



CHAPTER 17

Device Mobility

The Device Mobility feature dynamically changes important location settings, such as calling search space, region, date/time group, and SRST reference, for roaming devices.

This chapter includes information on the following topics:

- [Introducing Device Mobility, page 17-1](#)
- [Understanding How Device Mobility Works, page 17-2](#)
- [Interactions and Restrictions, page 17-5](#)
- [System Requirements, page 17-6](#)
- [Supported Cisco Unified IP Phones, page 17-6](#)
- [Installing Device Mobility, page 17-6](#)
- [Configuring Device Mobility, page 17-7](#)
- [Network Considerations for Device Mobility, page 17-9](#)
- [Configuration Tips for Device Mobility, page 17-9](#)
- [Configuration Checklist for Device Mobility, page 17-10](#)
- [Enabling Device Mobility, page 17-11](#)
- [Viewing Roaming Device Pool Parameters, page 17-12](#)
- [Troubleshooting Device Mobility, page 17-12](#)
- [Where to Find More Information, page 17-12](#)

Introducing Device Mobility

The Device Mobility feature dynamically changes important location settings, such as calling search space, region, date/time group, and SRST reference, for roaming devices. Cisco Unified Communications Manager uses device pool settings to implement new parameters when the phone roams away from its home location. Administrators no longer need to reconfigure location settings when a phone changes location.

The dynamically reconfigured location settings ensure that voice quality and allocation of resources are appropriate for the new phone location:

- When a mobile user moves to another location, call admission control (CAC) can ensure video and audio quality with the appropriate bandwidth allocations.

- When a mobile user makes a PSTN call, the phone can access the local gateway instead of the home gateway.
- When a mobile user calls the home location, Cisco Unified Communications Manager can assign the appropriate codec for the region.

Understanding How Device Mobility Works

When a phone device has mobility mode enabled, Cisco Unified Communications Manager uses the IP address of the registering device to find the proper location settings. The system compares the physical location that is configured in the device pool for the IP subnet and for the device to determine when a phone is away from its home location.

For example, phone A in Richardson with an IP address 10.81.17.9 registers with Cisco Unified Communications Manager. This IP address maps to subnet 10.81.16.0/16. Cisco Unified Communications Manager checks the device pool settings for the device and the subnet in the database. The physical location setting for the device pool in the phone record matches the physical location setting for the device pool in the subnet. The system considers the phone to be in its home location and uses the configuration settings in the phone record.

If phone A moves to Boulder, the phone queries the local DHCP server and gets an IP address of 130.5.5.25, which maps to subnet 130.5.5.0/8. Cisco Unified Communications Manager compares the physical location for the device pool in the phone record to the device pool location setting that is configured for the subnet. The system determines that the device is roaming because the physical locations do not match. Cisco Unified Communications Manager overwrites the phone record configuration settings with configuration settings for the subnet, downloads the settings in a new configuration file, and resets the device. The phone reregisters with the settings from the roaming device pool.



Note

The phone must have a dynamic IP address to use device mobility. If a phone with a static IP address roams, Cisco Unified Communications Manager uses the configuration settings from its home location.

For roaming devices, Cisco Unified Communications Manager overwrites the following device pool parameters with the device pool settings for the subnet:

- Date/Time Group
- Region
- Location
- Network Locale
- SRST Reference
- Connection Monitor Duration
- Physical Location
- Device Mobility Group
- Media Resource Group List

When networks span geographic locations outside the United States, administrators can configure device mobility groups to allow phone users to use their configured dial plan no matter where they roam. When a device is roaming but remains in the same device mobility group, Cisco Unified Communications Manager also overwrites the following device pool parameters:

- AAR Group
- AAR Calling Search Space
- Device Calling Search Space

When the phone returns to its home location, the system disassociates the roaming device pool, downloads the configuration settings for home location, and resets the device. The device registers with the home location configuration settings.

Refer to these topics for more specific details about the device mobility operations in different scenarios:

- [Device Mobility Operations Summary](#)
- [Device Mobility Groups Operations Summary](#)



Tip

Cisco Unified Communications Manager always uses the Communications Manager Group setting from the phone record. The device always registers to its home location Cisco Unified Communications Manager server even when roaming. When a phone is roaming, only network location settings such as bandwidth allocation, media resource allocation, region configuration, and AAR group get changed.

Device Mobility Operations Summary

This section describes how Cisco Unified Communications Manager manages phone registration and assignment of parameters for device mobility.

Following initialization, the device mobility feature operates according to the following process:

1. A phone device record gets created for an IP phone that is provisioned to be mobile, and the phone gets assigned to a device pool. The phone registers with Cisco Unified Communications Manager, and an IP address gets assigned as part of the registration process.
2. Cisco Unified Communications Manager compares the IP address of the device to the subnets that are configured for device mobility in the Device Mobility Info window. The best match uses the largest number of bits in the IP subnet mask (longest match rule). For example, the IP address 9.9.8.2 matches the subnet 9.9.8.0/24 rather than the subnet 9.9.0.0/16.
3. If the device pool in the phone record matches the device pool in the matching subnet, the system considers the phone to be in its home location, and the phone retains the parameters of its home device pool.
4. If the device pool in the phone record does not match the device pools in the matching subnet, the system considers the phone to be roaming. [Table 17-1](#) describes possible scenarios for device mobility and the system responses.

Table 17-1 Device Mobility Scenarios

Scenario	System Response
The physical location setting in the phone device pool matches the physical location setting in a device pool that is associated with the matching subnet. Note Although the phone may have moved from one subnet to another, the physical location and associated services have not changed.	The system does not consider the phone to be roaming, and the system uses the settings in the home location device pool.
The matching subnet has a single device pool that is assigned to it; the subnet device pool differs from the home location device pool, and the physical locations differ.	The system considers the phone to be roaming. It reregisters with the parameters of the device pool for the matching subnet.
The physical locations differ, and the matching subnet has multiple device pools assigned to it.	The system considers the phone to be roaming. The new device pool gets assigned according to a round-robin rule. Each time that a roaming devices comes in to be registered for the subnet, the next device pool in the set of available device pools gets assigned.
Physical location gets defined for the home device pool but is not defined for the device pools that are associated with the matching subnet	The physical location has not changed, so the phone remains registered in the home device pool.
Physical location that is not defined for the home device pool gets defined for the device pools that are associated with the matching subnet	The system considers the phone to be roaming to the defined physical location, and it registers with the parameters of the device pool for the matching subnet.
A subnet gets updated or removed.	The rules for roaming and assigning device pools get applied by using the remaining subnets.

Device Mobility Groups Operations Summary

You can use device mobility groups to determine when a device moves to another location within a geographic entity, so a user can use its own dial plan. For example, you can configure a device mobility group for the United States and another group for the United Kingdom. If a phone device moves into a different mobility group (such as from the United States to the United Kingdom), Cisco Unified Communications Manager uses the Calling Search Space, AAR Group and AAR CSS from the phone record, and not the roaming location.

If the device moves to another location with same mobility group (for example, Richardson, USA, to Boulder, USA), the CSS information will get taken from the roaming device pool settings. With this approach, if the user is dialing PSTN destinations, the user will reach the local gateway.

Table 17-2 describes the device pool parameters that the system uses for various scenarios.

Table 17-2 Device Mobility Group Scenarios

Scenario	Parameters Used
A roaming device moves to another location in the same device mobility group.	Roaming Device Pool: yes Location: Roaming device pool setting Region: Roaming device pool setting Media Resources Group List: Roaming device pool setting Device CSS: Roaming device pool setting (Device Mobility CSS) AAR Group: Roaming device pool setting AAR CSS: Roaming device pool setting
A roaming device moves to another location in a different device mobility group.	Roaming Device Pool: yes Location: Roaming device pool setting Region: Roaming device pool setting Media Resources Group List: Roaming device pool setting Device CSS: Home location settings AAR Group: Home location settings AAR CSS: Home location settings
A device roams, and a device mobility group does not get defined for the home or roaming device pool.	Because the device is roaming, it takes the roaming device pool settings, including the Device Mobility Calling Search Space, AAR Calling Search Space, and AAR Group.

Interactions and Restrictions

IP Address

The Device Mobility feature depends on the IP address of the device that registers with Cisco Unified Communications Manager.

- The phone must have a dynamic IP address to use device mobility.
- If the device is assigned an IP address by using NAT/PAT, the IP address that is provided during registration may not match the actual IP address of the device.

Roaming

When a device is roaming in the same device mobility group, Cisco Unified Communications Manager uses the Device Mobility CSS to reach the local gateway. If a user sets Call Forward All at the phone, the CFA CSS is set to None, and the CFA CSS Activation Policy is set to With Activating Device/Line CSS, then:

- The Device CSS and Line CSS get used as the CFA CSS when the device is in its home location.
- If the device is roaming within the same device mobility group, the Device Mobility CSS from the Roaming Device Pool and the Line CSS get used as the CFA CSS.
- If the device is roaming within a different device mobility group, the Device CSS and Line CSS get used as the CFA CSS.

For more information about configuration options for Call Forward All, refer to the [Directory Number Configuration](#) chapter in the *Cisco Unified Communications Manager Administration Guide* and the [Understanding Directory Numbers](#) chapter in the *Cisco Unified Communications Manager System Guide*.

System Requirements

Device Mobility requires the following software components:

- Cisco Unified Communications Manager 6.0 or later
- Cisco CallManager service running on at least one server in the cluster
- Cisco Database Layer Monitor service running on the same server as the Cisco CallManager service
- Cisco TFTP service running on at least one server in the cluster
- Cisco Unified Communications Manager Locale Installer (if you want to use non-English phone locales or country-specific tones)

Supported Cisco Unified IP Phones

Any phone that is running either SCCP or SIP and that can be configured in Cisco Unified Communications Manager Administration supports device mobility, including

- Cisco Unified IP Phone 7900 series
- Cisco Unified IP Phone 30 VIP
- Cisco Unified IP Phone 12 SP+
- Computer Telephony Integration (CTI) Ports
- Cisco IP Communicator

Installing Device Mobility

Device Mobility automatically installs when you install Cisco Unified Communications Manager. After you install Cisco Unified Communications Manager, you must configure device mobility settings in Cisco Unified Communications Manager Administration to enable the feature.

**Note**

Existing device pools automatically migrate to the new device pool and common profile structure as part of the upgrade to Cisco Unified Communications Manager Release 6.0 or later.

Configuring Device Mobility

For successful configuration of the device mobility feature, review the network design considerations, review the steps in the configuration checklist, perform the configuration requirements, and activate the Cisco CallManager service.

For an overview of device mobility parameter settings, refer to the following sections:

- [Device Mobility Mode Parameter, page 17-7](#)
- [Device Pool Parameters, page 17-7](#)
- [Device Mobility Group Parameter, page 17-8](#)
- [Physical Location Parameter, page 17-8](#)

See the “[Configuration Checklist for Device Mobility](#)” section on [page 17-10](#) for the configuration process and related procedures.

Device Mobility Mode Parameter

To enable device mobility, you configure device mobility mode settings for the cluster or for specific phones.

- When device mobility mode is enabled or disabled for the cluster, the cluster setting applies to all phones in the cluster that support device mobility.
- When device mobility mode is enabled or disabled for a phone, the phone settings take precedence over the cluster settings.
- When the phone setting for device mobility mode is Default, Cisco Unified Communications Manager uses the clusterwide service parameter setting for the device.

See “[Enabling Device Mobility](#)” section on [page 17-11](#) for the procedure to enable and disable device mobility.

Device Pool Parameters

The Device Pool Configuration window contains these new settings for device mobility:

- Device Mobility Group
- Location
- Physical Location
- Device Mobility Calling Search Space
- AAR Calling Search Space
- AAR Group

These existing device pool parameters also support device mobility:

- Date/Time Group
- Region
- SRST Reference
- Media Resource Group List
- Network Locale
- Connection Monitor Duration

Refer to [Device Pool Configuration](#) in the *Cisco Unified Communications Manager Administration Guide* to configure device pool parameters.

**Note**

User-related parameters, previously located in the device pool configuration window, now constitute a separate profile, the common device configuration: Name, Softkey Template, Network Hold MOH Audio Source, User Hold MOH Audio Source, User Locale, MLPP Indication, MLPP Preemption, and MLPP Domain.

Refer to [Common Device Configuration](#) in the *Cisco Unified Communications Manager Administration Guide* to configure common device configuration parameters. These parameters do not apply to device mobility.

Device Mobility Group Parameter

The device mobility group setting represents an optional setting. The default device mobility group setting in the Device Pool Configuration window specifies None.

See [Device Mobility Group Configuration](#) in the *Cisco Unified Communications Manager Administration Guide* for more information.

Physical Location Parameter

The physical location setting represents an optional setting in the Device Pool Configuration window; however, you must configure physical locations to invoke the device mobility feature. You must configure physical locations in the Physical Location Configuration window before you can associate physical locations with device pools. The default physical location setting in the Device Pool Configuration window specifies None.

See [Physical Location Configuration](#) in the *Cisco Unified Communications Manager Administration Guide* for more information.

Network Considerations for Device Mobility

The device mobility structure accommodates different network configurations.

For efficient device mobility design, divide the network into device mobility groups (optional), physical locations, and subnets. The number and levels of groups in the hierarchy depend on the size and complexity of the organization.

- Device mobility groups represent the top-level geographic entities in your network. The device mobility group setting determines whether the device is moved within the same geographical entity, primarily to allow users to keep their own dial plans. For example, if you want a roaming device to access the local gateway for PSTN calls, be sure that the device mobility group for the home location device pool and roaming location device pool are the same.

Device mobility groups could represent countries, regions, states or provinces, cities, or other entities. An enterprise with a worldwide network might choose device mobility groups that represent individual countries, whereas an enterprise with a national or regional network might define device mobility groups that represent states, provinces, or cities. The system does not require defining device mobility groups to use the device mobility feature.

- Physical location, the next level in the hierarchy, identifies a geographic location for device pool parameters that are location-based, such as date/time, region, and so on. Cisco Unified Communications Manager uses the geographic location to determine which network resources to assign to a phone. If a user moves away from the home location, the system ensures that the phone user uses local media resources and the correct bandwidth for the call.

For example, a Music on Hold (MOH) server may serve a specific office or campus within the enterprise. When a device roams to another office or campus and reregisters with Cisco Unified Communications Manager, having the device served by the MOH server at the roaming location represents best practice.

By defining the physical location according to availability of services such as MOH, you can assure efficient and cost-effective reassignment of services as devices move from one physical location to another. Depending upon the network structure and allocation of services, you can define physical locations based upon city, enterprise campus, or building.

Ideally, your network configuration places each network in one physical location, so a network can be mapped to a single physical location.

- A subnet may include all the devices at a geographical location, within the same building, or on the same LAN. You can configure one or more device pools, including device mobility group and physical location, for a subnet.
- Location identifies the CAC for a centralized call-processing system. You configure a location for a phone and a device pool. See the [Call Admission Control](#) chapter in the *Cisco Unified Communications Manager System Guide* for more information.

Configuration Tips for Device Mobility

Consider the following information when you configure device mobility in Cisco Unified Communications Manager Administration:

- When the Device Mobility Mode is set to Default in the Phone Configuration window, the Device Mobility Mode service parameter determines whether the device is enabled for the device mobility feature.

- Cisco Unified Communications Manager uses the longest match rule to match IP addresses and subnets, meaning the best match uses the largest number of bits in the IP subnet mask. For example, the IP address 9.9.8.2 matches the subnet 9.9.8.0/24 rather than the subnet 9.9.0.0/16.
- If no device mobility information entries match the device IP address, the device uses the home location device pool settings.
- You assign the device pool to the phone device in the Phone Configuration window; you assign device pools to subnets in the Device Mobility Info Configuration window.
- You can assign one or more device pools to a subnet address. Cisco Unified Communications Manager assigns device pools for the same subnet to roaming devices in round-robin fashion; for example, roaming device 1 gets assigned the first device pool in the list, and roaming device 2 gets assigned the second device pool in the list. This process allows you to load share when you expect a large number of phones to roam into an area, such as a meeting in the head office that employees from all branch locations will attend.
- Although physical location does not represent a required setting in the Device Pool Configuration window, you must define a physical location for a device pool to use the device mobility feature. Be sure to configure physical location for the home location device pool and for the roaming device pool.
- After the device mobility structure is in place, you can turn device mobility on for IP phones that support device mobility.

Configuration Checklist for Device Mobility

Table 17-3 shows the steps for configuring Device Mobility. This procedure assumes that you have configured locations, calling search spaces, and AAR groups in Cisco Unified Communications Manager Administration.

- For more information about location settings, refer to [Location Configuration](#) in the *Cisco Unified Communications Manager Administration Guide*.
- For more information about calling search space settings, refer to [Calling Search Space Configuration](#) in the *Cisco Unified Communications Manager Administration Guide*.
- For more information about AAR group settings, refer to [Automated Alternate Routing Group Configuration](#) in the *Cisco Unified Communications Manager Administration Guide*.

Table 17-3 Cisco Unified Communications Manager Device Mobility Checklist

Configuration Steps		Related Procedures and Topics
Step 1	Configure physical locations.	Physical Location Configuration , <i>Cisco Unified Communications Manager Administration Guide</i>
Step 2	Configure device mobility groups.	Device Mobility Group Configuration , <i>Cisco Unified Communications Manager Administration Guide</i>
Step 3	Configure device pools in the Device Pool Configuration window.	Device Pool Configuration , <i>Cisco Unified Communications Manager Administration Guide</i>
Step 4	Configure subnets and assign one or more device pools to a subnet in the Device Mobility Info window.	Device Mobility Info Configuration , <i>Cisco Unified Communications Manager Administration Guide</i>

Table 17-3 Cisco Unified Communications Manager Device Mobility Checklist (continued)

Configuration Steps		Related Procedures and Topics
Step 5	Enable device mobility mode for the cluster or specific phones.	Enabling Device Mobility, page 17-11
Step 6	Verify that the Cisco CallManager service is activated.	<i>Cisco Unified Serviceability Administration Guide</i>

Enabling Device Mobility

This section describes the procedure to enable the device mobility feature for a cluster or a phone.

Consider the following information when enabling the device mobility feature:

- At installation, the default setting for Device Mobility Mode for the cluster specifies Off, meaning that device mobility is disabled for the cluster.
- At installation, the default setting for Device Mobility Mode for phones specifies Default, meaning the phone setting takes the cluster setting.
- To enable device mobility for all phones in the cluster that support device mobility, set the Device Mobility Mode to On.
- To enable device mobility for specific phones in the cluster, set the Device Mobility Mode to Off for the cluster and configure the Device Mobility Mode to On for the specific phones.
- To disable device mobility for specific phones in the cluster, set the Device Mobility Mode to On for the cluster and configure the Device Mobility Mode to Off for the specific phones.
- To enable or disable device mobility for phones that support device mobility as a group, keep the Device Mobility Mode setting to Default. All phones that support device mobility take the clusterwide setting.

Before You Begin

Refer to the *Cisco Unified Communications Manager Administration Guide* to configure device mobility parameters and related settings:

- [Physical Location Configuration](#)
- [Device Mobility Group Configuration](#)
- [Device Mobility Info Configuration](#)
- [Device Pool Configuration](#)

After the device mobility structure is in place, you can turn device mobility on for phones that support device mobility.

Procedure

-
- Step 1** Find the Device Mobility Mode setting for a cluster or a phone:
- To enable or disable device mobility for the cluster, choose **System > Service Parameters** in Cisco Unified Communications Manager Administration.
 - From the Server drop-down list box, select the server that is running the Cisco CallManager service.

- From the Service drop-down list box, select the Cisco CallManager service. The Service Parameters Configuration window displays. Go to [Step 2](#).
 - To enable Device Mobility Mode, choose On.
 - To configure device mobility for a phone, choose **Device > Phone** in Cisco Unified Communications Manager Administration. Click **Find** to display the device pools list, or use the search results from an active query.
 - Choose a device from the phone list that displays in the Find and List Phones window. The Phone Configuration window displays. Go to [Step 2](#).
- Step 2** Configure the device mobility mode:
- In the Device Mobility Mode drop-down list box, choose On to enable device mobility; choose Off to disable device mobility.
 - Choose Default in the Device Mobility drop-down box in the Phone Configuration window to configure all phones that support device mobility to take the clusterwide setting.
-

.Additional Information

See the [“Where to Find More Information”](#) section on page 17-12.

Viewing Roaming Device Pool Parameters

When the phone device has mobility mode enabled, you can view the roaming device pool settings by clicking **View Current Device Mobility Settings** next to the Device Mobility Mode field in the Phone Configuration window. If the device is not roaming, the home location settings display.

Troubleshooting Device Mobility

View the roaming device parameters when a device is roaming to verify that they are correct.

Use the Cisco Unified Serviceability Trace Configuration and Cisco Unified Real-Time Monitoring Tool to help troubleshoot device mobility problems. Refer to the *Cisco Unified Serviceability Administration Guide*.

Where to Find More Information

Related Topic

- [Device Pool Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Service Parameters Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Physical Location Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Device Mobility Group Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Device Mobility Info Configuration](#), *Cisco Unified Communications Manager Administration Guide*

- [Common Device Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Location Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Physical Location Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Cisco Unified IP Phone Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Survivable Remote Site Telephony Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Automated Alternate Routing Group Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Date/Time Group Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Region Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Calling Search Space Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Media Resource Group Configuration](#), *Cisco Unified Communications Manager Administration Guide*
- [Call Admission Control](#), *Cisco Unified Communications Manager System Guide*
- [System-Level Configuration Settings](#), *Cisco Unified Communications Manager System Guide*
- [Cisco TFTP](#), *Cisco Unified Communications Manager System Guide*

Additional Cisco Documentation

- *Cisco Unified Serviceability Administration Guide*
- *Troubleshooting Guide for Cisco Unified Communications Manager*

