco Unified Communications Manager Administration allows you to manipulate the calling party number and the called party number that Cisco Unified Communications Manager sends with each call setup message.

**Tip**

You configure calling and called party transformation patterns to provide context-sensitive modifications to a calling or called party; Cisco Unified Communications Manager does not use these patterns for routing calls.

**Note**

Both calling party transformations and called party transformations can be used with the Cisco Intercompany Media Engine (Cisco IME). See the *Cisco Intercompany Media Engine Installation and Configuration Guide* for details.

The following topics provide information on these settings:

- [Calling Party Number Transformations Settings, page 16-37](#)
- [Called Party Number Transformations Settings, page 16-40](#)

**Additional Information**

See the “[Where to Find More Information](#)” section on [page 16-49](#).

## Calling Party Number Transformations Settings

Calling party transformations settings allow you to manipulate the appearance of the calling party number for outgoing calls. Cisco Unified Communications Manager uses the calling party number for calling line identification (CLID). During an outgoing call, the CLID passes to each private branch exchange (PBX), central office (CO), and interexchange carrier (IXC) as the call progresses. The called party receives the calling line identification (CLID) when the call is offered to the called party.

Configuration for calling party transformations settings that are used in route lists occurs in the individual route groups that comprise the list. The calling party transformations settings that are assigned to the route groups in a route list override any calling party transformations settings that are assigned to a route pattern that is associated with that route list.

You can set the following calling party transformation settings in the route group configuration:

- Use Calling Party's External Phone Number Mask
- Calling Party Transform Mask
- Prefix Digits (Outgoing Calls)
- Calling Party Number Type
- Calling Party Numbering Plan

Table 16-8 describes the fields, options, and values that are used to specify calling party number transformations.

**Table 16-8** Calling Party Number Transformations Settings

Field Name	Description
Use Calling Party's External Phone Number Mask	<p>This field determines whether the full, external phone number is used for calling line identification (CLID) on outgoing calls. (Configure the external number by using the Directory Number Configuration window.)</p> <p>You can set the following Calling Party Transformations settings for the route group by clicking the members in the Route List Details panel of the Route List Configuration window:</p> <ul style="list-style-type: none"> <li>• <b>Default:</b> This setting indicates that the route group does not govern the calling party external phone number and calling party transform masks. If a calling party external phone number mask or transform mask is chosen for the route pattern, calls that are routed through this route group use those masks.</li> <li>• <b>Off:</b> This setting indicates that the calling party external phone number is not used for CLID. If no transform mask is entered for this route group, calls that are routed through this group do not get associated with a CLID.</li> <li>• <b>On:</b> This setting indicates that the calling party full, external number is used for CLID.</li> </ul> <p>The external phone number mask can contain up to 24 digits.</p>
Calling Party Transform Mask	<p>This field specifies the calling party transform mask for all calls that are routed through this route group. Valid values for this field range from 0 through 9, the wildcard character X, and the characters *, #, and +. You can also leave this field blank. If it is blank and the preceding field is set to Off, this means that no calling party number is available for CLID.</p> <p>The calling party transform mask can contain up to 50 digits.</p>
Prefix Digits (Outgoing Calls)	<p>This field contains a prefix digit or a set of Prefix Digits (Outgoing Calls) that are appended to the calling party number on all calls that are routed through this route group. Valid values for this field range from 0 through 9, the characters *, #, and +, and blank. Prefix Digits (Outgoing Calls) can contain up to 50 digits on route patterns or up to 24 digits on DNs.</p>
Calling Line ID Presentation	<p>Cisco Unified Communications Manager uses calling line ID presentation (CLIP/CLIR) as a supplementary service to allow or restrict the originating caller phone number on a call-by-call basis.</p> <p>Choose whether you want the Cisco Unified Communications Manager to allow or restrict the display of the calling party phone number on the called party phone display for this route pattern.</p> <p>Choose <i>Default</i> if you do not want to change calling line ID presentation. Choose <i>Allowed</i> if you want Cisco Unified Communications Manager to allow the display of the calling number. Choose <i>Restricted</i> if you want Cisco Unified Communications Manager to block the display of the calling number.</p>

Table 16-8 Calling Party Number Transformations Settings (continued)

Field Name	Description
Calling Name Presentation	<p>Cisco Unified Communications Manager uses calling name presentation (CNIP/CNIR) as a supplementary service to allow or restrict the originating caller name on a call-by-call basis.</p> <p>Choose whether you want the Cisco Unified Communications Manager to allow or restrict the display of the calling party name on the called party phone display for this route pattern.</p> <p>Choose <i>Default</i> if you do not want to change calling name presentation. Choose <i>Allowed</i> if you want Cisco Unified Communications Manager to display the calling name information. Choose <i>Restricted</i> if you want Cisco Unified Communications Manager to block the display of the calling name information.</p>
Calling Party Number Type	<p>Choose the format for the number type in calling party directory numbers.</p> <p>Cisco Unified Communications Manager sets the calling directory number (DN) type. Cisco recommends that you do not change the default value unless you have advanced experience with dialing plans such as NANP or the European dialing plan. You may need to change the default in Europe because Cisco Unified Communications Manager does not recognize European national dialing patterns. You can also change this setting when you are connecting to a PBX that expects the calling directory number to be encoded to a non-national type numbering plan.</p> <p>Choose one of the following options:</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager—Use when the Cisco Unified Communications Manager sets the directory number type.</li> <li>• Unknown—Use when the dialing plan is unknown.</li> <li>• National—Use when you are dialing within the dialing plan for your country.</li> <li>• International—Use when you are dialing outside the dialing plan for your country.</li> <li>• Subscriber—Use when you are dialing a subscriber by using a shortened subscriber number.</li> </ul>

**Table 16-8** *Calling Party Number Transformations Settings (continued)*

Field Name	Description
Calling Party Numbering Plan	<p>Choose the format for the numbering plan in calling party directory numbers.</p> <p>Cisco Unified Communications Manager sets the calling DN numbering plan. Cisco recommends that you do not change the default value unless you have advanced experience with dialing plans such as NANP or the European dialing plan. You may need to change the default in Europe because Cisco Unified Communications Manager does not recognize European national dialing patterns. You can also change this setting when you are connecting to PBXs by using routing as a non-national type number.</p> <p>Choose one of the following options:</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager—Use when the Cisco Unified Communications Manager sets the Numbering Plan in the directory number.</li> <li>• ISDN—Use when you are dialing outside the dialing plan for your country.</li> <li>• National Standard—Use when you are dialing within the dialing plan for your country.</li> <li>• Private—Use when you are dialing within a private network.</li> <li>• Unknown—Use when the dialing plan is unknown.</li> </ul>

**Additional Information**

See the [“Where to Find More Information”](#) section on page 16-49.

## Called Party Number Transformations Settings

Called party transformations settings allow you to manipulate the dialed digits, or called party number, for outgoing calls. Examples of manipulating called numbers include appending or removing prefix digits (outgoing calls), appending area codes to calls dialed as seven-digit numbers, appending area codes and office codes to interoffice calls dialed as four- or five-digit extensions, and suppressing carrier access codes for equal access calls.

Configuration of called party transformations settings that are used in route lists occurs in the individual route groups that comprise the list. The called party transformations settings that are assigned to the route groups in a route list override any called party transformations settings that are assigned to a route pattern or translation pattern that is associated with that route list.

You can set the following called party transformation settings in the route group, route pattern, and translation pattern configuration:

- Discard Digits
- Called Party Transform Mask
- Prefix Digits (Outgoing Calls)
- Called Party Number Type
- Called Party Numbering Plan



Table 16-9 describes the fields, options, and values that are used to specify called party number transformations.

**Table 16-9** *Called Party Number Transformations Settings*

Field Name	Description
<b>Route Group Configuration</b>	
Discard Digits	<p>This field contains a list of discard patterns that control the discard digit instructions. For example, in a system where users must dial 9 to make a call to the public switched telephone network (PSTN), the PreDot discard pattern causes the 9 to be stripped from the dialed digit string. See the “Closest Match Routing” section on page 16-16 for more information.</p> <p><b>Note</b> Any setting other than the default setting of &lt;None&gt; overrides the setting in the route pattern. The &lt;None&gt; setting means “do not discard digits.”</p>
Called Party Transform Mask	<p>This field specifies the called party transform mask for all calls that are routed through this route group. Valid values for this field range from 0 through 9, the wildcard character X, and characters *, +, and #. You can also leave this field blank. If this field is blank, no transformation takes place; Cisco Unified Communications Manager sends the dialed digits exactly as dialed.</p> <p>The called party transform mask can contain up to 50 digits.</p>
Prefix Digits (Outgoing Calls)	<p>This field contains a prefix digit or a set of Prefix Digits (Outgoing Calls) that are appended to the called party number on all calls that are routed through this route group. Valid values for this field range from 0 through 9, the characters *, +, and #, and blank. Prefix Digits (Outgoing Calls) can contain up to 50 digits on route patterns or up to 24 digits on DNs.</p>

Table 16-9 Called Party Number Transformations Settings (continued)

Field Name	Description
<b>Route Group Configuration</b>	
Called Party Number Type	<p>Choose the format for the number type in called party directory numbers.</p> <p>Cisco Unified Communications Manager sets the called directory number (DN) type. Cisco recommends that you do not change the default value unless you have advanced experience with dialing plans such as NANP or the European dialing plan. You may need to change the default in Europe because Cisco Unified Communications Manager does not recognize European national dialing patterns. You can also change this setting when you are connecting to a PBX that expects the called directory number to be encoded to a non-national type numbering plan.</p> <p>Choose one of the following options:</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager—Use when the Cisco Unified Communications Manager sets the directory number type.</li> <li>• Unknown—Use when the dialing plan is unknown.</li> <li>• National—Use when you are dialing within the dialing plan for your country.</li> <li>• International—Use when you are dialing outside the dialing plan for your country.</li> <li>• Subscriber—Use when you are dialing a subscriber by using a shortened subscriber number.</li> </ul>
Called Party Numbering Plan	<p>Choose the format for the numbering plan in called party directory numbers.</p> <p>Cisco Unified Communications Manager sets the called DN numbering plan. Cisco recommends that you do not change the default value unless you have advanced experience with dialing plans such as NANP or the European dialing plan. You may need to change the default in Europe because Cisco Unified Communications Manager does not recognize European national dialing patterns. You can also change this setting when you are connecting to PBXs by using routing as a non national type number.</p> <p>Choose one of the following options:</p> <ul style="list-style-type: none"> <li>• Cisco Unified Communications Manager—Use when the Cisco Unified Communications Manager sets the Numbering Plan in the directory number.</li> <li>• ISDN—Use when you are dialing outside the dialing plan for your country.</li> <li>• National Standard—Use when you are dialing within the dialing plan for your country.</li> <li>• Private—Use when you are dialing within a private network.</li> <li>• Unknown—Use when the dialing plan is unknown.</li> </ul>

**Related Topics**

- [Special Characters and Settings, page 16-21](#)
- [Closest Match Routing, page 16-16](#)
- [Caller Identification and Restriction, page 16-43](#)
- [Understanding Route Plans, page 16-1](#)

**Additional Information**

See the “[Where to Find More Information](#)” section on [page 16-49](#).

## Caller Identification and Restriction

Cisco Unified Communications Manager provides the following types of caller identification information:

- **Calling Line Identification (CLID)**—Provides the called party with the extension or directory number of the calling party on a display.
- **Calling Name Identification**—Provides the called party with the name of the calling party on a display.
- **Connected Line Identification**—Provides the calling party with the phone number of the connected party on a display.
- **Connected Name Identification**—Provides the calling party with the name of the connected party on a display.

Cisco Unified Communications Manager provides flexible configuration options to allow and to restrict the display of the line and name information for both calling and connected parties.

For more information on how to use caller identification settings, see the following topics:

- [Calling Party Presentation and Restriction Settings, page 16-43](#)
- [Connected Party Presentation and Restriction Settings, page 16-46](#)

**Additional Information**

See the “[Where to Find More Information](#)” section on [page 16-49](#).

## Calling Party Presentation and Restriction Settings

Calling party presentation information controls whether to display the phone number and name information that Cisco Unified Communications Manager sends with setup messages for an outgoing call. Cisco Unified Communications Manager uses the following fields to provide these supplementary services:

- **Calling Line ID Presentation field**—Calling line identification presentation (CLIP) or calling line identification restriction (CLIR)
- **Calling Name Presentation field**—Calling name presentation (CNIP) or calling name restriction (CNIR)

You can use the Calling Party Presentation field in the Gateway Configuration window to control whether the CLID displays for all outgoing calls on the gateway. To control the CLID display on a call-by-call basis, you use the Calling line ID Presentation field in Route Pattern Configuration or Translation Pattern Configuration windows. You can also configure the Calling Line ID Presentation field in the Calling Party Transformation Pattern Configuration window.

**Note**

Configure Calling Line ID Presentation and Connected Line ID Presentation, in combination with the Ignore Presentation Indicators (internal calls only) device-level parameter, to set up call display restrictions. Together, these settings allow you to selectively present or block calling and/or connected line display information for each call. For more information about the Ignore Presentation Indicators (internal calls only) field, see the [“Device Profile Configuration”](#) chapter and the [“Cisco Unified IP Phone Configuration”](#) chapter in the *Cisco Unified Communications Manager Administration Guide*. For more information about call display restrictions, see the [“Call Display Restrictions”](#) chapter in the *Cisco Unified Communications Manager Features and Services Guide*.

The following example describes how calling line ID presentation works. When a user makes a call, Cisco Unified Communications Manager checks whether the dialed number matches a translation pattern. Cisco Unified Communications Manager finds a match and sets the presentation indicator to the value in the translation pattern Calling Line ID Presentation field, which specifies “restricted” in this example. Next, Cisco Unified Communications Manager checks and finds a match on a route pattern that is configured for the dialed number. Cisco Unified Communications Manager checks the Calling Line ID Presentation field and finds that the value specifies “default.” The presentation indicator remains as “restricted” because the previous setting is unchanged when default is set.

The gateway Calling Party Presentation field gets checked last. In this example, the value specifies “allowed” and overrides the previous calling line ID presentation indicator to allow the calling party number to display on the called party phone. Therefore, the calling line ID presentation field indicator changed from “restricted” at the time that the calling party initiated the call to “allowed” by the time that Cisco Unified Communications Manager sends the call setup message to the endpoint device.

You can configure line and name presentation or restriction on a call-by-call basis for outgoing calls and incoming calls by using the Route Pattern Configuration or Translation Pattern Configuration windows.

For the gateway, you can only configure calling line ID presentation for outgoing calls. For incoming calls, Cisco Unified Communications Manager uses the Connected Line ID Presentation field for the gateway to specify whether to allow or restrict the connected party number to display on the calling party phone. Gateway settings only apply in these two situations, and these settings override all other settings. For the gateway, you can only configure calling and connected line presentation. No settings exist to control name presentation on the gateway.

The type of device control protocol that handles the call limits caller name and number information. See [Table 16-12](#) for a list of protocols with the supported caller name and number information.

**Note**

To control the name display for non-QSIG trunks, you must enable the Display IE Delivery field or Send Calling Name in Facility IE field in the Gateway Configuration window.

Table 16-10 describes the fields, options, and values that are used to specify calling party presentations.

**Table 16-10** Calling Party Presentation Settings

Field Name	Description
Calling Party Presentation (outgoing call)	<p>This field determines whether the calling party phone number displays on the called party phone display screen. The Gateway Configuration, the Route Pattern Configuration, and the Translation Pattern Configuration windows use the Calling Line Presentation field.</p> <p>The following list gives the options for this field:</p> <ul style="list-style-type: none"> <li>• Default: If default is set, calling line ID presentation does not get modified.</li> <li>• Allowed: Use this setting to permit the calling party phone number to display in the called party phone display.</li> <li>• Restricted: Use this setting to display “Private” in the called party phone display and block the display of the calling party phone number.</li> </ul>
Calling Name Presentation (outgoing call)	<p>This field determines whether the name of the calling party displays on the called party phone display. The Route Pattern Configuration and Translation Pattern Configuration windows use the Calling Name Presentation field.</p> <p>The following list gives the options for this field:</p> <ul style="list-style-type: none"> <li>• Default: If default is set, calling name presentation does not get modified.</li> <li>• Allowed: Use this setting to display the calling party name in the called party phone display.</li> <li>• Restricted: Use this setting in the route patterns or translation patterns configuration displays “Private” in the called party phone display.</li> </ul> <p><b>Note</b> The gateway has no setting for calling name presentation.</p>
Calling Line ID Presentation (incoming call)	<p>If the incoming call goes through a translation pattern or route pattern and the calling line ID presentation setting is allowed or restricted, the calling line presentation gets modified with the translation or route pattern setting. If the call comes into the Cisco Unified Communications Manager system and then goes out to a PBX or the PSTN, the outgoing call rules apply as stated in the <a href="#">“Calling Party Presentation and Restriction Settings”</a> section on page 16-43.</p> <p><b>Note</b> The Calling Party Presentation setting controls outgoing calls only.</p>
Calling Name Presentation (incoming call)	<p>If the incoming call goes through a translation pattern or route pattern and the calling name presentation setting is allowed or restricted, the calling name presentation gets modified with the translation or route pattern setting. If the call comes into the Cisco Unified Communications Manager system and then goes out to a PBX or the PSTN, the outgoing call rules apply as stated in the <a href="#">“Calling Party Presentation and Restriction Settings”</a> section on page 16-43.</p> <p><b>Note</b> The gateway has no settings to control name information.</p>

### Additional Information

See the [“Where to Find More Information”](#) section on page 16-49.

## Connected Party Presentation and Restriction Settings

Connected party presentation information controls whether to display the phone number and name information that Cisco Unified Communications Manager receives with an incoming call. Cisco Unified Communications Manager uses the following fields to provide these supplementary services:

- Connected Line ID Presentation field—Connected line identification presentation (COLP) or connected line identification restriction (COLR)
- Connected Name Presentation field—Connected name presentation (CONP) or calling name restriction (CONR)

Connected party settings allow you to display or restrict the display of the phone number and name of the connected party on the calling party phone. Translation Pattern Configuration and Route Pattern Configuration windows include these two settings. The calling party receives the connected name information after the call connects to Cisco Unified Communications Manager and the terminating phone.

The following example describes how connected line ID works. When Cisco Unified Communications Manager receives an incoming call, it checks whether a translation pattern is configured for the incoming number. Cisco Unified Communications Manager uses the value in the Connected Line ID Presentation field that specifies “restricted” for this example. Next, if a route pattern is configured for the incoming call, the value in the Connected Line ID Presentation field gets checked. In this example, the value specifies “default,” so the indicator remains as “restricted,” which prevents the connected party number from displaying on the calling party phone.

For incoming calls only, the gateway Connected Line ID Presentation field value gets checked last and is set for “allowed” in this example. The gateway setting specifies whether the connected party number can display on the calling party phone. In this case, Cisco Unified Communications Manager sends “allowed” in the CONNECT message, so the connected line can display on the originating caller phone display.

You can configure connected line and name presentation or restriction on a call-by-call basis for outgoing calls and incoming calls by using the Route Pattern Configuration or Translation Pattern Configuration windows.

For incoming calls on the gateway, you use the Connected Line ID Presentation field to specify whether to allow or restrict the display of the connected party number on the calling party phone. Gateway settings only apply to line presentation settings and override all other settings.



### Note

For the gateway, you can only configure calling and connected line presentation options. No settings exist for name presentation on the gateway.

When a call routes through a translation or route pattern and connected line presentation is allowed, the phone updates the connected number presentation for the modified number, unless the Always Display Original Dialed Number service parameter is set to true. When this setting is true, the originating phone displays only the dialed digits for the duration of the call. Only phones that are running SCCP support this option. For more information, see [“Call Display Restrictions”](#) in the *Cisco Unified Communications Manager Features and Services Guide*.

Table 16-11 describes the fields, options, and values that are used to specify connected party presentations.

**Table 16-11 Connected Party Presentation Settings**

Field Name	Description
Connected Line ID Presentation (outgoing call)	<p>In the Route Pattern Configuration and the Translation Pattern Configuration windows, this field determines whether the connected party number displays on the calling party phone display.</p> <p>The following list gives the options for this field:</p> <ul style="list-style-type: none"> <li>• Default: If default is set, connected line ID presentation does not get modified.</li> <li>• Allowed: Use this setting to display the connected line number that Cisco Unified Communications Manager received in protocol messages on the calling party phone display.</li> <li>• Restricted: Use this setting to block the connected party number from displaying in the calling party phone display, and “Unknown Number” displays instead.</li> </ul> <p><b>Note</b> This setting applies to internal calls and calls on QSIG connections only.</p>
Connected Name Presentation (CONP/CONR) (outgoing call)	<p>This field determines whether the connected party name displays on the calling party phone display. The Route Pattern Configuration and Translation Pattern Configuration windows use the Connected Name Presentation field.</p> <p>The following list gives the options for this field:</p> <ul style="list-style-type: none"> <li>• Default: If default is set, calling name presentation does not get modified.</li> <li>• Allowed: Use this setting to display the connected party name that Cisco Unified Communications Manager received in protocol messages in the calling party phone display.</li> <li>• Restricted: Use this setting to block the connected party name from displaying, and display “Unknown” in the calling party phone display.</li> </ul>
Connected Line ID Presentation (incoming call)	<p>If the incoming call goes through a translation or route pattern and the connected line ID presentation field is set to allowed or restricted, the connected line presentation indicator gets modified with the translation or route pattern setting.</p> <p><b>Note</b> The Connected Line ID Presentation setting on the gateway determines if the connected party number can display on the originating party phone.</p> <p>If the call comes into the Cisco Unified Communications Manager system and then goes out to a PBX or the PSTN, the outgoing call rules apply as stated in the <a href="#">“Connected Party Presentation and Restriction Settings”</a> section on page 16-46.</p>

Table 16-11 Connected Party Presentation Settings (continued)

Field Name	Description
Connected Name Presentation (incoming call)	If the incoming call goes through a translation or route pattern and the connected name presentation setting is set to allowed or restricted, the connected name presentation gets modified with the translation or route pattern setting. If the call comes into the Cisco Unified Communications Manager system and then goes out to a PBX or the PSTN, the outgoing call rules apply as stated in the <a href="#">“Connected Party Presentation and Restriction Settings”</a> section on page 16-46.  <b>Note</b> The gateway has no settings to control name information.

**Additional Information**

See the [“Where to Find More Information”](#) section on page 16-49.

## Caller Identification Support with Device Control Protocols in Cisco Unified Communications Manager

Cisco Unified Communications Manager provides support for caller name and number identification presentation based on the device control protocols that handle the call. Not all device protocols provide caller number and name information in the protocol messages.

[Table 16-12](#) summarizes which protocols support caller identification services.

Table 16-12 Caller Identification Information Supported by Device Control Protocols

Device Control Protocol	Calling Line	Calling Name	Connected Line	Connected Name
IP Phones with SCCP	provides line number	provides name associated with DN	displays number when received	displays name when received
MGCP Stations (FXS)	provides line number	provides name associated with DN	not supported	displays name when received
MGCP Trunk (FXO, T1 CAS)	supported on FXO incoming ports only	supported on FXO incoming ports only	supported on FXO incoming ports only	supported on FXO incoming ports only
H.323 Trunk	calling line sent in H.225 SETUP	supported by using DISPLAY IE in H.225 messages for intercluster trunks only	supported by H.225 NOTIFY for intercluster trunks only	supported by DISPLAY IE in H.225 messages for intercluster trunks only
PRI Trunk	calling line in PRI SETUP	supported by using FACILITY IE in PRI messages	not supported	supported by using FACILITY IE in PRI messages
QSIG Trunk	calling line in QSIG SETUP	supported by using FACILITY IE in QSIG messages	supported by QSIG CONNECT	supported by using FACILITY IE in QSIG messages
SIP Trunk	calling line included in From and Remote-Party-ID headers	calling name included in From and Remote-Party-ID headers	connected line included in Remote-Party-ID header	connected name included in Remote-Party-ID header



**Related Topics**

- [Calling and Called Party Transformations, page 16-36](#)
- [Special Characters and Settings, page 16-21](#)
- [Enhanced Call Identification Services, page 40-17](#)

**Additional Information**

See the [“Where to Find More Information”](#) section on page 16-49.

## Route Plan Report

The route plan report comprises a listing of all unassigned directory numbers (DN), call park numbers, call pickup numbers, conference numbers (Meet-Me numbers), directory numbers, route patterns, translation patterns, voice-mail ports, and message-waiting indicators.

The route plan report allows you to view either a partial or full list and to go directly to the associated configuration windows by choosing a route pattern, partition, route group, route list, directory number, call park number, call pickup number, conference number (Meet-Me number), or gateway.

Using the route plan report, you can get a list of unassigned directory numbers and delete those numbers from the Cisco Unified Communications Manager database, if required.

In addition, the route plan report allows you to save report data into a .csv file that you can import into other applications such as the Bulk Administration Tool (BAT). The .csv file contains more detailed information, including directory numbers (DN) for phones, route patterns, and translation patterns. See the [“Route Plan Report”](#) chapter in the *Cisco Unified Communications Manager Administration Guide* for more information.

See the [“Local Route Groups and Called Party Transformations”](#) section on page 16-10 for details of route plan reports in a local route group scenario.

**Related Topic**

- [Local Route Groups and Called Party Transformations, page 16-10](#)

**Additional Information**

See the [“Where to Find More Information”](#) section on page 16-49.

## Where to Find More Information

**Related Topic**

- [Partitions and Calling Search Spaces, page 14-1](#)

**Related Cisco Documentation**

- [Partition Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Calling Search Space Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Route Group Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Route List Configuration](#), *Cisco Unified Communications Manager Administration Guide*

- [Route Pattern Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Line Group Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Hunt List Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Hunt Pilot Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Softkey Template Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Presence](#), *Cisco Unified Communications Manager Features and Services Guide*
- [Calling Party Normalization](#), *Cisco Unified Communications Manager Features and Services Guide*
- [Local Route Groups](#), *Cisco Unified Communications Manager Features and Services Guide*
- *Cisco Unified Communications Solution Reference Network Design (SRND) Based on Cisco Unified Communications Manager*
- *Cisco Unified Communications Manager CDR Analysis and Reporting Administration Guide*
- *Troubleshooting Guide for Cisco Unified Communications Manager*