



Vocera Edge[®] Communications

Set-up Guide for Cisco Unified Call Manager (CUCM)

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Table of Contents

Vocera Edge® Communications Set-up Guide for Cisco Unified Call Manager (CUCM)	1
Overview	2
Requirements	2
DNS Setup	3
CUCM Setup	3
Login to CUCM	4
Enable AXL on CUCM	6
Enter AXL Data in Enterprise Manager	12
CUCM Settings	14
Route Partition & Calling Search Space	14
Enterprise Manager Properties	17
Device Pool	19
SIP Security Profile	22
Enterprise Manager Settings	24
SIP Profile	26
SIP Domain	29
Call History	32
Hunt Groups	35
Create New Voice System in Enterprise Manager	42
VoIP Settings in Org Services	43
Vocera Edge Client SIP Setup	46
Appendix	47
Authentication	47
Fully Qualified Domain Name	48
Licensing	50



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Vocera Edge[®] Communications Set-up Guide for Cisco Unified Call Manager (CUCM)

The purpose of this document is to provide the step-by-step instructions on how to configure Cisco Unified Call Manager (CUCM) for integration with Vocera Edge Communications. The target audience for this document is CUCM administrators/technicians.

To setup the CUCM, you will need to follow all of the instructions listed below. Click a link to access a topic or use your mouse to scroll through the pages.

[Login to CUCM and Enable AXL](#)

[CUCM Settings](#)

[Device Pool](#)

[SIP Security Profile](#)

[SIP Profile](#)

[SIP Domain](#)

[Call History](#)

[Hunt Groups](#)

[Create New Voice Settings in Enterprise Manager](#)

[Appendix](#)

Overview

The Vocera Edge App for iOS can register with Cisco Unified Call Manager (CUCM) for making voice calls. The Vocera Edge app connects to CUCM using the SIP protocol. Users can be assigned extensions in the Enterprise Manager web app, via auto provisioning or via LDAP using Org Services integration.

Org Services uses AXL (Cisco's Administrative XML Rest Interface for CUCM) to provision devices and extensions for each user in CUCM.

Vocera Edge communicates with Org Services, an internal Vocera Edge service. Org Services then communicates with Active Directory (AD) and CUCM to manage user extensions.

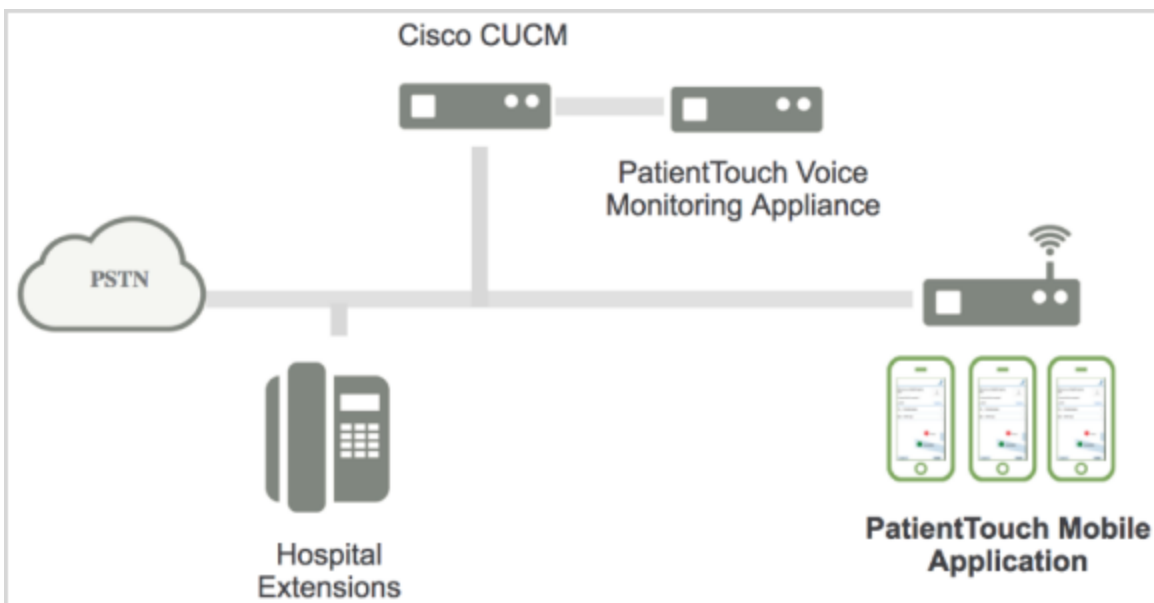
There are two ways that extensions can sync between Vocera Edge and CUCM. This is dependent on whether or not the organization has enabled AD Sync.

If the organization has AD Sync enabled, extensions will sync periodically, as configured, and update the user profile in Vocera Edge.

If the organization does not have AD sync enabled, when the user logs into a Vocera Edge handheld with AD credentials, Org Services will query AD for user profile and extension information. Org Services will then send an AXL request to CUCM to provision a device and extension directory number (DN).

Similarly, when an extension is assigned via Enterprise Manager, Org Services will provision device and extension information in CUCM on login.

This allows Vocera Edge devices to connect automatically to CUCM as SIP devices.



Requirements

- Cisco Unified Call Manager 9.1 or greater.
- A Cisco license for each Vocera Edge device that will connect to the network is required. PSS devices connect to CUCM as a "3rd Party Basic SIP" device. If your licenses are of the type "User Connect Licensing", each device will require one "Enhanced" license. If your licenses are of the type "Unified Workspace Licensing", you may utilize either a "Standard" or "Professional" license.



DNS Setup

The Vocera Edge handheld app uses SRV records to locate CUCM subscribers to connect to. A domain is configured in the app and the app will query VOIP SRV records for this domain. Here is an example SRV setup for the 'test.pss.net' domain:

```
_pssvoip._udp.test.pss.net 0 0 5060 cucm.node1.pss.net  
_pssvoip._udp.test.pss.net 0 0 5060 cucm.node2.pss.net  
_pssvoip._udp.test.pss.net 0 0 5060 cucm.node3.pss.net
```

The Vocera Edge app will round robin between the SRV records until a connection can be made. The CUCM subscribers can also be given a priority in the SRV. The Vocera Edge app will try subscribers with a priority of '0' first, then '1', '2', etc. Load balancing can be achieved by adding multiple servers at the same priority.

CUCM Setup

The following CUCM configuration will be required (detailed in later sections):

- AXL Service Enabled (Cisco's Administrative XML REST interface for CUCM).
 - A valid AXL user account is required, to allow Org Services to provision Vocera Edge devices.
- A new 'SIP Profile' for making changes specific to Vocera Edge devices.
- A new 'Device Pool' for easy management and tracking of Vocera Edge devices.
- A new SIP Security Profile for making SIP security changes specific to Vocera Edge devices.
- Enable CDR reporting so Vocera Edge devices can get call history, even for calls made while the device is offline.
 - Add Vocera Edge server ips (VIP) as a CDR Billing Application Server.
- If the same extension will be shared within the same PBX Cluster or if extension ranges will be shared with desk phones then the Route Partition MUST be the same.
- (Optional) A new Calling Search space for managing how calls are routed from Vocera Edge devices.

Login to CUCM

1. Click Cisco Unified Communications Manager.



2. Enter your Username and Password.
3. Click **Login**.

**Cisco Unified CM Administration**
For Cisco Unified Communications Solutions

Navigation **Cisco Unified CM Administration** ▼ Go

Cisco Unified CM Administration

Username

Password



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A summary of U.S. laws governing Cisco cryptographic products may be found at our [Export Compliance Product Report](#) web site.

For information about Cisco Unified Communications Manager please visit our [Unified Communications System Documentation](#) web site.

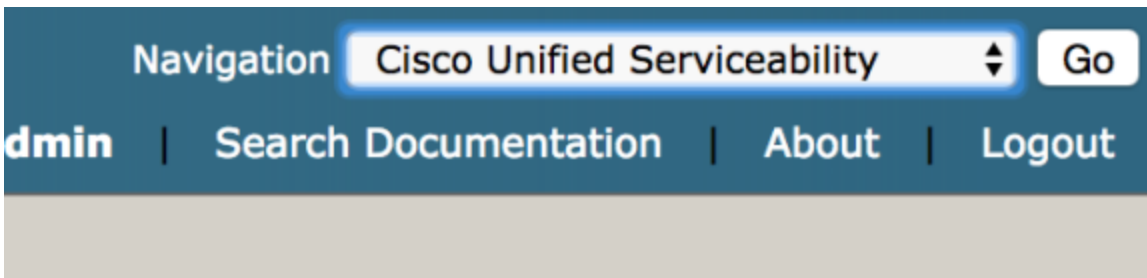
For Cisco Technical Support please visit our [Technical Support](#) web site.

Enable AXL on CUCM

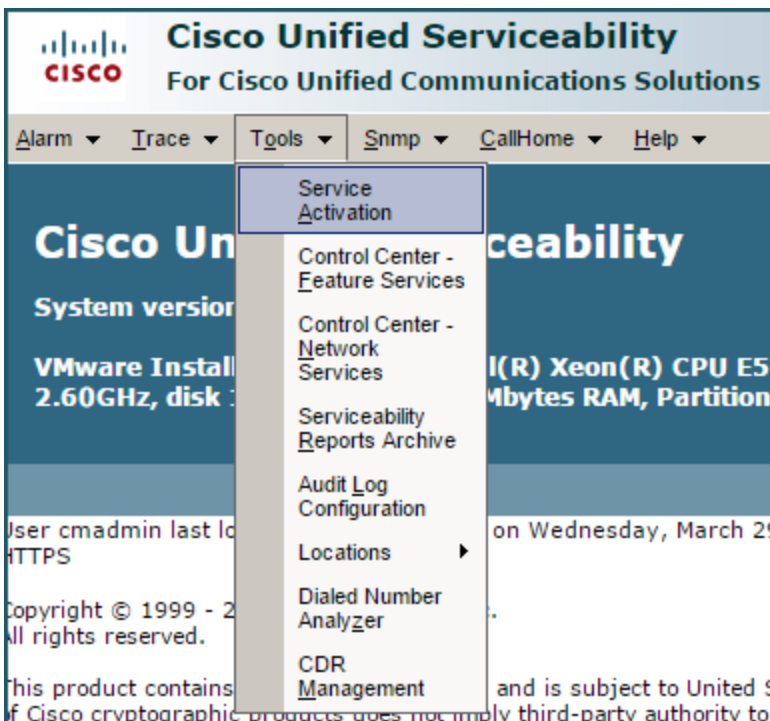
Org Services uses AXL to connect to CUCM and manage the per device SIP settings.

Enable AXL service in Service Availability:

1. In the Navigation drop down menu on the top right of the screen, select Cisco Unified Serviceability.
2. Click **Go**.



3. Select Tools>Service Activation to view the list of enabled services.

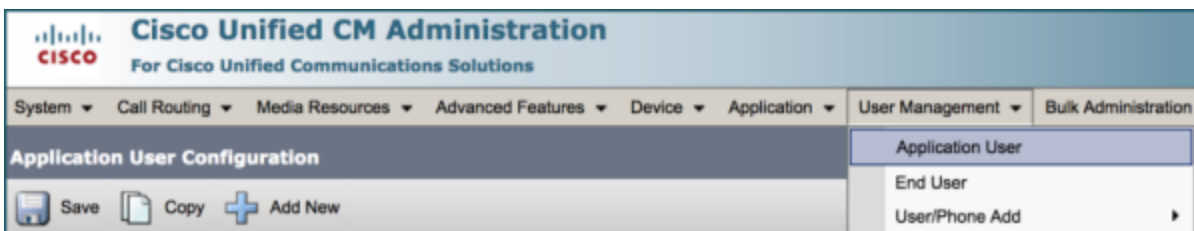


4. Select the Cisco AXL Web Service check box.
5. Click **Apply**.

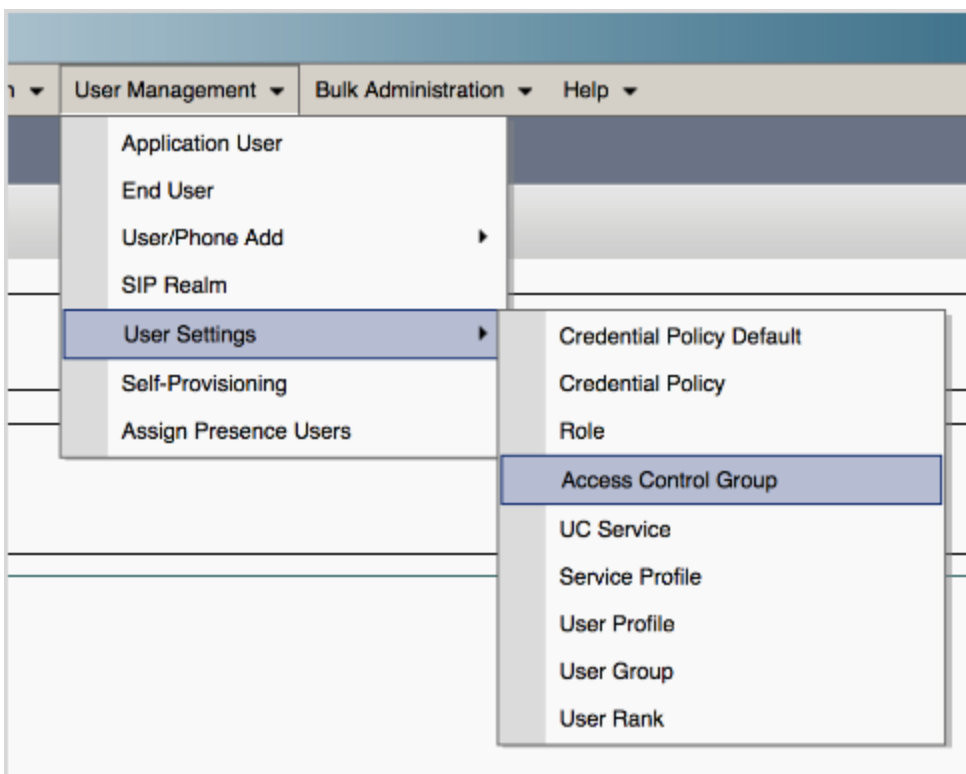
Database and Admin Services		
	Service Name	Activation Status
<input type="checkbox"/>	Cisco Bulk Provisioning Service	Deactivated
<input checked="" type="checkbox"/>	Cisco AXL Web Service	Activated
<input type="checkbox"/>	Cisco UXL Web Service	Deactivated
<input type="checkbox"/>	Cisco TAPS Service	Deactivated

Next you will need to add an Application User to allow Vocera Edge Cucm-Sync to communicate (over AXL) to CUCM. This username and password will be entered in Enterprise Manager later.

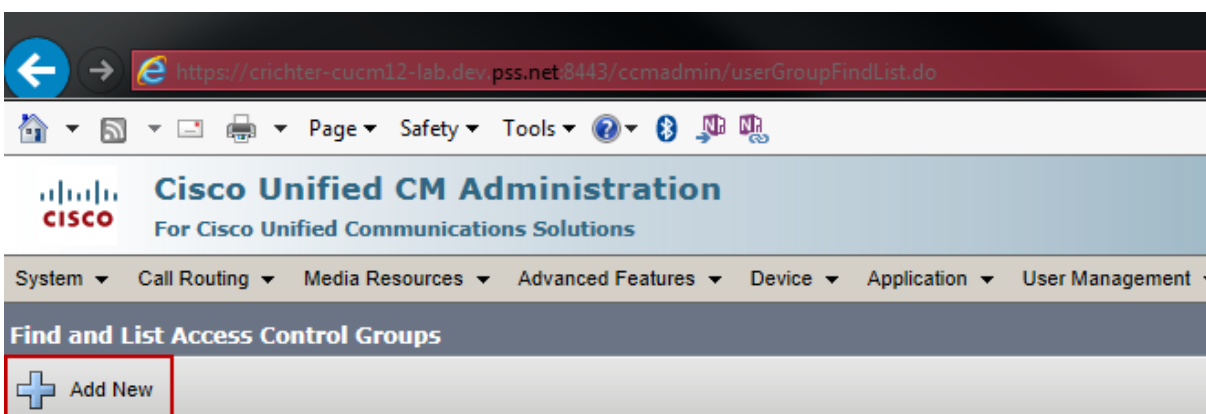
6. Go back to the Cisco Unified CM Administration using the drop-down menu located on the top right of the screen. Make sure to click **Go**.
7. Select User Management>Application User.



8. Add the 'Standard AXL API Access' Role to the user. Roles are granted to CUCM Users by adding 'Access Control Groups'. See below for how to create a more restrictive Access Control Group.
9. A more restrictive Access Control Group for Vocera Edge can be created and added to the Application User. Create a new 'Access Control Group':
10. Click **User Management>User Settings>Access Control Group**



11. Click **Add New**



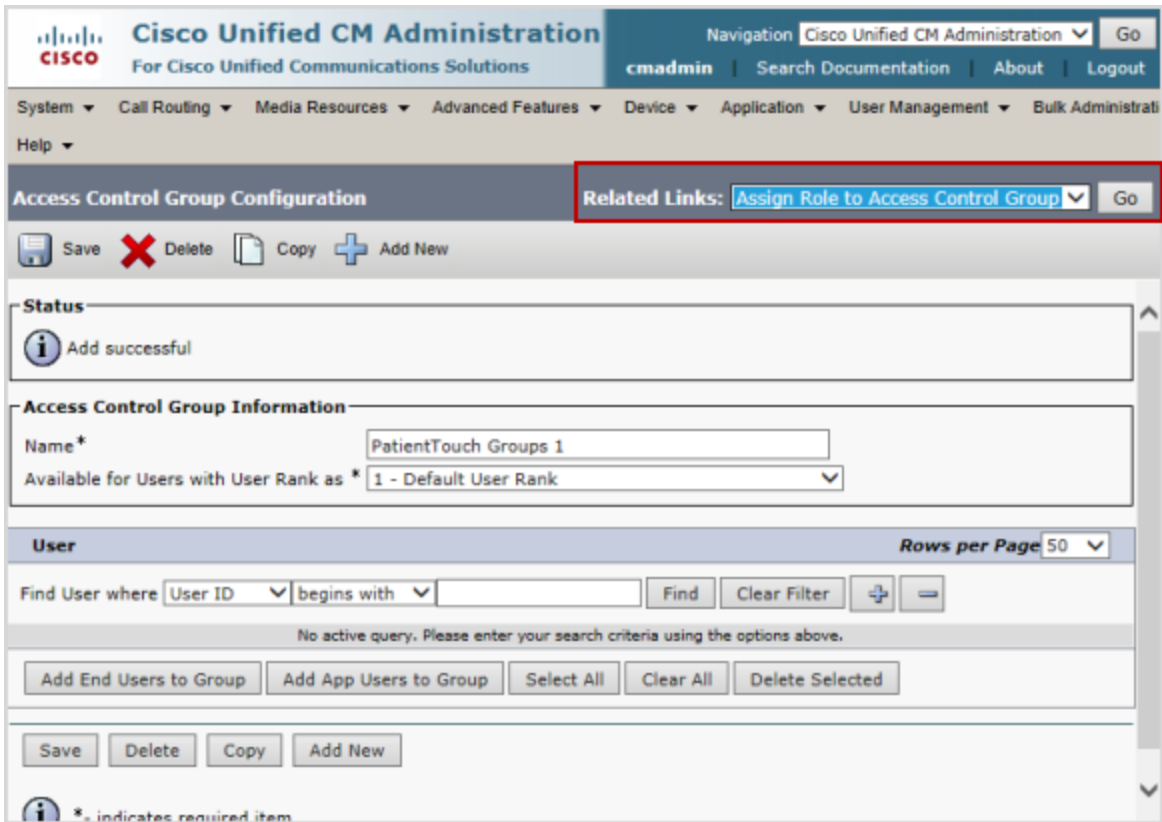
12. Enter the Access Control Group Name

13. Click **Save**



The screenshot shows the Cisco Unified CM Administration web interface. At the top, there is a navigation bar with the Cisco logo and the title "Cisco Unified CM Administration For Cisco Unified Communications Solutions". Below this is a menu bar with tabs: System, Call Routing, Media Resources, Advanced Features, Device, and Application. The "Advanced Features" tab is selected, and the "Access Control Group Configuration" page is displayed. The page has a "Save" button at the top left. Below this is a "Status" section showing "Status: Ready". The "Access Control Group Information" section contains a "Name" field with the value "PatientTouch Groups 1" (highlighted with a red box) and an "Available for Users with User Rank as" dropdown menu set to "1 - Default User Rank". There is another "Save" button at the bottom left. A note at the bottom states: "*- indicates required item."

14. Select **Assign Role to Access Control Group** from the drop-down menu on the top right of the screen.
15. Click **Go**



Cisco Unified CM Administration
For Cisco Unified Communications Solutions

Navigation: Cisco Unified CM Administration | Go
cmadmin | Search Documentation | About | Logout

System | Call Routing | Media Resources | Advanced Features | Device | Application | User Management | Bulk Administration | Help

Access Control Group Configuration

Related Links: [Assign Role to Access Control Group](#) | Go

Save | Delete | Copy | Add New

Status
Add successful

Access Control Group Information

Name* PatientTouch Groups 1
Available for Users with User Rank as * 1 - Default User Rank

User Rows per Page: 50

Find User where: User ID | begins with | Find | Clear Filter | + | -

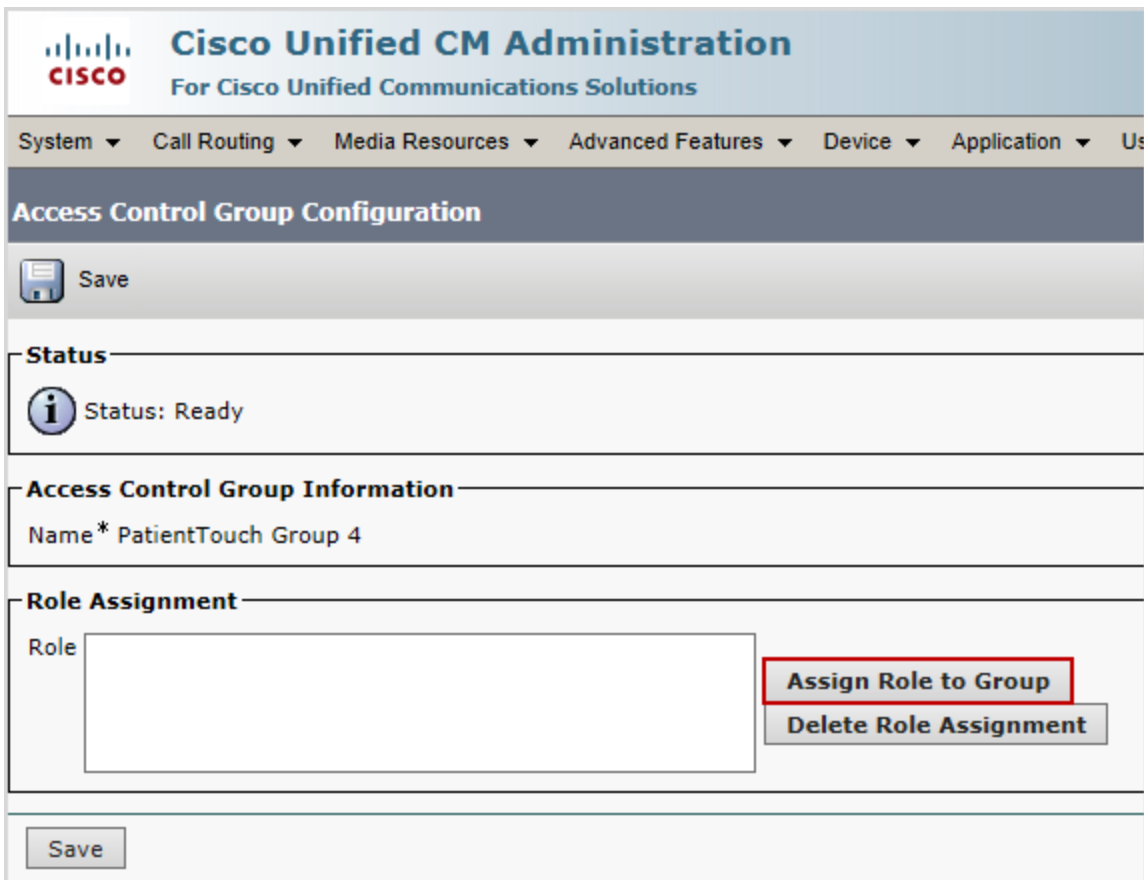
No active query. Please enter your search criteria using the options above.

Add End Users to Group | Add App Users to Group | Select All | Clear All | Delete Selected

Save | Delete | Copy | Add New

* indicates required item


16. Click Assign Role to Group




Cisco Unified CM Administration
For Cisco Unified Communications Solutions

System ▾ Call Routing ▾ Media Resources ▾ Advanced Features ▾ Device ▾ Application ▾ Users ▾

Access Control Group Configuration

 Save

Status

 Status: Ready

Access Control Group Information


Name * PatientTouch Group 4

Role Assignment

Role

Assign Role to Group

Delete Role Assignment

 Save

17. When you click **Assign Role to Group**, the window below should display. However, you may need to click **Find** in order to see the list of roles.
18. Click the following roles and then click **Add Selected**
 - Standard AXL API Access
 - Standard Admin Rep Tool Admin
 - Standard Audit Log Administration
 - Standard CCM Admin Users
 - Standard CCM Admin Administration

Find and List Roles

Select All Clear All **Add Selected** Close

Status

50 records found

Role (1 - 50 of 50) Rows per Page 50

Find Role where Name begins with Find Clear Filter + -

Select item or enter search text


<input type="checkbox"/>	Name ^	Application	Description	Copy
<input checked="" type="checkbox"/>	Standard AXL API Access	Cisco Call Manager AXL Database	Access the AXL APIs	
<input type="checkbox"/>	Standard AXL API Users		All users with access to AXL APIs	
<input type="checkbox"/>	Standard AXL Read Only API Access	Cisco Call Manager AXL Database Read Only	Access the AXL Read Only APIs	
<input checked="" type="checkbox"/>	Standard Admin Rep Tool Admin		Administer CAR	
<input checked="" type="checkbox"/>	Standard Audit Log Administration	Cisco Call Manager Serviceability	Serviceability Audit Log Administration	
<input checked="" type="checkbox"/>	Standard CCM Admin Users		All users with access to CCM web site	
<input type="checkbox"/>	Standard CCM End Users		Access to CCM User Option Pages	
<input type="checkbox"/>	Standard CCM Feature Management	Cisco Call Manager Administration	Standard CCM Feature Management	

Enter AXL Data in Enterprise Manager

Under Voice Systems, go to Properties and update the following properties:

1. Enter the AXL Username and AXL Password for the user on the server you are setting up.
2. Enter the AXL URL as the URL to the AXL API of the cluster: 'https://<cluster_hostname>:8443/axl/'. The host is normally just the 'SIP Server' one you entered above but can be any hostname that resolves to a server or multiple servers on the cluster.

Blue Hospital

 **User Admin**

Dashboard

Assignment

Configuration

Settings

Logout

Voice Systems

Affiliated Facilities

Facility ↑	DNS Mapping
No affiliated facilities	

Delete

Edit

Add

Properties

Name ↑	Value
AXL Password	
AXL URL	
AXL Username	
AXL Version	9.0
Call Forward CSS	
Calling Search Space	pss-css
Cluster Name	

Back

Delete

Fix Extensions

Save

CUCM Settings

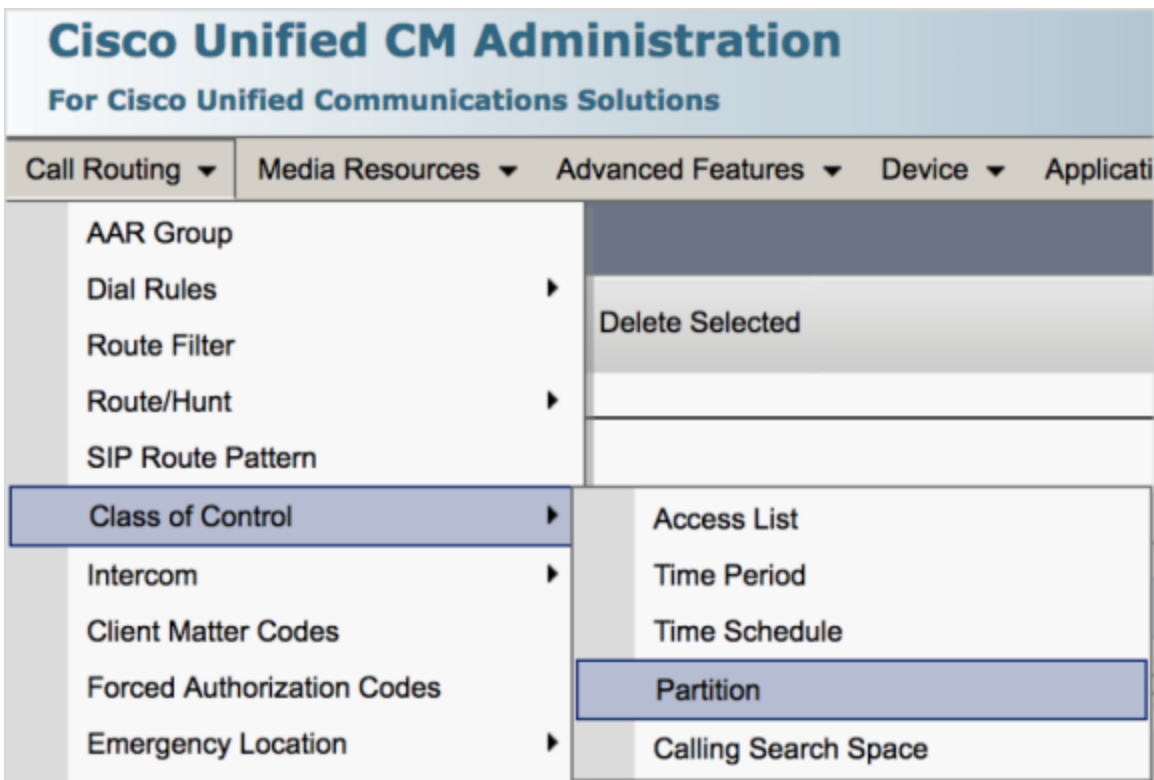
The following have to be configured on the CUCM server and the corresponding properties updated in Enterprise Manager> Voice Systems.

Route Partition & Calling Search Space

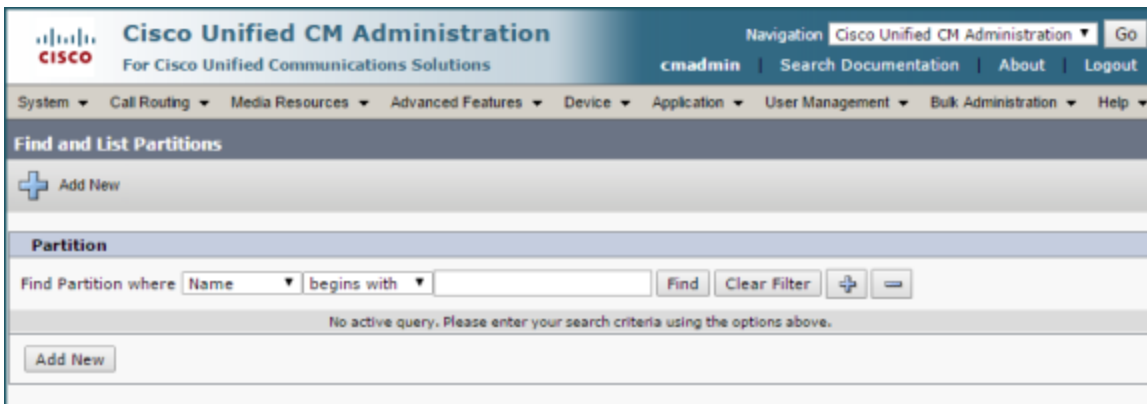
To enable custom call routing for Vocera Edge devices, a new Route Partition and a new Calling Search Space specific to PSS devices are required. In addition to call routing, the Route Partition is also used to determine calls made by Vocera Edge devices as part of the Call History feature.

Not down the 'Route Partition' and 'Calling Search Space' names, these will need to be entered in Enterprise Mgr under the Voice System Properties.

1. Select **Call Routing>Class of Control>Partition**.

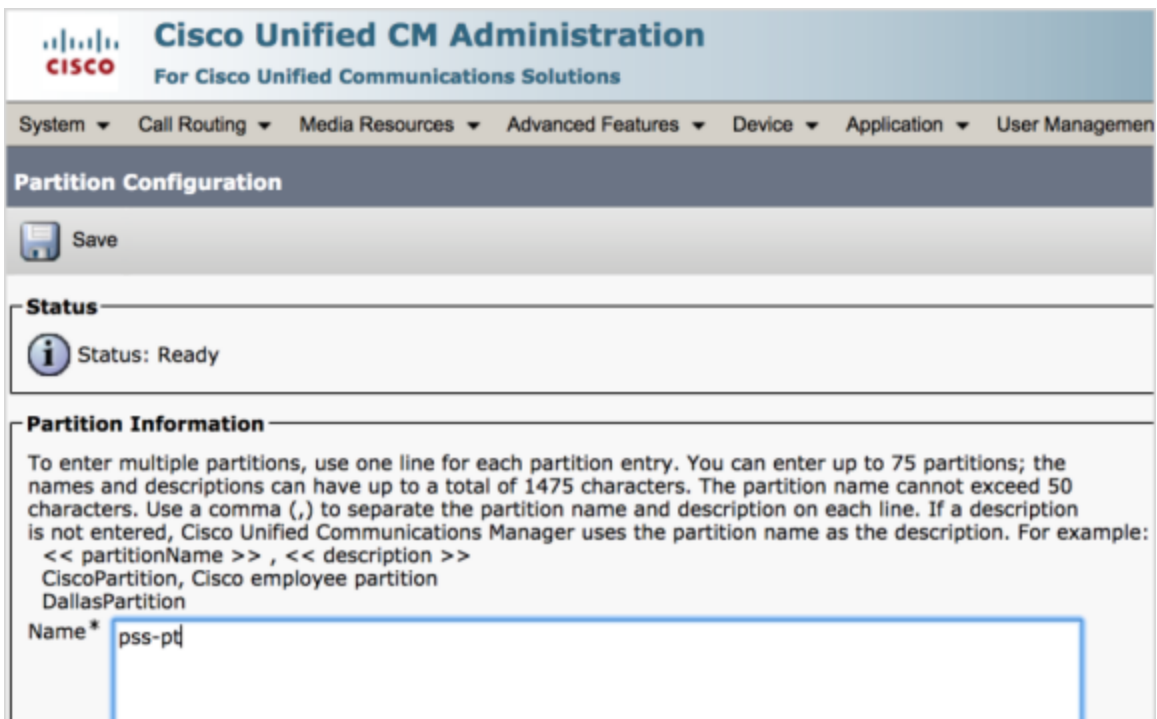


2. Click **Add New**.



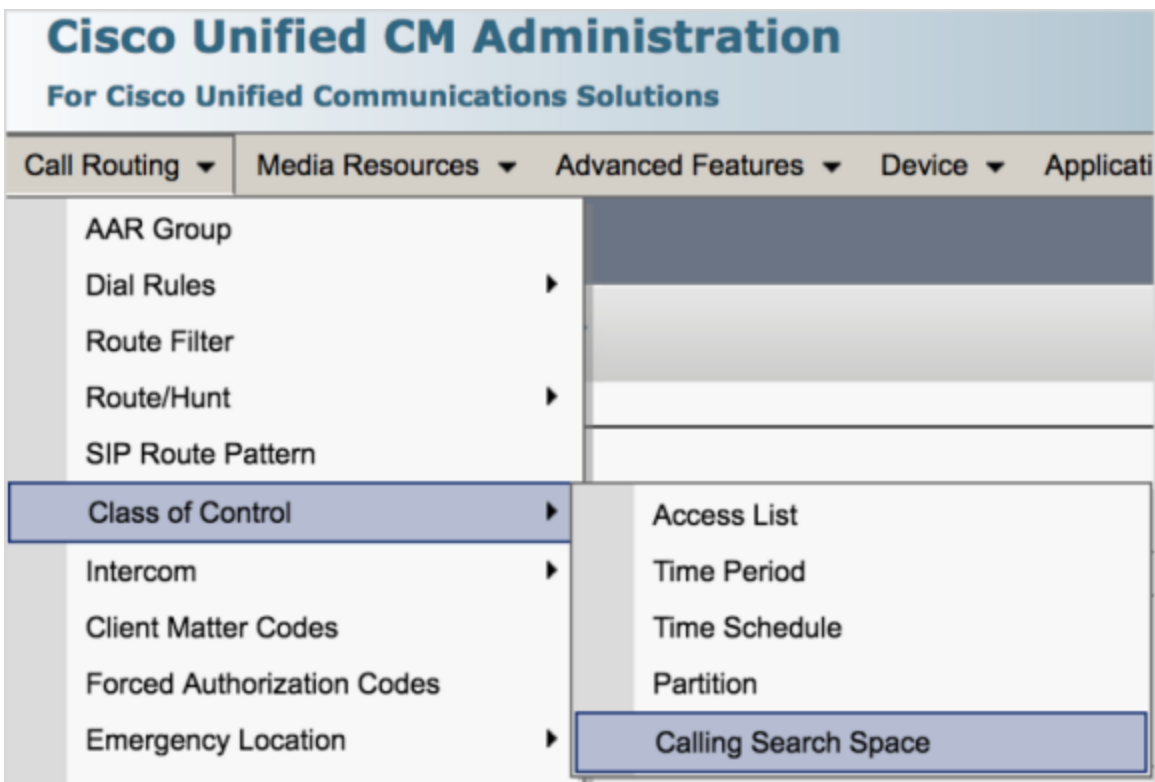
The screenshot shows the 'Find and List Partitions' page in the Cisco Unified CM Administration interface. The page has a header with the Cisco logo and navigation links. Below the header, there are tabs for 'System', 'Call Routing', 'Media Resources', 'Advanced Features', 'Device', 'Application', 'User Management', 'Bulk Administration', and 'Help'. The 'Find and List Partitions' section includes an 'Add New' button and a search form. The search form has a 'Find Partition where' dropdown set to 'Name', a 'begins with' dropdown, and a text input field. There are 'Find', 'Clear Filter', and navigation buttons. A message below the search form states: 'No active query. Please enter your search criteria using the options above.' There is also an 'Add New' button at the bottom of the search section.

3. Enter the Partition name.
4. Click **Save**.

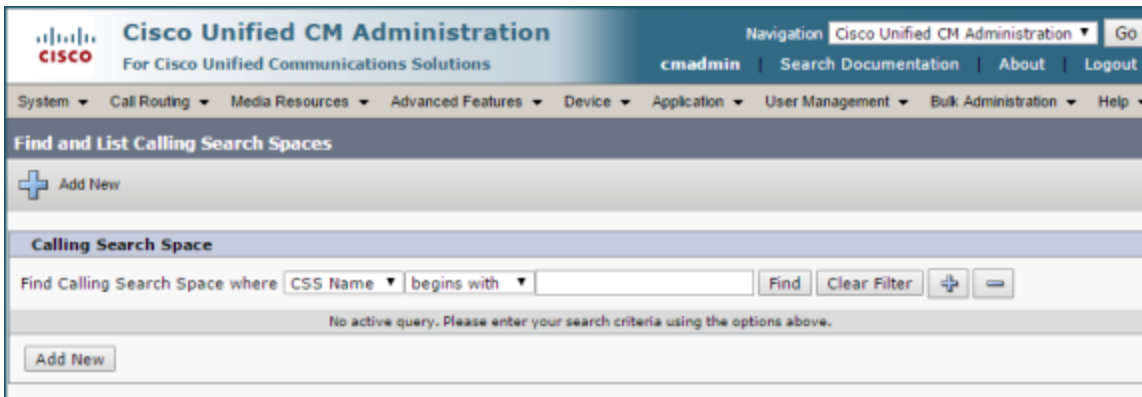


The screenshot shows the 'Partition Configuration' page in the Cisco Unified CM Administration interface. The page has a header with the Cisco logo and navigation links. Below the header, there are tabs for 'System', 'Call Routing', 'Media Resources', 'Advanced Features', 'Device', 'Application', and 'User Management'. The 'Partition Configuration' section includes a 'Save' button. Below the 'Save' button, there is a 'Status' section showing 'Status: Ready'. The 'Partition Information' section contains instructions on how to enter multiple partitions and a text input field for the 'Name' field, which contains the text 'pss-pt'.

5. Select **Call Routing>Class of Control>Calling Search Space**.



6. Click **Add New**.







7. Enter a Name.


8. Click **Save**.

System ▾ Call Routing ▾ Media Resources ▾ Advanced Features ▾ Device ▾ Application ▾ User Manage

Calling Search Space Configuration

 Save  Delete  Copy  Add New

Status

 Status: Ready

Calling Search Space Information

Name*

Description

Route Partitions for this Calling Search Space

Available Partitions**

Directory URI

Global Learned E164 Numbers



Global Learned E164 Patterns

Global Learned Enterprise Numbers

Global Learned Enterprise Patterns

Selected Partitions

pss-pt

9. Write down the 'Route Partition' and 'Calling Search Space' names as these will need to be entered in Enterprise Manager under the Voice System Properties.

Enterprise Manager Properties

Enter the Route Partition and Calling Search Space in Enterprise Manager under Voice Systems>Properties.



Properties	
Name	
Allow Create Users	false
AXL Password	*****
AXL URL	https://<your CUCM host>:8443/axl/
AXL Username	pssaxluser
AXL Version	9.0
Calling Search Space	pss-css
Device Pool	PSS Device Pool
Device Type	Third-party SIP Device (Basic)
Digest Password	*****
Digest Realm	ccmsipline
Route Partition	pss-pt
Sip Profile	PSS Sip Profile
Sip Security Profile	PSS Security Profile
User Prefix	

Device Pool

A separate Device Pool should be used for each CUCM Voice Setting in Enterprise Manager. The Device Pool is how Org Services knows where to find Vocera Edge devices in CUCM. Take note of the name used for the Device Pool, this will be entered into Enterprise Manager later.

To allow multiple Voice Settings for the same CUCM cluster from a multi-facility installation of Org Services, each facility will have a single Voice Settings, that will have its own device pool and calling search space. A separate calling search space is necessary for each facility so 0, 911, etc, can be routed. Separate Device Pools are needed for to allow for different routing, and Caller ID transforms mask (among other settings that may be optionally used).

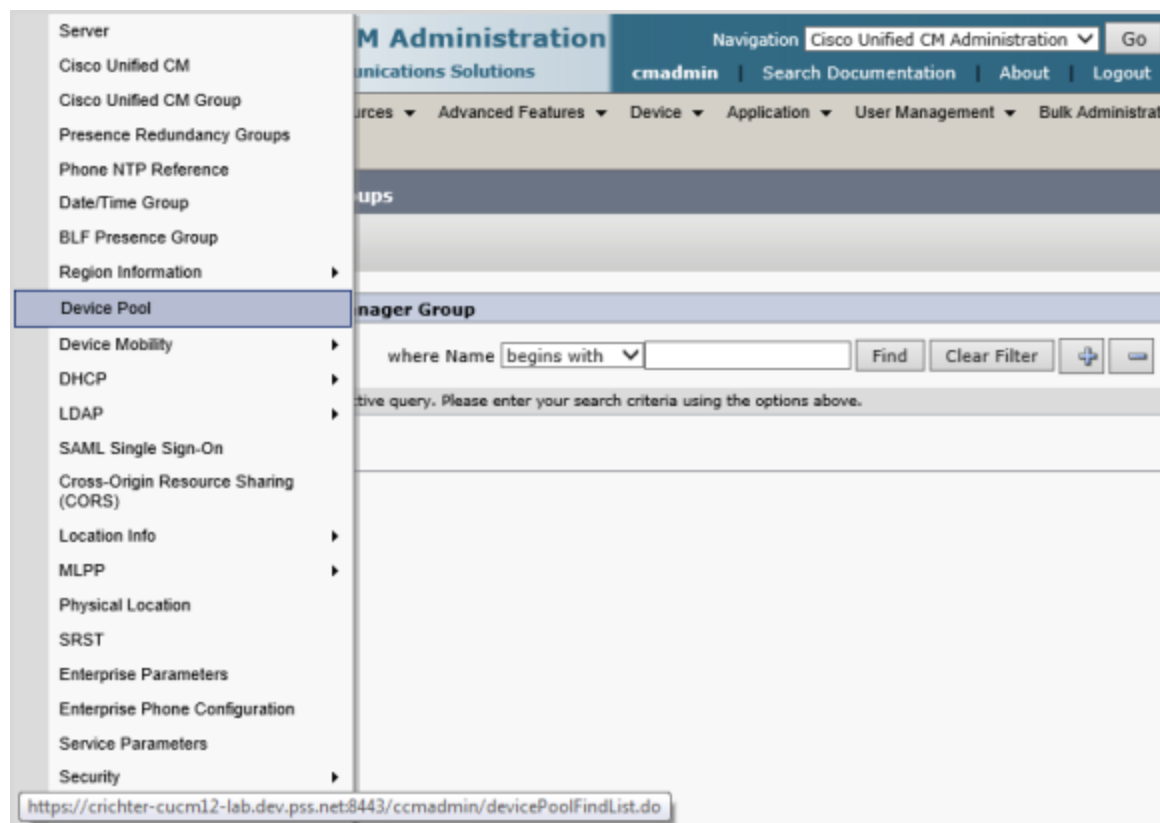
Device may be duplicated per facility OR move per facility in CUCM. This is determined by number of device pools listed per PBX.

- If single device pool entered, device will be duplicated across facilities.
- If multiple device pools, device will be moved between facilities.
- In both cases calling should work as expected.

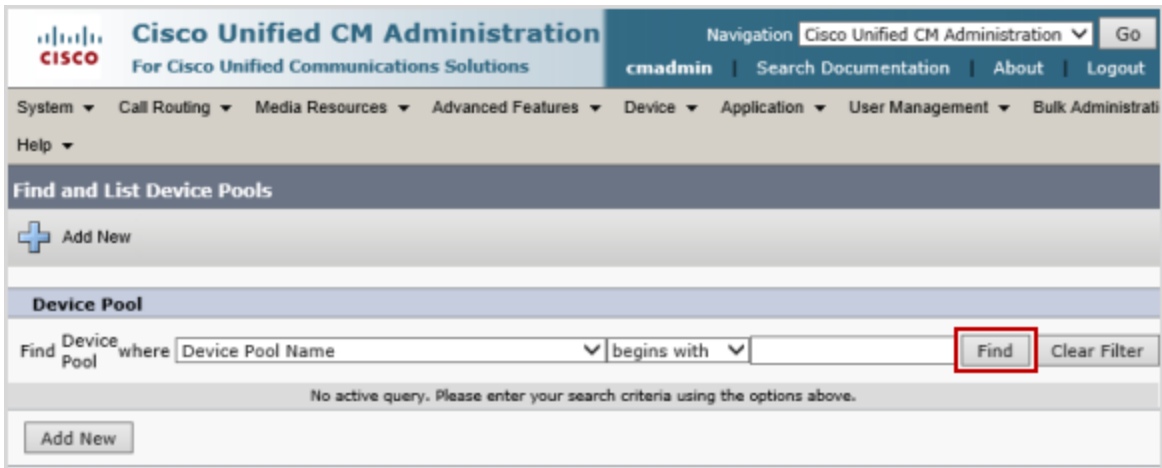
Only needed if you want to enable digest authentication. Add a new 'SIP Security Profile' and check 'Enable Digest Authentication'. Take note of the name you used for this SIP Security Profile, this will be configured in Enterprise Mgr later.

The device type must match 'Third-Party SIP Device (Basic)'.

1. From the System menu, select **Device Pool**.



2. Click **Find**.



Cisco Unified CM Administration
For Cisco Unified Communications Solutions

Navigation: Cisco Unified CM Administration

cmadmin | Search Documentation | About | Logout

System ▾ Call Routing ▾ Media Resources ▾ Advanced Features ▾ Device ▾ Application ▾ User Management ▾ Bulk Administration ▾

Help ▾

Find and List Device Pools

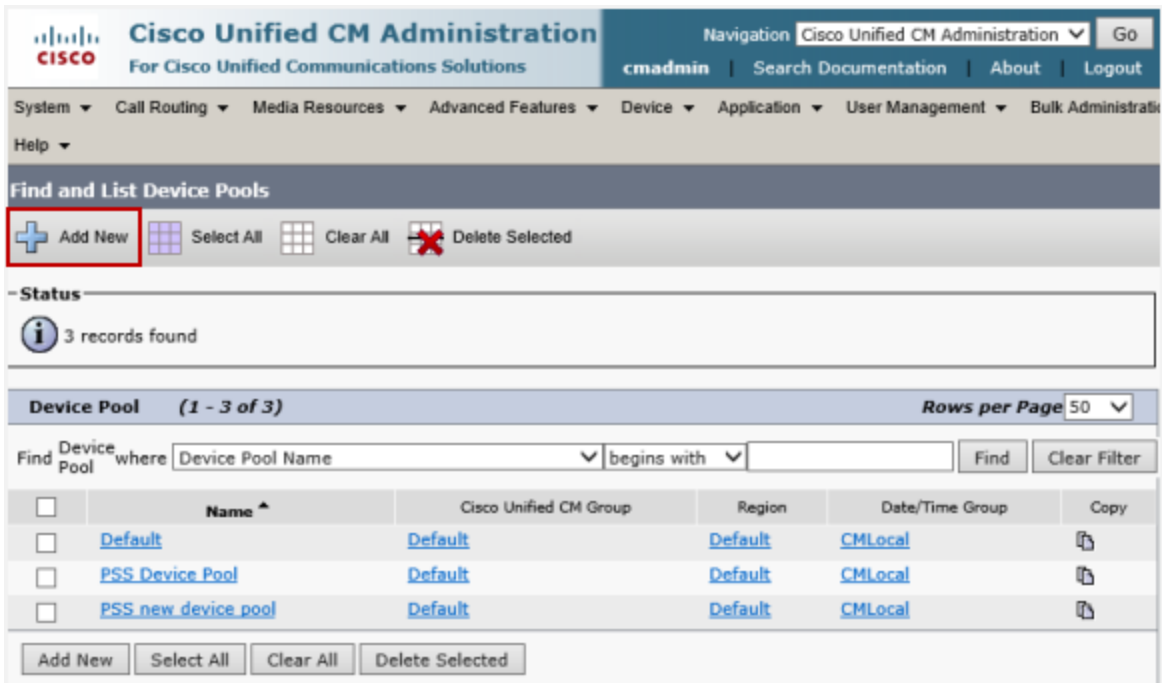
Add New

Device Pool

Find Device Pool where ▾ begins with

No active query. Please enter your search criteria using the options above.

3. Click **Add New**.



Cisco Unified CM Administration
For Cisco Unified Communications Solutions

Navigation: Cisco Unified CM Administration

cmadmin | Search Documentation | About | Logout

System ▾ Call Routing ▾ Media Resources ▾ Advanced Features ▾ Device ▾ Application ▾ User Management ▾ Bulk Administration ▾

Help ▾

Find and List Device Pools

Add New

Status

3 records found

Device Pool (1 - 3 of 3) Rows per Page: 50 ▾

Find Device Pool where ▾ begins with

<input type="checkbox"/>	Name ^	Cisco Unified CM Group	Region	Date/Time Group	Copy
<input type="checkbox"/>	Default	Default	Default	CMLocal	<input type="button" value="Copy"/>
<input type="checkbox"/>	PSS Device Pool	Default	Default	CMLocal	<input type="button" value="Copy"/>
<input type="checkbox"/>	PSS_new_device_pool	Default	Default	CMLocal	<input type="button" value="Copy"/>

4. Enter the following Device Pool Information:

- Device Pool Name -
- Cisco Unified Communications Manager Group - Default
- Calling Search Space for Auto-registration - pss css
- Date/Time Group - CMLocal
- Region - Default



Device Pool Information	
Device Pool:	New

Device Pool Settings	
Device Pool Name*	PSS Device Pool
Cisco Unified Communications Manager Group*	Default
Calling Search Space for Auto-registration	pss-css
Adjunct CSS	< None >
Reverted Call Focus Priority	Default
Intercompany Media Services Enrolled Group	< None >

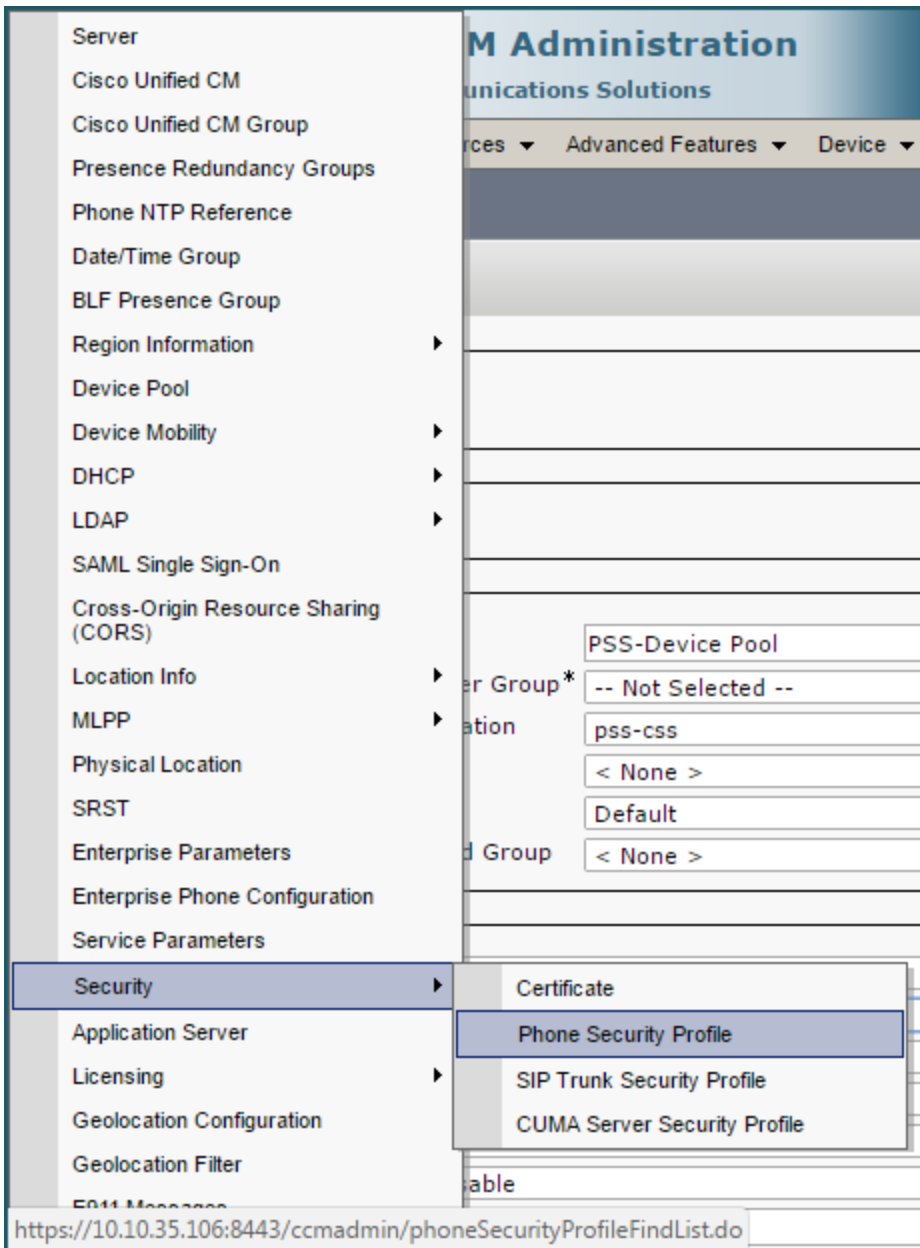
Roaming Sensitive Settings	
Date/Time Group*	CMLocal
Region*	Default
Media Resource Group List	< None >
Location	< None >
Network Locale	< None >
SRST Reference*	Disable
Connection Monitor Duration***	
Single Button Barge*	Default
Join Across Lines*	Default
Physical Location	< None >
Device Mobility Group	< None >

SIP Security Profile

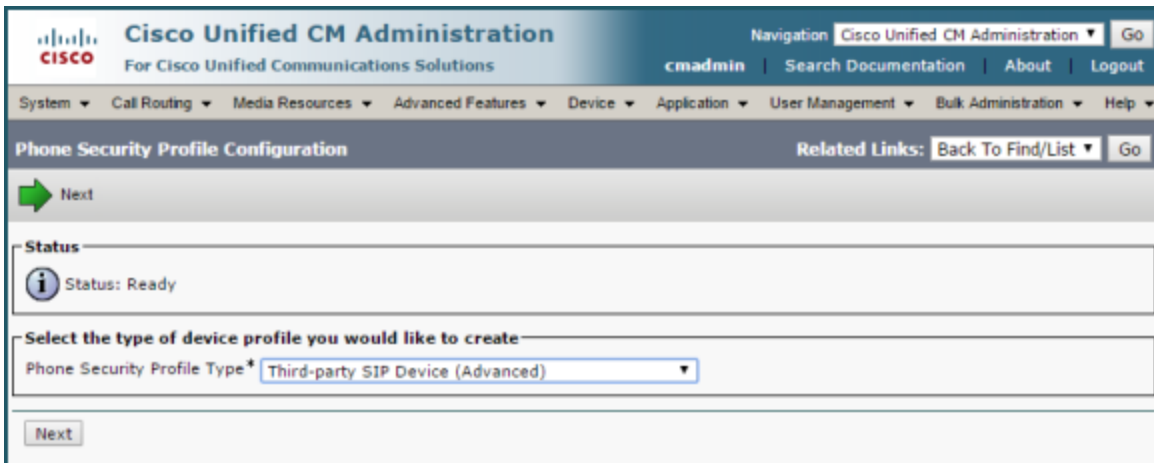
This is only needed if you want to enable digest authentication. Add a new SIP Security Profile and select 'Digest Authentication'. Take note of the name you used for this SIP Security Profile, this will be configured in Enterprise Manager later.

The device type must match the device type entered into Enterprise Manager. E.g. 'Third-Party SIP Device (Basic)'.

1. Click **System>Security>Phone Security Profile**.









2. Click **Add New**.
3. Enter the Phone Security Profile Type.
4. Click **Next**.




The screenshot shows the Cisco Unified CM Administration web interface. The page title is "Phone Security Profile Configuration". The navigation bar includes "System", "Call Routing", "Media Resources", "Advanced Features", "Device", "Application", "User Management", "Bulk Administration", and "Help". The "Device" menu is expanded, showing "Phone Security Profile Configuration". The "Status" section shows "Status: Ready". The "Select the type of device profile you would like to create" section has a dropdown menu for "Phone Security Profile Type*" with "Third-party SIP Device (Advanced)" selected. A "Next" button is at the bottom.

5. Enter the following information:

Phone Security Profile Configuration

 Save
  Delete
  Copy
  Reset
  Apply Config
  Add New

Status

 Status: Ready

Phone Security Profile Information

Product Type: Third-party SIP Device (Basic)
Device Protocol: SIP
Name *
Description
Nonce Validity Time *
Transport Type *
☒ Enable Digest Authentication

Parameters used in Phone

SIP Phone Port *

Save Delete Copy Reset Apply Config Add New

Enterprise Manager Settings

Enter the name of the new device security profile in Enterprise Manager under Settings>Voice Systems>Properties.



Properties	
Name ↑	Value
Digest Realm	ccmsipline
No Answer Timeout	15
Route Partition	pss-pt
Sip Port	5060
Sip Profile	PSS Sip Profile
Sip Security Profile	PSS Basic Security Profile
User Prefix	pss_blue_



SIP Profile

Create a new SIP Profile for Vocera Edge devices, take note of the name used, this will be configured in Enterprise Manager later.

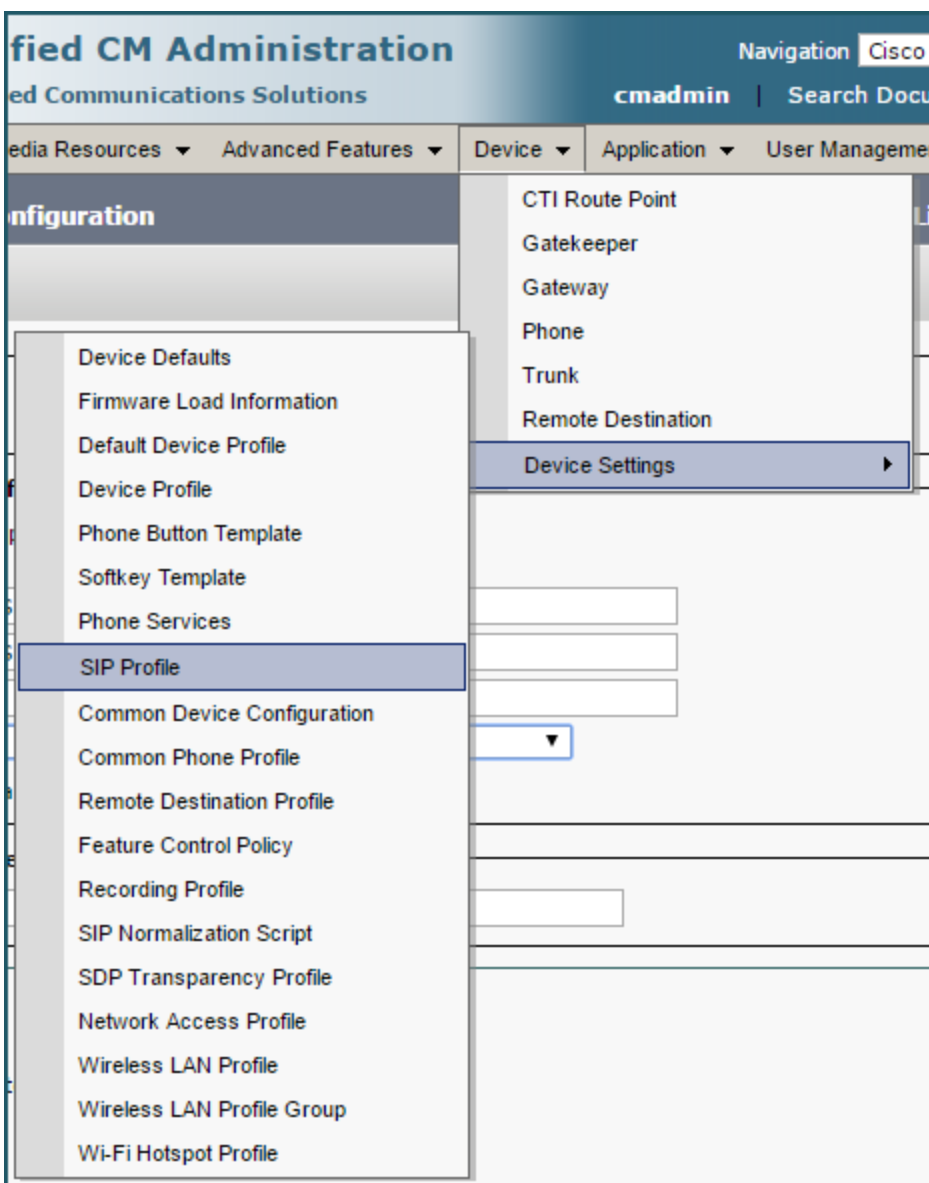
Call History has to be enabled on the CUCM server. Call history logs are uploaded by CUCM to the Org Services cluster over SFTP. Only logs for the route partition configured in 'Voice Systems' are considered.

Set the 'CDR File Time Interval' to '1' under 'System' -> 'Enterprise Parameters' (the call history records will be uploaded to Org Services every 1 minute).

- Directory should be '/callhistory/'
- User should be 'cucmsftp'
- Password is per install and provided by your PSS Support representative

Make sure 'Use Fully Qualified Domain Name in SIP requests' is enabled as well if you want to connect with a domain name instead of an IP (recommended):

1. Click **Device>Device Settings>SIP Profile**.




2. Click **Add New**.
3. Enter the following information:
 - Name
 - Description
 - Select the Redirect by Application check box
 - Select the Use Fully Qualified Domain Name in SIP Requests check box

Cisco Unified CM Administration
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Navigation: Cisco Unified CM Administration **Go**
cadmin | Search Documentation | About | Logout

System ▾ Call Routing ▾ Media Resources ▾ Advanced Features ▾ Device ▾ Application ▾ User Management ▾ Bulk Administration ▾ Help ▾

SIP Profile Configuration Related Links: Back To Find/List **Go**

 Save

Status

-  Status: Ready
-  All SIP devices using this profile must be restarted before any changes will take affect.

SIP Profile Information

Name* PSS SIP Profile

Description PSS SIP Profile

Default MTP Telephony Event Payload Type* 101

Early Offer for G.Clear Calls* Disabled ▾

User-Agent and Server header information* Send Unified CM Version Information as User-Agen ▾

Version in User Agent and Server Header* Major And Minor ▾

Dial String Interpretation* Phone number consists of characters 0-9, *, #, and ▾

Confidential Access Level Headers* Disabled ▾

☒ Redirect by Application

☐ Disable Early Media on 180

☐ Outgoing T.38 INVITE include audio mline

☒ Use Fully Qualified Domain Name in SIP Requests

☐ Assured Services SIP conformance

SDP Information

SDP Session-level Bandwidth Modifier for Early Offer and Re-invites* TIAS and AS ▾

SDP Transparency Profile Pass all unknown SDP attributes ▾

Accept Audio Codec Preferences in Received Offer* Default ▾

☐ Require SDP Inactive Exchange for Mid-Call Media Change

☐ Allow RR/RS bandwidth modifier (RFC 3556)



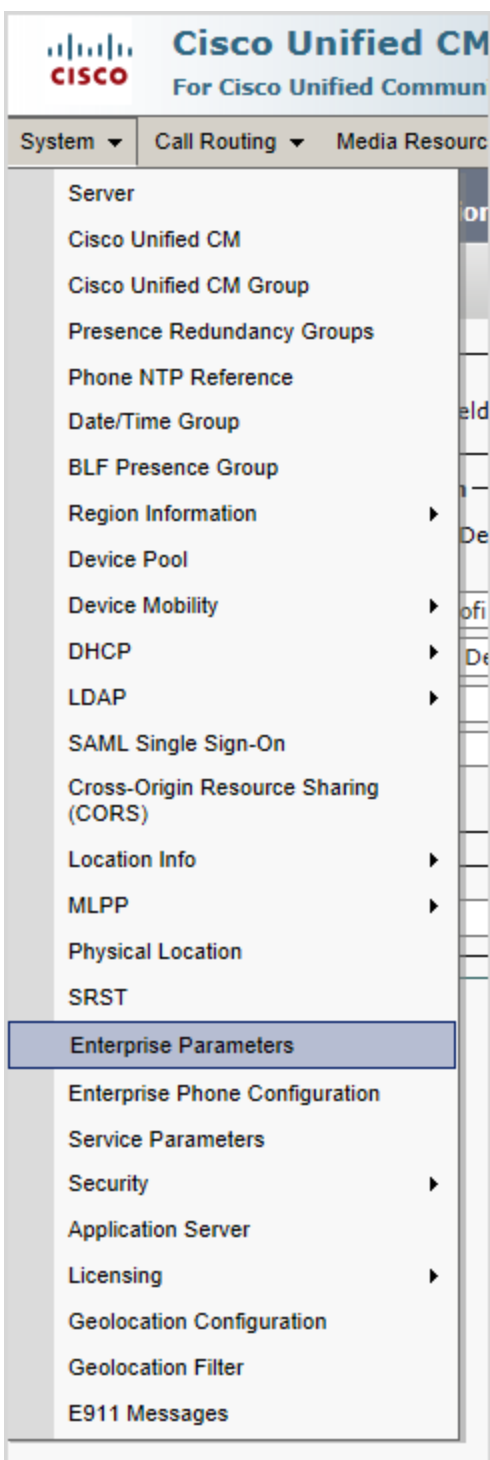
SIP Domain

The Vocera Edge clients use the 'SIP Domain' when registering the SIP connection with CUCM, <extension>@<sipdomain>, e.g. 1000@cucm.mycompany.com.

This can be an IP or a fully qualified domain name (FQDN). The FQDN on the CUCM Publisher if set can be found below. Note this for later.

When connecting via a FQDN, make sure the SIP Security Profile (see previous section) has the setting 'Use Fully Qualified Domain Name in SIP requests' enabled.

1. Click **System>Enterprise Parameters**.



2. Enter your CUCM server in the designated fields.
3. Click **Save**.



System ▾ Call Routing ▾ Media Resources ▾ Advanced Features ▾ Device ▾ Application ▾ User Management ▾ Bulk Administration ▾ Help ▾

Enterprise Parameters Configuration

Save Set to Default Reset Apply Config

Clusterwide Domain Configuration

[Organization Top Level Domain](#)

[Cluster Fully Qualified Domain Name](#)

Denial-of-Service Protection

[Denial-of-Service Protection](#) * ▾

TLS Handshake Timer

[TLS Handshake Timer](#) *

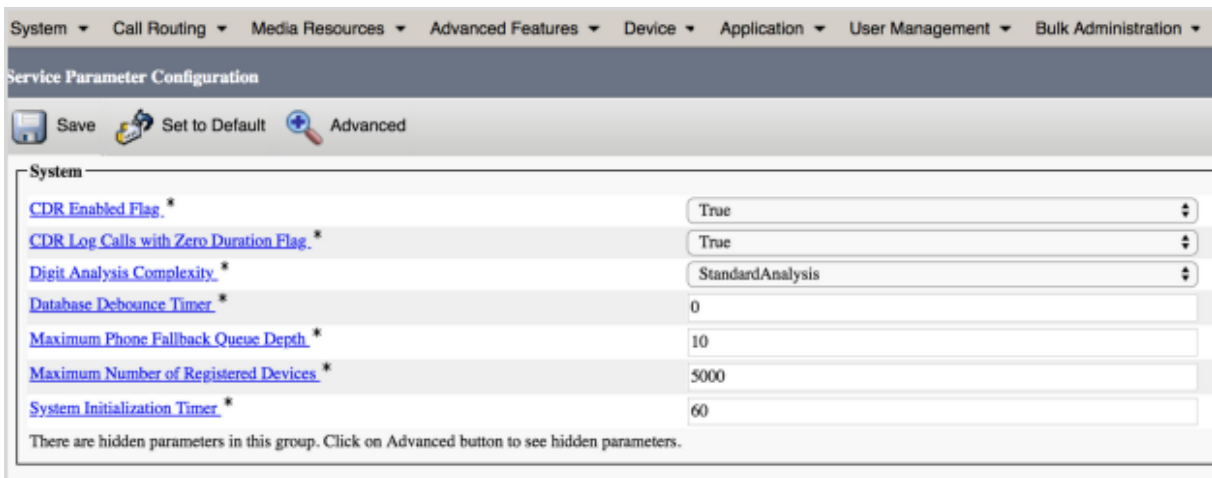
TLS Resumption Timer

[TLS Resumption Timer](#) *

Call History

Call History has to be enabled on the CUCM server. Call history logs are uploaded by CUCM to the Org Services cluster over SFTP. Only logs for the route partition configured in Voice System are considered.

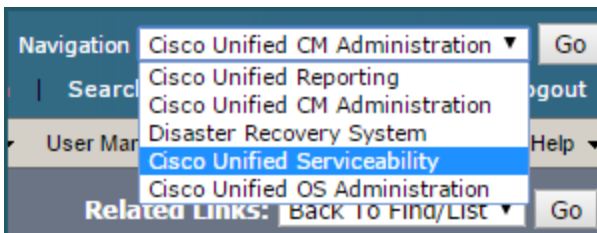
1. Set the 'CDR File Time Interval' to '1' under 'System' -> 'Enterprise Parameters' (the call history records will be uploaded to Org Services every 1 minute).
2. Go 'System' -> 'Service Parameters', then select the server and 'Cisco CallManager' this will bring up properties editor for call manager. Set the following:
 - 'CDR Enabled Flag' to 'true.'
 - 'CDR Log Calls with Zero Duration Flag' to 'true.'



System	
CDR Enabled Flag *	True
CDR Log Calls with Zero Duration Flag *	True
Digit Analysis Complexity *	StandardAnalysis
Database Debounce Timer *	0
Maximum Phone Fallback Queue Depth *	10
Maximum Number of Registered Devices *	5000
System Initialization Timer *	60

There are hidden parameters in this group. Click on Advanced button to see hidden parameters.

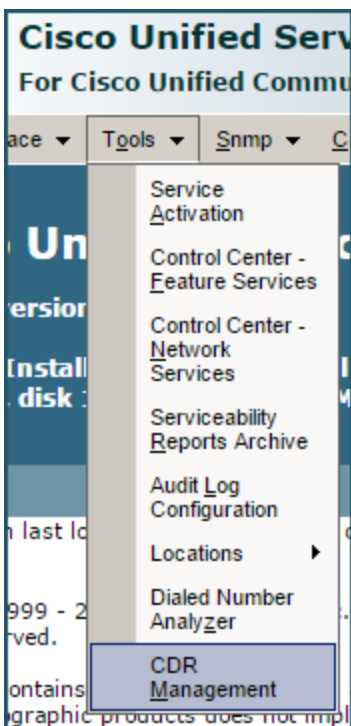
3. Then setup 'CDR Management': Select 'Cisco Unified Serviceability' and click 'Go'.



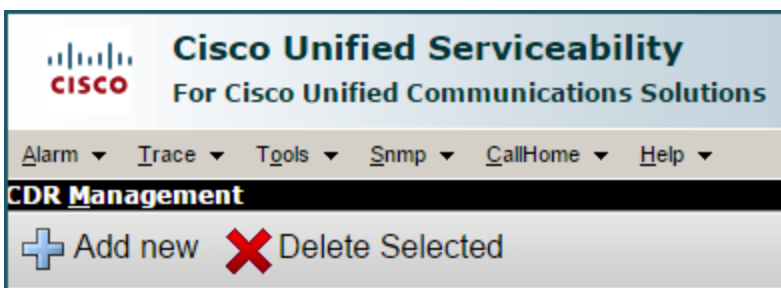
Navigation: Cisco Unified CM Administration, Cisco Unified Reporting, Cisco Unified CM Administration, Disaster Recovery System, **Cisco Unified Serviceability**, Cisco Unified OS Administration

Related LINKS: Back To Find/List

4. Click Tools>CDR Management.




5. Click **Add New** to add a new 'Billing Application Server'. This is just a server that accepts CDR CSV files, it's nothing to do with billing.





Fill out the Org Services server hostname (this can be any server in the org services cluster where cucm-sync is running. It can be a load balanced hostname/ip).

6. Enter the following information:
 - Host Name: enter your host name
 - User Name: should be 'cucmsftp'
 - Password: Password is per install and provided by your PSS Support representative
 - Directory Path: Should be '/callhistory/'

**Cisco Unified Serviceability**
For Cisco Unified Communications Solutions



Alarm ▾ Trace ▾ Tools ▾ Snmp ▾ CallHome ▾ Help ▾

CDR Management



Billing Application Server Parameters

Host Name / IP Address*	<input type="text" value="blue.qa.pss.net"/>
User Name*	<input type="text" value="cucmsftp"/>
Password*	<input type="password" value="....."/>
Protocol*	<input type="button" value="SFTP ▾"/>
Directory Path*	<input type="text" value="/callhistory/"/>
Resend on Failure	<input checked="" type="checkbox"/>

* - indicates required item.
Updation of IPAddress/Hostname and Directory Path is not allowed, CD

Hunt Groups

A hunt group is a method of distributing phone calls from a single extension or number to a group of users. In order to use Hunt Groups with Vocera Edge they must first be configured in CUCM.

Terminology:

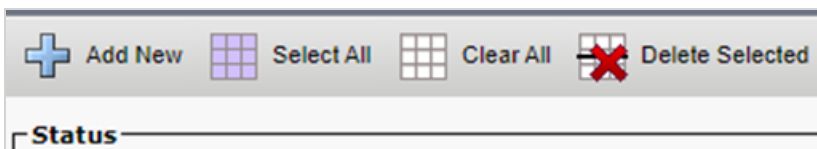
- **Line Group** - A line group allows you to designate the order in which directory numbers are chosen. Vocera Edge Extensions are added and removed from this line group. In general, we anticipate sites configuring the Distribution Algorithm(Ring Order) to Broadcast, which will ring all numbers.
- **Hunt List** - A Hunt List lists a set of Line groups in a specific order.
- **Hunt Pilot** - A Hunt Pilot is the extension that routes calls to the Hunt List.

Create a new Line Group. Vocera Edge extensions will be added/removed from this line group.

1. Click **Route/Hunt > Line Group**.



2. Click **Add New**.





3. Enter the following information:

- Line Group Name. Note this as it will need to be entered into Enterprise Manager.
- Ring No Answer (RNA) Timer. The recommended length is 15 seconds.
- Distribution Algorithm. The recommended option is Broadcast.
- Optionally, set responses for No Answer and Busy settings.

System ▾ Call Routing ▾ Media Resources ▾ Advanced Features ▾ Device ▾ Application ▾ User Manage

Line Group Configuration

Save  Delete  Add New

Line Group Information

Line Group Name*

RNA Reversion Timeout*

Distribution Algorithm*

Hunt Options

No Answer*



☐ Automatically Logout Hunt Member on No Answer

Busy**

Not Available**

Optionally, a second line group may be set up as a fallback.

Line Group Configuration Related Links: [Back To](#)

Save  Delete  Add New

Line Group Information

Line Group Name*

RNA Reversion Timeout*

Distribution Algorithm*

Hunt Options

No Answer*

☐ Automatically Logout Hunt Member on No Answer

Busy**

Not Available**

Line Group Member Information

Find Directory Numbers to Add to Line Group

Partition

Directory Number Contains

Available DN/Route Partition


- 6101/pss-pt
- 8888#1/pss-pt
- 88888252*1#/pss-pt
- 9101/pss-mwtest1-pt
- Too many matches; use more specific search.

Current Line Group Members

Selected DN/Route Partition

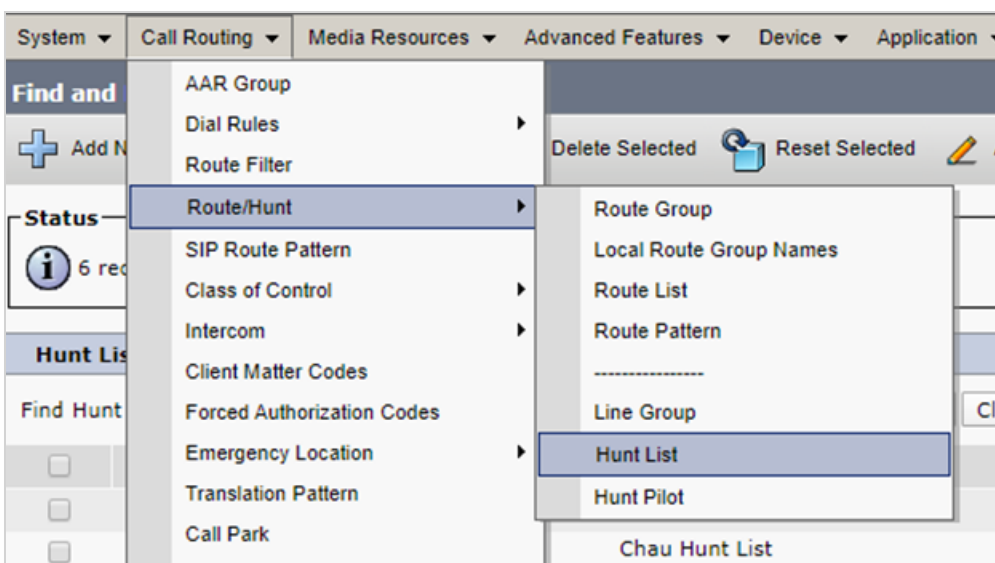
Removed DN/Route Partition

Directory Numbers

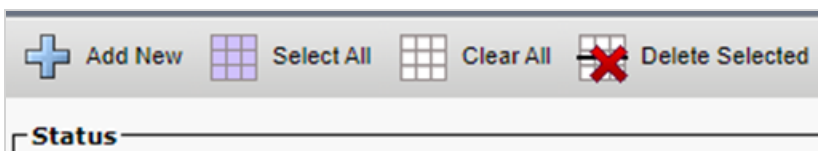
 [View 1006 in ccs-white-pt](#)

Create a Hunt List.

1. Click on **Route/Hunt > Hunt List**.



2. Click **Add New**.



3. Enter the following information:

- Name
- Description
- Check the box next to "Enable Hunt List".
- Click "Add Line Group" and add the line group created in the first step.

Save

Delete

Copy

Reset

Apply Config

Add New

Status

Status: Ready

Hunt List Information

Device is trusted

Name*

Hunt List PSS 1

Description

Hunt List PSS 1

Cisco Unified Communications Manager Group*

Default

Enable this Hunt List (change effective on Save; no reset required)

For Voice Mail Usage

Hunt List Member Information

Add Line Group

Selected Groups**

Line Group PSS 1

7001 Fall Back Number

Removed Groups***

Hunt List Details

Line Group PSS 1

7001 Fall Back Number

Save

Delete

Copy

Reset

Apply Config

Add New

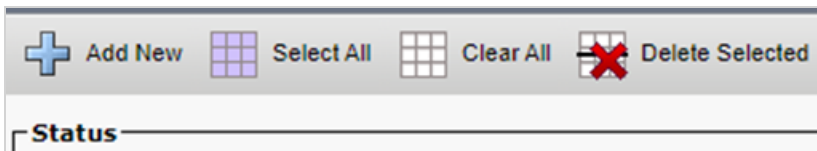
Create Hunt pilot.

1. Click on **Route/Hunt > Hunt Pilot**.

The screenshot shows the Cisco Unified Communications Manager Administration interface. The top navigation bar includes tabs for System, Call Routing, Media Resources, Advanced Features, Device, Application, and User. The left sidebar contains sections for Find and Add, Status, and Hunt Pilot. The 'Find and Add' section is active, displaying a list of search criteria. The 'Route/Hunt' option is selected, which has opened a sub-menu. This sub-menu lists various search options: Route Group, Local Route Group Names, Route List, Route Pattern, Line Group, Hunt List, and Hunt Pilot. The 'Hunt Pilot' option is highlighted in blue.

System	Call Routing	Media Resources	Advanced Features	Device	Application	User
Find and Add						
<div> <div> Add New </div> <div> <div> <div>Status</div> <div> 5 records </div> </div> <div> <div>Hunt Pilot</div> <div>Find Hunt</div> <div> <input type="checkbox"/> <input type="checkbox"/> </div> </div> </div> <div> <div>AAR Group</div> <div>Dial Rules</div> <div>Route Filter</div> <div>Route/Hunt</div> <div>SIP Route Pattern</div> <div>Class of Control</div> <div>Intercom</div> <div>Client Matter Codes</div> <div>Forced Authorization Codes</div> <div>Emergency Location</div> <div>Translation Pattern</div> <div>Call Park</div> </div> <div> <div>Delete Selected</div> <div>Route Group</div> <div>Local Route Group Names</div> <div>Route List</div> <div>Route Pattern</div> <div>-----</div> <div>Line Group</div> <div>Hunt List</div> <div>Hunt Pilot</div> </div> </div>						

2. Click **Add New**.



3. Enter the following information:
 - Hunt Pilot DN
 - Select the Route Partition
 - Description
 - Select the Hunt List created in the second step.
 - Alerting name
 - Optionally, set forward no answer and busy settings.



Hunt Pilot Configuration Related Link

Save Delete Copy Add New

Status
 Status: Ready

Pattern Definition

Hunt Pilot*	<input type="text" value="7001"/>
Route Partition	<input type="text" value="pss-white-pt"/>
Description	<input type="text" value="Hunt Group PSS 1"/>
Numbering Plan	<input type="text" value=" < None >"/>
Route Filter	<input type="text" value=" < None >"/>
MLPP Precedence*	<input type="text" value=" Default"/>
Hunt List*	<input type="text" value=" Hunt List PSS 1"/> (Edit)
Call Pickup Group	<input type="text" value=" < None >"/>
Alerting Name	<input type="text" value=" Hunt Group PSS 1"/>
ASCII Alerting Name	<input type="text" value=" Hunt Group PSS 1"/>
Route Option	<input checked="" type="radio"/> Route this pattern <input type="radio"/> Block this pattern <input type="text" value=" No Error"/>
<input type="checkbox"/> Provide Outside Dial Tone <input type="checkbox"/> Urgent Priority	

Hunt Call Treatment Settings

Forward Hunt No Answer

<input checked="" type="radio"/> Do Not Forward Unanswered Calls <input type="radio"/> Use Forward Settings of Line Group Member <input type="radio"/> Forward Unanswered Calls to	
Destination	<input type="text"/>
Calling Search Space	<input type="text" value=" < None >"/>
Maximum Hunt Timer	<input type="text"/>

Forward Hunt Busy

<input checked="" type="radio"/> Do Not Forward Busy Calls <input type="radio"/> Use Forward Settings of Line Group Member <input type="radio"/> Forward Busy Calls to	
Destination	<input type="text"/>
Calling Search Space	<input type="text" value=" < None >"/>

When setting up the Hunt Group in Enterprise Manager, enter the Line Group Name from CUCM. Please see step by step instructions in the Enterprise Manager User Guide.



Voice

Facility:	PatientSafe Temecula	Name:	3RDFLOOR: Consulting Endocrinologist
Voice System:	pss-cucm-12-5-cluster	Extension (Display Only):	6010
		Fallback # (Display Only):	6000
		Hunt Group:	<input checked="" type="checkbox"/>
		External Number:	
		Line Group Name:	<input type="text"/> ⓘ

Cancel Done



Create New Voice System in Enterprise Manager

A 'Voice System' in Enterprise Manager allows directory numbers (extensions) to be provisioned on a Call Manager/PBX.

Note There may be an existing 'Vocera Edge Voice Appliance' example Voice System added, remove this if connecting only to CUCM.

1. Select **Settings>Voice Systems**.
2. Click **Create New**. Enter a Name.
3. Select 'Cisco CUCM' as the type.
4. Make sure 'Enable Extension Configuration' is selected (it is selected by default).

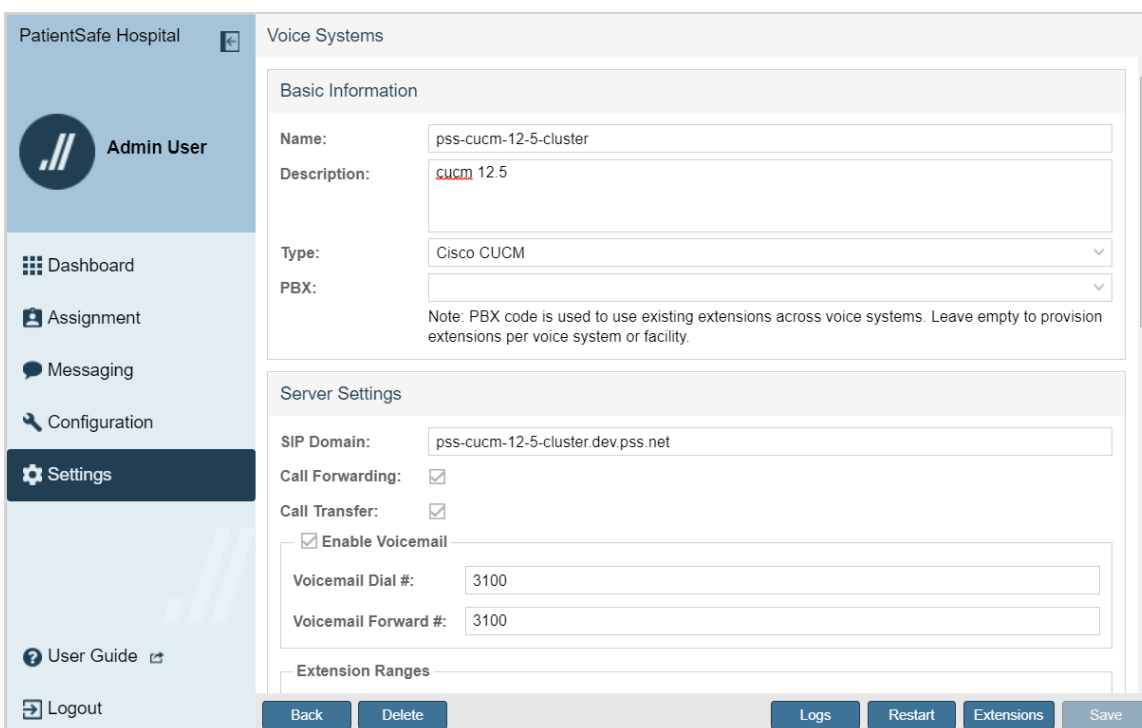
Note When Enable Extension Configuration is enabled, users, devices and lines in CUCM will be managed by Enterprise Manager. When disabled Enterprise Mgr will only read these from CUCM. However, in both cases the forwarding number on the line will be updated every time a user logs in or changes it from the client.

5. Add the CUCM SIP domain under SIP Domain. This can be an IP but a fully qualified domain name (FQDN) is preferred. Vocera Edge devices register over SIP to CUCM using this 'SIP Domain'

VoIP Settings in Org Services

The handheld then requests VOIP settings from Org Services, to allow the handheld to login over SIP. Settings include:

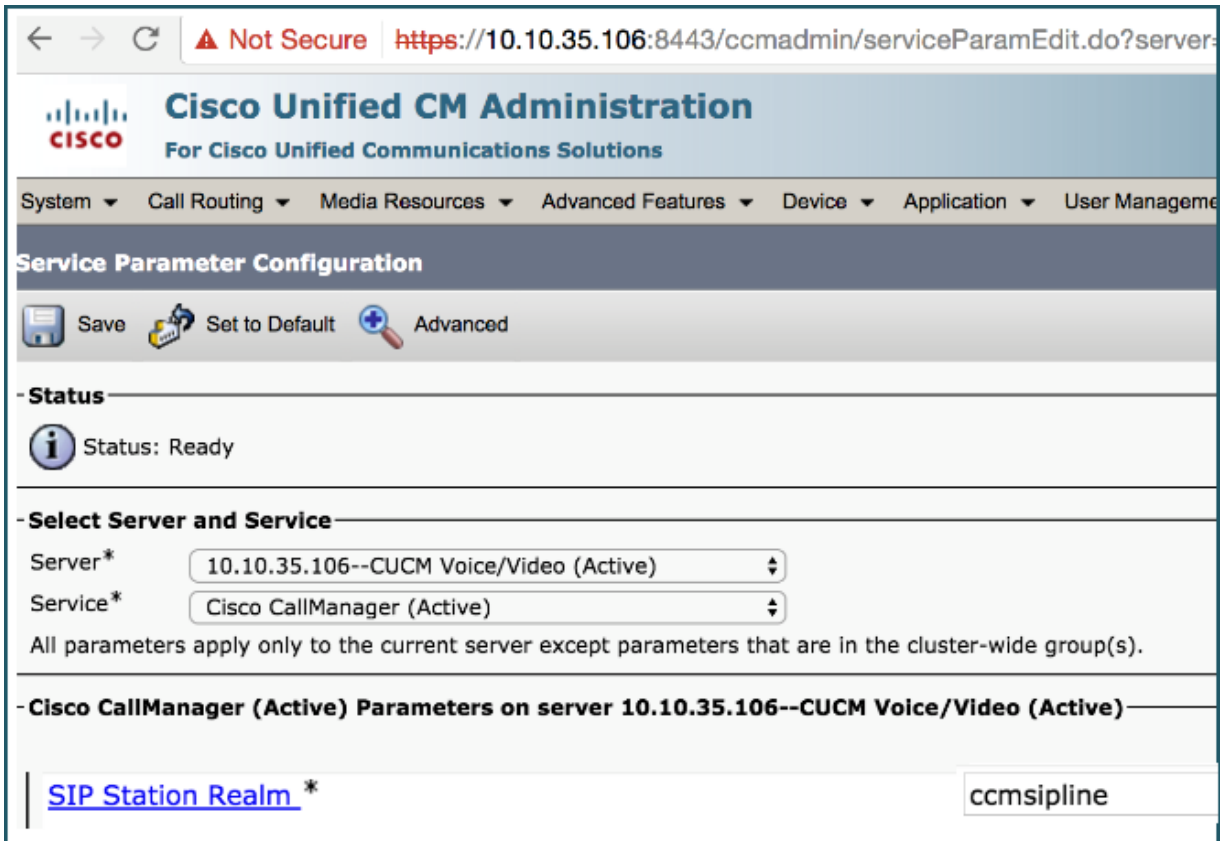
- SIP domain & Extension (SIP URL)
- CUCM subscribers to connect to
- Digest Username & Password (Encrypted)



The Vocera Edge clients use the 'SIP Domain' when registering the SIP connection with CUCM, <extension>@<sipdomain>, e.g. 1000@cucm.mycompany.com.

Affiliate with facilities you want the voice server to be available for. For each facility enter in the host name of the CUCM server to connect to. This can be different per facility. Multiple CUCM servers can be specified by comma separating them in this field.

The 'Digest Password' property in Enterprise Manager allows you to set the digest password configured on CUCM. This password will be set by Org Services as the digest password for any users that have a Vocera Edge extension. The Vocera Edge client will authenticate with this password. The password is not sent directly to clients instead a hash of the username and Digest Realm is used. The default digest realm used in CUCM is 'ccmsipline'. If this is changed to something else in CUCM you will need to change the 'Digest Realm' property in Enterprise Manager.



The screenshot shows the Cisco Unified CM Administration web interface. The browser address bar displays a URL starting with https://10.10.35.106:8443/ccmadmin/serviceParamEdit.do?server=. The page title is "Cisco Unified CM Administration For Cisco Unified Communications Solutions". The navigation menu includes System, Call Routing, Media Resources, Advanced Features, Device, Application, and User Management. The main section is "Service Parameter Configuration". It has buttons for Save, Set to Default, and Advanced. The "Status" section shows "Status: Ready". The "Select Server and Service" section has dropdowns for "Server*" (10.10.35.106--CUCM Voice/Video (Active)) and "Service*" (Cisco CallManager (Active)). A note states: "All parameters apply only to the current server except parameters that are in the cluster-wide group(s)". The "Cisco CallManager (Active) Parameters on server 10.10.35.106--CUCM Voice/Video (Active)" section is visible, showing a text field for "SIP Station Realm *" with the value "ccmsipline".

Enter the following properties:

1. Set 'AXL Password' to the password for the AXL user you created.
2. Set 'AXL URL' as the URL to the AXL API of CUCM host(s), example 'https://<cucm_host>:8443/axl/'.
3. Set 'AXL Username' to the username for the AXL user you created.
4. Set 'Calling Search Space' to the name of the PSS specific 'Calling Search Space' you added.
5. Set Country Code property settings to a default value of 1.
6. Set 'Device Pool' to the name of the PSS specific 'Device Pool' you added.
7. Set 'Device Type' to blank, by default 'Third-party SIP Device (Basic)' is used as the device type.
8. Set 'Route Partition' to the name of the PSS specific 'Route Partition' you added.
9. Set 'SIP Profile' to the name of the PSS specific 'SIP Profile' you added.
10. Set 'SIP Security Profile' to the name of the PSS specific 'SIP Security Profile' you added.
11. Set 'User Prefix' to blank - this is only used in test environments.

Other properties:

1. Make sure 'Allow Create Users' is set to 'false' (it is by default) if users are already created in CUCM via Active Directory (AD). If your CUCM install is NOT Active Directory integrated with 'CUCM Dir Sync', set

this to 'true' so that Org Services will create the users as needed in CUCM.

2. Set 'Digest Password' to a custom password - This will be used by the Vocera Edge client devices to connect to CUCM.
3. Make sure the 'Digest Realm' matches the setting 'SIP Station Realm' in CUCM.
4. Make sure the 'CUP!' settings are blank (they are by default) - these are only used in test environments.

Properties	
Name ↑	Value
Allow Create Users	false
AXL Password	*****
AXL URL	https://pss-cucm-12-5-cluster.dev.pss.net:8443/axl
AXL Username	pssaxluser
AXL Version	12.5
Call Forward CSS	
Cluster Name	
Country Code	1
Device CSS	pss-css
Device Pool	PSS Device Pool
Device Type	Third-party SIP Device (Basic)

Properties	
Name ↑	Value
Dial Out Prefix	8
Digest Password	*****
Digest Realm	ccmsipline
Directory Number CSS	pss-css
No Answer Timeout	15
Registration Logging	
Route Partition	pss-pt
SIP Ping Interval	
SIP Ping Retry	
Sip Profile	PSS Sip Profile
Sip Security Profile	PSS Security Profile



Vocera Edge Client SIP Setup

SIP REGISTER to sip:1000@pss-cucm-version11-01.patientsafesolutions.com.

Will register every 20 seconds (this is configured in CUCM and communicated to the client over the SIP protocol directly).

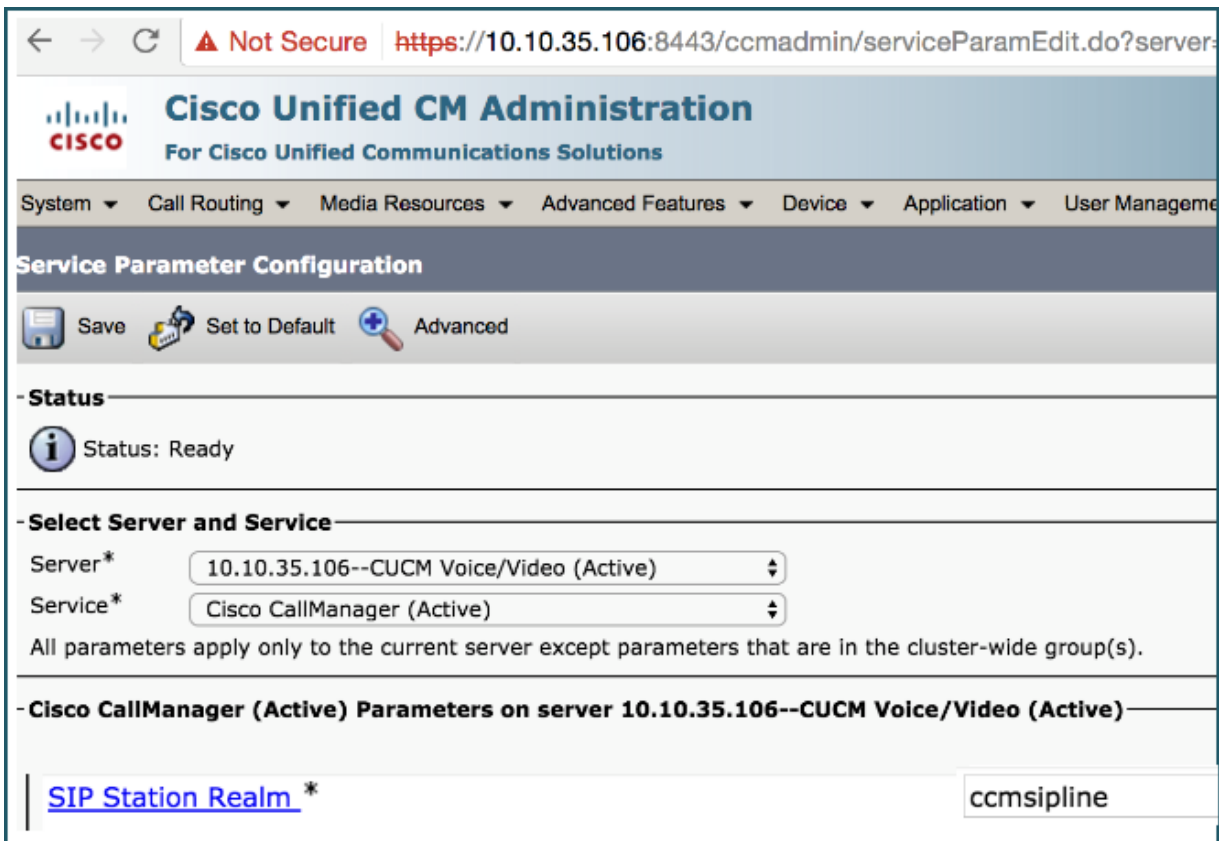
The registration is done to the 'SIP Domain' configured under Server Settings.

Note Prior to 4.5 (4.4.1 and before) the client apps would register using the subscriber hostname as the domain.

Appendix

Authentication

The 'Digest Password' property in Enterprise Manager allows you to set the digest password configured on CUCM. This password will be set by Org Services as the digest password for any users that have a Vocera Edge extension. The Vocera Edge client will authenticate with this password. The password is not sent directly to clients instead a hash of the username and Digest Realm is used. The default digest realm used in CUCM is 'ccmsipline'. If this is changed to something else in CUCM you will need to change the 'Digest Realm' property in Enterprise Manager.



The screenshot shows the Cisco Unified CM Administration web interface. The browser address bar displays the URL: <https://10.10.35.106:8443/ccmadmin/serviceParamEdit.do?server=10.10.35.106&service=CCMSIPLINE>. The page title is "Cisco Unified CM Administration" with the subtitle "For Cisco Unified Communications Solutions". The navigation menu includes System, Call Routing, Media Resources, Advanced Features, Device, Application, and User Management. The main section is "Service Parameter Configuration" with buttons for Save, Set to Default, and Advanced. The "Status" section shows "Status: Ready". The "Select Server and Service" section has two dropdown menus: "Server*" set to "10.10.35.106--CUCM Voice/Video (Active)" and "Service*" set to "Cisco CallManager (Active)". Below these, it states "All parameters apply only to the current server except parameters that are in the cluster-wide group(s)". The "Cisco CallManager (Active) Parameters on server 10.10.35.106--CUCM Voice/Video (Active)" section is expanded, showing a text input field for "SIP Station Realm *" with the value "ccmsipline".

We use digest authentication when registering with SIP. The credentials (username/password) are passed to the client from Org Services when the client requests /pt/voip/settings

CUCM itself has some limitations on digest passwords:

Each user in CUCM can only have 1 digest password, no matter how many devices they log into.

The digest password cannot be sync'ed to CUCM over AD, it has to be set manually or over AXL (we set it over AXL).

In our setup, one password is shared across all PSS users (This can be changed per Voice System in Enterprise Manager -> Voice Systems). The customer can set a password of their choosing for all PSS users, and we will set this password via AXL on extension / user setup.

The password is not passed to the client in plaintext, instead a hash (per user) is sent to the client. So having this hash you can only log in as that user. This prevents one leaked password allowing for login to any extension. The 1 password is not sent in the /pt/voip/settings response.



The reason for one password across all PSS users is because the digest password can be used outside of Vocera Edge. Non PSS devices can require digest passwords, and these require the digest password to be entered on admin setup of the device. If we were to generate our own password per user, we would have to give the customer a way to lookup this password in Enterprise Manager. We could also have a way to set it per user in Enterprise Manager. This would be error prone from an admin perspective and should not be the default; it's not common to use digest auth. These changes could be a future enhancement if needed, but right now the customer can set 1 password of their choosing for all users.

Fully Qualified Domain Name

To connect with the fully qualified domain name for 'SIP Domain' you will need to make sure CUCM is configured correctly.

1. Under Cisco Unified CM Administration, select System>Enterprise Parameters.

Cisco Unified CM Administration
For Cisco Unified Communications Solutions

Server ▼ Advanced Features ▼

- Cisco Unified CM
- Cisco Unified CM Group
- Presence Redundancy Groups
- Phone NTP Reference
- Date/Time Group
- BLF Presence Group
- Region Information ▶
- Device Pool
- Device Mobility ▶
- DHCP ▶
- LDAP ▶
- SAML Single Sign-On
- Cross-Origin Resource Sharing (CORS)
- Location Info ▶
- MLPP ▶
- Physical Location
- SRST
- Enterprise Parameters**
- Enterprise Phone Configuration
- Service Parameters
- Security ▶
- Application Server
- Licensing ▶
- Geolocation Configuration
- Geolocation Filter
- E911 Messages

ing with an insufficient
e not configured in y
able to provision use
device is configured

Administration

2

Intel(R) Xeon(R) CPU E5-2
14Mbytes RAM, Partitions

ter on Wednesday, March 29,

Inc.

res and is subject to United Sta
imply third-party authority to in
with U.S. and local country laws
with U.S. and local laws, return t

cryptographic products may be

Communications Manager please visit

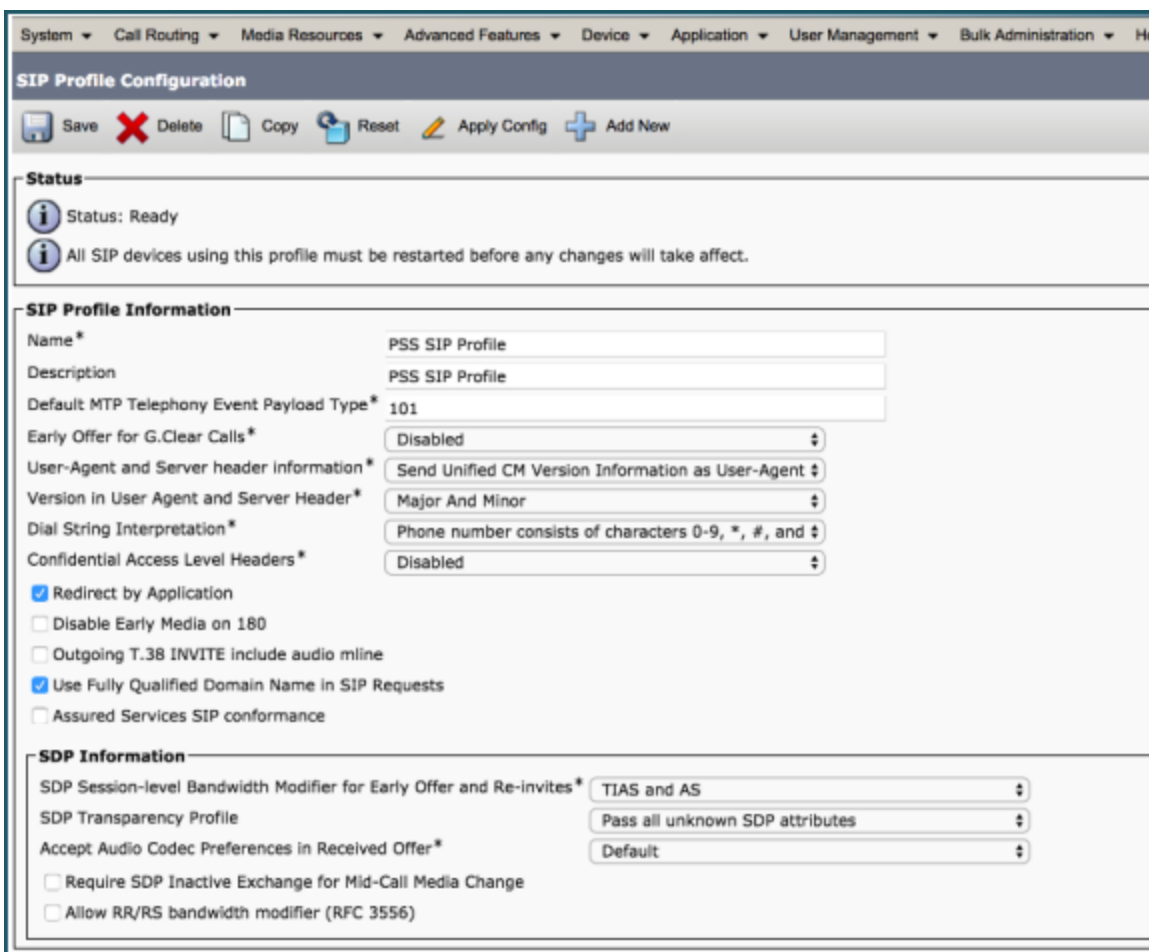
ur [Technical Support](#) web site.

Clusterwide Domain Configuration

[Organization Top Level Domain](#)

[Cluster Fully Qualified Domain Name](#)

- Under the SIP Security Profile (see section above), make sure 'Use Fully Qualified Domain Name in SIP requests' is enabled:



SIP Profile Configuration

System ▾ Call Routing ▾ Media Resources ▾ Advanced Features ▾ Device ▾ Application ▾ User Management ▾ Bulk Administration ▾ Help

Save ✖ Delete Copy Reset Apply Config Add New

Status

- Status: Ready
- All SIP devices using this profile must be restarted before any changes will take affect.

SIP Profile Information

Name* PSS SIP Profile

Description PSS SIP Profile

Default MTP Telephony Event Payload Type* 101

Early Offer for G.Clear Calls* Disabled

User-Agent and Server header information* Send Unified CM Version Information as User-Agent

Version in User Agent and Server Header* Major And Minor

Dial String Interpretation* Phone number consists of characters 0-9, *, #, and

Confidential Access Level Headers* Disabled

☒ Redirect by Application

☐ Disable Early Media on 180

☐ Outgoing T.38 INVITE include audio mline

☒ Use Fully Qualified Domain Name in SIP Requests

☐ Assured Services SIP conformance

SDP Information

SDP Session-level Bandwidth Modifier for Early Offer and Re-invites* TIAS and AS

SDP Transparency Profile Pass all unknown SDP attributes

Accept Audio Codec Preferences in Received Offer* Default

☐ Require SDP Inactive Exchange for Mid-Call Media Change

☐ Allow RR/RS bandwidth modifier (RFC 3556)

Licensing

The number of Cisco licenses required by your organization will depend on the number of devices your organization will connect to the network. For example, if your organization has 1500 nurses and 600 shared devices, then 600 licenses are required.

Each physical device that connects direct to CUCM (rather than a SIP Trunk alternative) requires a CUCM "Enhanced" license. In these cases, Vocera Edge device connects direct to CUCM as a 3rd Party Basic SIP device. If your licenses are of the type "User Connect Licensing", each device will utilize one "Enhanced" license. For example, if your organization has 1500 nurses and 600 shared devices connect direct to CUCM, then 600 licenses are required.

Care Role Forwarding extension numbers do not require any additional licenses.

For Cisco Unified Workspace Licensing (UWL) this equates to a Standard UWL or Professional UWL license. You may utilize either a "Standard" or "Professional" license.

We've highlighted a few examples in the figure below:



License Type	Supported Devices
Essential UCL	<ul style="list-style-type: none"> • Cisco Unified SIP Phone 3905 • Cisco Unified IP Phone 6901 • Analog devices
Basic UCL	<ul style="list-style-type: none"> • Cisco Unified IP Phone 6911 and 6921 models • Any Essential device
Enhanced UCL or Enhanced Plus UCL or UWL Standard or UWL Professional	<ul style="list-style-type: none"> • Cisco Unified IP Phone 6941, 6945, and 6961 models • Cisco Unified IP Phone 7900 Series (7900G, 7911G, 7912G, 7931G, 794xG, 796xG, and 7975G models) • Cisco Unified IP Phone 8900 Series (8941, 8945, and 8961 models) • Cisco Unified IP Phone 9900 Series (9951 and 9971 models) with or without camera • Cisco Unified Wireless IP Phones Series (792xG and 7925G-EX models) • Cisco Unified IP Conference Stations (7936G and 7937G stations) • Cisco Unified Softphones (Cisco Unified Personal Communicator, Cisco UC Integration for Lync, Cisco UC Integration for Connect, and Cisco IP Communicator) • Jabber clients (Jabber for Mac, Jabber for Windows, Jabber for iPhone, Jabber for Android, Jabber for iPad and Jabber SDK) • Cisco Virtual Experience Clients (VXC) with voice and video firmware • Cisco TelePresence System E20 • TelePresence System EX Series (EX60 and EX90) • Third-party SIP devices • Any Basic or Essential device
Cisco TelePresence Room	<ul style="list-style-type: none"> • Cisco TelePresence Systems 500, 1000, 1100, 1300, 3000, 3200, TX9000, TX9200 • Cisco TelePresence System Profile 42-inch 6000 MXP, 52-inch MXP, 52-inch Dual MXP, 65-inch, and 65-inch Dual • Cisco TelePresence System Codecs C90, C60, and C40; Cisco TelePresence System Quick Set C20 • Cisco TelePresence MX Series (MX300 and MX200)

For example, a health system with 100 CUWL Professional licenses, where 89 of the devices are used by the Enhanced license requirement of the 3rd Party Basic SIP devices we have setup will appear as follows in the CUCM License Usage display:

License Usage		
Type	Required	
User (11.x) - Emergency Responder	0	
CUWL Professional (11.x) - Unified CM	0	
Enhanced (11.x) - Unified CM	89	
TelePresence Room (11.x) - Unified CM	0	
CUWL Professional Messaging (11.x) - Unity Connection	0	
Basic Messaging (11.x) - Unity Connection	8	