



# Comcast: Connecting Cisco Unified Communication Manager Express (CME) 12.3 (IOS-XE 16.9.3) using SIP

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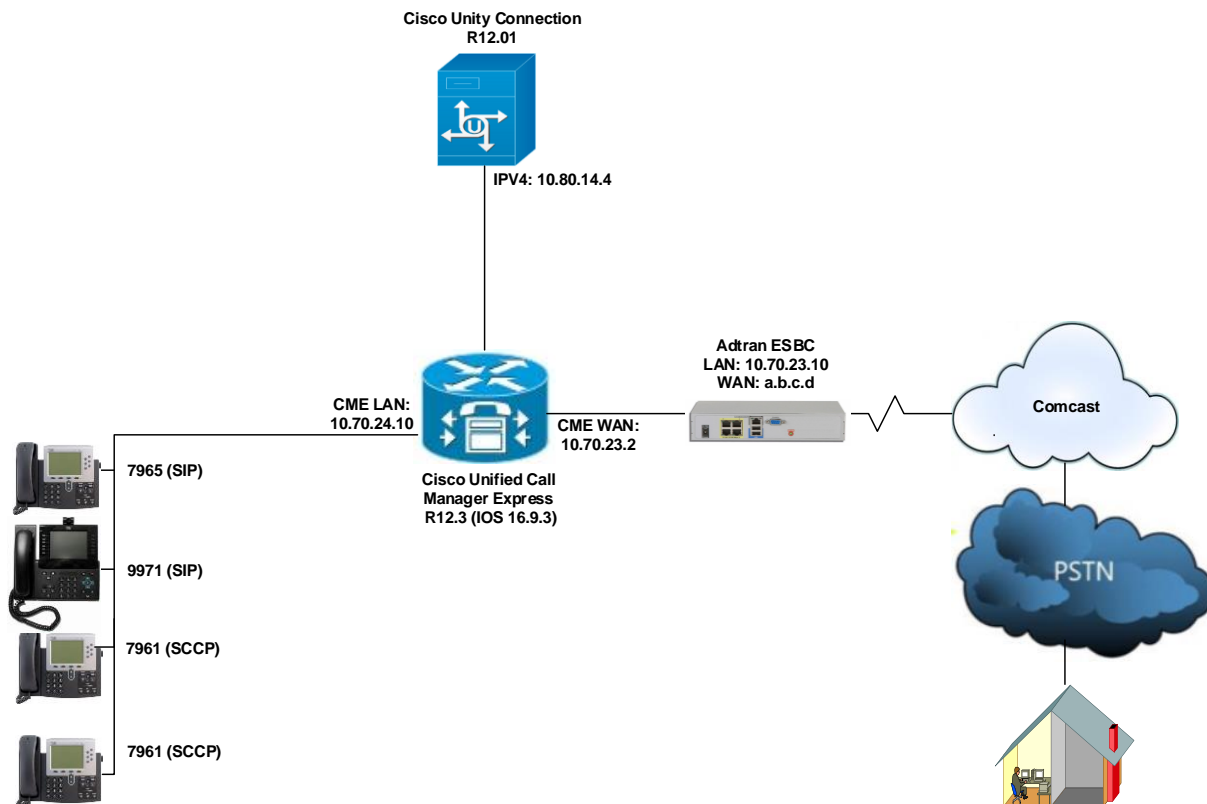
## Introduction

Service Providers today, such as Comcast, are offering alternative methods to connect to the PSTN via their IP network. Most of these services utilize SIP as the primary signaling method and a centralized IP to TDM gateway to provide on-net and off-net services. Comcast is a service provider offering that allows connection to the PSTN and may offer the end customer a viable alternative to traditional PSTN connectivity via either analog or T1 lines. A demarcation device between these services and customer owned services is recommended.

- This application note describes how to configure a Cisco Unified Communications Manager Express (Cisco Unified CME) version 12.3 (IOS-XE 16.9.3), Cisco Unity Connection version 12.0.1, and Adtran ESG R12.3.4.V with connectivity to Comcast SIP trunk service. The deployment model covered in this application note is Customer Premises Equipment (Cisco Unified CME) to PSTN (Comcast). Comcast provides inbound and outbound call service.
- Testing was performed in accordance to Comcast test plan and all features were verified. Key features verified are: inbound and outbound basic call (including international calls), calling name delivery, calling number and name restriction, CODEC negotiation, intra-site transfers, intra-site conferencing, call hold and resume, call forward (forward all, busy and no answer), leaving and retrieving voicemail (Cisco Unity Connection).
- Consult your Cisco representative for the correct IOS image and for the specific application and Device Unit License and Feature License requirements for all your Cisco CME.

## Network Topology

Figure 1. Basic Call Setup



The Cisco Unified CME in Figure 1

## Hardware Components

- This solution was tested with Cisco ISR4321.
- Cisco IP Phones. This solution was tested with 7965, 9971, and 7961 phones, but any Cisco IP Phone model supporting RFC2833 can be used.
- Cisco ISR4321/K9 (1RU) processor with 1784679K/6147K bytes of memory. Processor board ID FLM1925D0WZ.
- 3 Gigabit Ethernet interfaces.
- Cisco Unity Connection - VMware - 1 vCPU: Intel(R) Xeon(R) CPU X5675 @ 3.07GHz.
- HDD 160 GB, Memory 4096 Mbytes RAM.

## Software Requirements

- Cisco IOS-XE gateway running Cisco Unified CME Version 12.3 (IOS-XE 16.9.3), RELEASE SOFTWARE (fc2). This solution was tested with Cisco IOS image: "bootflash:isr4300-universalk9.16.09.03.SPA.bin" .
- This solution was tested with Cisco Unity Connection version (Version 12.0.1.21900-10).



## Features

### Features - Supported

- Basic Call using G711ulaw.
- Calling Party Number Presentation and Restriction.
- Calling Name.
- Call Transfer.
- Conference.
- Call Hold and Resume (See Caveat section for details).
- Call Forward All, Busy and No Answer.
- Incoming DID Translation and Routing.
- Outbound calls and Inbound calls.
- Voicemail.
- Auto-attendant

### Features Not Supported

- Cisco IP phones used in this test do not support Blind Transfer, only Semi-attendant and Attendant transfers were tested.
- Comcast does not support G729 codec.

## Caveats

Fax:

- Comcast does not support Fax with VoIP service.

## Configuration Considerations

- None.



## Configuration

### Cisco IOS Version

Comcast\_CME#sh version

Cisco IOS XE Software, Version 16.09.03

Cisco IOS Software [Fuji], ISR Software (X86\_64\_LINUX\_IOSD-UNIVERSALK9-M), Version 16.9.3, RELEASE SOFTWARE (fc2)

Technical Support: <http://www.cisco.com/techsupport>

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ROM: IOS-XE ROMMON

Comcast\_CME uptime is 1 week, 5 days, 18 hours, 37 minutes

Uptime for this control processor is 1 week, 5 days, 18 hours, 39 minutes

System returned to ROM by Reload Command at 14:39:18 CDT Thu Sep 5 2019

System image file is "bootflash:isr4300-universalk9.16.09.03.SPA.bin"

Last reload reason: Reload Command

This product contains cryptographic features and is subject to United States and local country laws governing import, export, transfer and use. Delivery of Cisco cryptographic products does not imply third-party authority to import, export, distribute or use encryption. Importers, exporters, distributors and users are responsible for compliance with U.S. and local country laws. By using this product you agree to comply with applicable laws and regulations. If you are unable to comply with U.S. and local laws, return this product immediately.

A summary of U.S. laws governing Cisco cryptographic products may be found at: <http://www.cisco.com/wwl/export/crypto/tool/stqrg.html>

If you require further assistance please contact us by sending email to [export@cisco.com](mailto:export@cisco.com).



Suite License Information for Module:'esg'

Suite	Suite Current	Type	Suite Next reboot
FoundationSuiteK9 securityk9 appxk9	FoundationSuiteK9	EvalRightToUse	FoundationSuiteK9
AdvUCSuiteK9 uck9 cme-srst cube	AdvUCSuiteK9	EvalRightToUse	AdvUCSuiteK9

Technology Package License Information:

Technology	Technology-package Current	Type	Technology-package Next reboot
appxk9	None	None	None
uck9	None	None	uck9
securityk9	None	None	securityk9
ipbase	ipbasek9	Permanent	ipbasek9

The current throughput level is 50000 kbps

Smart Licensing Status: Smart Licensing is DISABLED

cisco ISR4321/K9 (1RU) processor with 1784679K/6147K bytes of memory.  
Processor board ID FLM1925D0WZ  
3 Gigabit Ethernet interfaces  
32768K bytes of non-volatile configuration memory.  
4194304K bytes of physical memory.  
3223551K bytes of flash memory at bootflash:.  
0K bytes of WebUI ODM Files at webui:.

Configuration register is 0x2102



## Cisco Unified CME

Comcast\_CME#sh run

```
version 16.9
service timestamps debug datetime msec
service timestamps log datetime msec
platform qfp utilization monitor load 80
no platform punt-keepalive disable-kernel-core
!
hostname Comcast_CME
!
boot-start-marker
boot system flash isr4300-universalk9.16.09.03.SPA.bin
boot-end-marker
!
!
vrf definition Mgmt-intf
!
address-family ipv4
exit-address-family
!
address-family ipv6
exit-address-family
!
no logging console
enable secret 5 $1$Rrx8$nm82keZ4yvW0V88d7JHI.0
enable password XXXXX
!
no aaa new-model
clock timezone CST -6 0
clock summer-time CDT recurring
!
ip admission watch-list expiry-time 0
!
login on-success log
!
subscriber templating
!
multilink bundle-name authenticated
!
crypto pki trustpoint TP-self-signed-1270583006
enrollment selfsigned
subject-name cn=IOS-Self-Signed-Certificate-1270583006
revocation-check none
rsakeypair TP-self-signed-1270583006
!
```





```
crypto pki certificate chain TP-self-signed-1270583006  
certificate self-signed 01
```

```
!
```

```
voice service voip  
ip address trusted list  
no ip address trusted authenticate  
media disable-detailed-stats  
allow-connections h323 to h323  
allow-connections h323 to sip  
allow-connections sip to h323  
allow-connections sip to sip1  
no supplementary-service sip moved-temporarily  
no supplementary-service sip refer  
no supplementary-service sip handle-replaces  
redirect ip2ip  
fax protocol pass-through g711ulaw  
sip  
session refresh2  
registrar server expires max 600 min 603  
asserted-id pai
```

```
!
```

```
voice class codec 14  
codec preference 1 g711ulaw
```

```
!
```

```
voice register global  
mode cme5  
source-address 10.70.24.10 port 50606  
max-dn 207  
max-pool 108
```

```
load 7965 SIP45.9-2-1S.loads9  
load 9971 sip9971.9-3-1-33.loads  
mwi stutter  
voicemail 7777  
tftp-path flash:10  
file text
```

---

<sup>1</sup> This command enables Cisco Unified CME to perform basic SIP to SIP voice communication.

<sup>2</sup> Use the SIP session refresh command to send the session refresh request.

<sup>3</sup> Enable Local SIP Registrar which is required for SIP phones in Cisco Unified CME.

<sup>4</sup> This command enables multiple codec support and performs codec filtering required for correct interoperability between Comcast SIP network and Cisco Unified CME.

<sup>5</sup> Enables the mode for configuring SIP IP phones in Cisco Unified CME.

<sup>6</sup> This is the source address for SIP phone registration.

<sup>7</sup> Configuration for maximum extensions.

<sup>8</sup> Configuration for maximum phones.

<sup>9</sup> Specify phone loads for each phone type.

<sup>10</sup> Setup path for tftp files.



```
create profile sync 005544059411755411
auto-register
!
voice register dn 1
number 0425
name Comcast Phone 1
mwi
!
voice register dn 2
number 0426
name Comcast Phone 2
mwi
!
voice register pool 1
id mac 1C17.D337.D08D
type 9971
number 1 dn 1
dtmf-relay rtp-nte
voice-class codec 1
!
voice register pool 2
id mac 001D.452C.D981
type 7965
number 1 dn 2
dtmf-relay rtp-nte
voice-class codec 1
!
voice moh-group 1
moh enable-g711 "flash:music-on-hold.au"
!
voice translation-rule 112
rule 1 /\(^0...\)/ /856333\1/
!
voice translation-rule 213
rule 1 /856333\(...\)/ /\1/
!
voice translation-profile to_Comcast
translate calling 1
!
voice translation-profile to_ext
translate called 2
!
license udi pid ISR4321/K9 sn FDO19220WQ8
license accept end user agreement
```

---

<sup>11</sup> Create configuration files for phones.

<sup>12</sup> This translation rule/profile is used to modify the calling number.

<sup>13</sup> This translation rule/profile is used to modify the called number.



```
license boot suite FoundationSuiteK9
license boot suite AdvUCSuiteK9
no license smart enable
diagnostic bootup level minimal
!
spanning-tree extend system-id
!
redundancy
mode none
!
interface GigabitEthernet0/0/0
description WAN
ip address 10.70.23.2 255.255.255.0
negotiation auto
!
interface GigabitEthernet0/0/1
description LAN
ip address 10.70.24.10 255.255.255.0
negotiation auto
!
interface GigabitEthernet0/1/0
no ip address
shutdown
negotiation auto
!
interface GigabitEthernet0
vrf forwarding Mgmt-intf
no ip address
shutdown
negotiation auto
!
ip forward-protocol nd
ip http server
ip http authentication local
ip http secure-server
ip http client source-interface GigabitEthernet0/0/1
ip tftp source-interface GigabitEthernet0/0/1
ip route 10.64.0.0 255.255.0.0 10.70.24.1
ip route 10.80.0.0 255.255.0.0 10.70.24.1
!
tftp-server flash:sip9971.9-3-1-33.loads
tftp-server flash:kern9971.9-3-1-33.sebn
tftp-server flash:rootfs9971.9-3-1-33.sebn
tftp-server flash:sboot9971.031610R1-9-3-1-33.sebn
tftp-server flash:skern9971.022809R2-9-3-1-33.sebn
tftp-server flash:dkern9971.100609R2-9-3-1-33.sebn
tftp-server flash:apps45.9-2-1TH1-13.sbn
tftp-server flash:cnu45.9-2-1TH1-13.sbn
```



```
tftp-server flash:cvm45sip.9-2-1TH1-13.sbn
tftp-server flash:dsp45.9-2-1TH1-13.sbn
tftp-server flash:jar45sip.9-2-1TH1-13.sbn
tftp-server flash:SIP45.9-2-1S.loads
tftp-server flash:term45.default.loads
tftp-server flash:term65.default.loads
tftp-server flash:apps41.9-2-1TH1-13.sbn
tftp-server flash:cnu41.9-2-1TH1-13.sbn
tftp-server flash:cvm41sccp.9-2-1TH1-13.sbn
tftp-server flash:dsp41.9-2-1TH1-13.sbn
tftp-server flash:jar41sccp.9-2-1TH1-13.sbn
tftp-server flash:SCCP41.9-2-1S.loads
tftp-server flash:term41.default.loads
tftp-server flash:term61.default.loads
tftp-server flash:P0030801SR02.bin
tftp-server flash:P0030801SR02.loads
tftp-server flash:P0030801SR02.sb2
tftp-server flash:P0030801SR02.sbn
tftp-server flash:P0030801SR02.txt
tftp-server flash:music-on-hold.au
!
control-plane
!
mgcp behavior rsip-range tgcp-only
mgcp behavior comedia-role none
mgcp behavior comedia-check-media-src disable
mgcp behavior comedia-sdp-force disable
!
mgcp profile default
!
telephony-service
conference transfer-pattern
max-ephones 20
max-dn 20
ip source-address 10.70.24.10 port 2000
load 7960-7940 P0030801SR02.loads
load 7961 SCCP41.9-2-1S.loads
load 7975 SCCP75.9-4-2SR3-1S
time-zone 8
voicemail 777714
max-conferences 8 gain -6
call-forward pattern .T
moh enable-g711 "music-on-hold.au"15
transfer-system full-consult
transfer-pattern .T
```

<sup>14</sup> 7777 - Voice mail pilot number used in this example.

<sup>15</sup> This is Music on Hold file configured in this example.



```
create cnf-files version-stamp Jan 01 2002 00:00:00
!
dspfarm profile 1 transcode universal16
  codec g711ulaw
!
dial-peer voice 100 voip
  description Outbound Call to Comcast
  translation-profile outgoing to_Comcast
  destination-pattern .T
  session protocol sipv2
  session target ipv4:10.70.23.10:506017
  session transport udp
  voice-class codec 118
  dtmf-relay rtp-nte
  no vad
!
dial-peer voice 101 voip
  description inbound from Comcast
  translation-profile incoming to_ext
  session protocol sipv2
  session transport udp
  incoming called-number 856333....
  voice-class codec 1
  dtmf-relay rtp-nte
  no vad
!
dial-peer voice 102 voip19
  description to UnityConnection
  destination-pattern 7777
  session protocol sipv2
  session target ipv4:10.80.14.4:506020
  session transport udp
  voice-class codec 1
  dtmf-relay rtp-nte
  no vad
!
sip-ua
  mwi-server ipv4:10.80.14.4 expires 3600 port 5060 transport udp unsolicited
!
ephone-dn 1
  number 0427
  label 0427
```

---

<sup>16</sup> Transcoding profile used in this example.

<sup>17</sup> This command sets the SIP server target for outgoing SIP calls.

<sup>18</sup> This command assigns the voice class codec setting to this dial-peer.

<sup>19</sup> Dial peer used to route the calls to Cisco unity connection server for Voicemail access.

<sup>20</sup> This command sets the Cisco unity connection server target for voicemail calls.



```
name SCCP
moh-group 1
!
ephone-dn 2
number 0428
label 0428
name SCCP
mwi sip
moh-group 1
!
ephone 1
device-security-mode none
mac-address 001C.5856.CFE6
type 7961
mwi-line 1
button 1:1
!
ephone 2
device-security-mode none
mac-address FCFB.FBCA.533F
type 7960
mwi-line 1
button 1:2
!
line con 0
password XXXXX
transport input none
stopbits 1
line aux 0
stopbits 1
line vty 0 4
exec-timeout 0 0
privilege level 15
password XXXXXX
login
transport input telnet ssh
line vty 5 15
exec-timeout 0 0
privilege level 15
password XXXXXX
login
transport input telnet ssh
!
ntp server 10.10.10.5
!
end
```



## Cisco Unity Connection

### Version Details

# Cisco Unity Connection Administration

Version 12.0.1.21900-10



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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.



## Cisco Unity Connection User Configuration

**Navigation:** Cisco Unity Connection → Users → Users

Set Alias\*= 0425. This is used for this example.

Set First Name = 0425 is used to identify this User.

Set Last Name\* = 0425. This is used for this example

Set Display Name= 0425. This is used in this example.

Set SMTP Address =0425. This is used in this example.

Set Extension = 0425. This is used in this example.

Set Phone System= Comcast\_CME\_10.70.24.10. This is used in this example.

All other values are default.

### Edit User Basics (0425)

Related Links [Bulk Edit](#)

User Edit Refresh Help

[Save](#) [Delete](#) [Previous](#) [Next](#)

#### Name

Alias*	0425
First Name	0425
Last Name	0425
Display Name	, 0425
SMTP Address	0425 @clus24-unity.lab.tekvizion.com
Initials	
Title	
Employee ID	

#### LDAP Integration Status

Integrate with LDAP Directory

Do Not Integrate with LDAP Directory

#### Phone

Extension*	0425
Cross-Server Transfer Extension or URI	
Outgoing Fax Number	
Outgoing Fax Server	--- Not Selected ---
Partition	clus24-unity Partition
Search Scope	clus24-unity Search Space
Phone System	Comcast_CME_10.70.24.10
Class of Service	Voice Mail User COS
Active Schedule	Weekdays <a href="#">View</a>





## Cisco Unity Connection User Configuration (Continued)

All other values are default.

The screenshot displays the Cisco Unity Connection Administration web interface. The top navigation bar includes the Cisco logo, the title "Cisco Unity Connection Administration", and the tagline "For Cisco Unified Communications Solutions". On the right, there is a navigation menu with "Cisco Unity Connection Administration", "Go", "administrator", "Search Documentation", "About", and "Sign Out".

The main content area is divided into a left sidebar and a main configuration pane. The sidebar, titled "Cisco Unity Connection", contains a tree view with the following items: Users (expanded), Import Users, Synch Users, Class of Service, Templates, Contacts, Distribution Lists, Call Management, Message Storage, Networking, Unified Messaging, Video, Dial Plan, System Settings, Telephony Integrations, and Tools.

The main configuration pane is for a user configuration. At the top, it shows "Class of Service" set to "Voice Mail User COS" and "Active Schedule" set to "Weekdays". Below these are several checkboxes: "Set for Self-enrollment at Next Sign-In" (unchecked), "List in Directory" (checked), "Send Non-Delivery Receipts on Failed Message Delivery" (checked), "Skip PIN When Calling From a Known Extension" (unchecked), and "Use Short Calendar Caching Poll Interval" (unchecked).

The "Recorded Name" section features a simulated phone interface with a speaker, a microphone, a numeric keypad with "8485" entered, a "Number or URI" label, a "30" timer, a "Volume" slider, and a "1x Speed" control.

The "Location" section contains several text input fields: "Address", "Building", "City", "State", "Postal Code", and "Country" (set to "United States"). Below these are radio buttons for "Use System Default Time Zone" (checked) and "Language" (set to "Use System Default Language"). There are also dropdown menus for "Time Zone" (set to "(GMT-06:00) America/Chicago") and "Language" (set to "English(United States)").

At the bottom, there are text input fields for "Department", "Manager", "Billing ID", and "Corporate Email Address".



## Cisco Unity Connection Telephony Integration

**Navigation:** Telephony Integrations → Phone system

Set System Name\* = CME. This Name used for this example.

The screenshot displays the Cisco Unity Connection Administration web interface. The left sidebar shows a navigation tree with 'Telephony Integrations' and 'Phone System' highlighted. The main content area is titled 'Phone System Basics (CME)' and contains the following configuration sections:

- Phone System:** A text field for 'Phone System Name\*' is set to 'CME' and is highlighted with a red box. Below it is a checkbox for 'Default TRAP Phone System'.
- Message Waiting Indicators:** Includes checkboxes for 'Send Message Counts', 'Use Same Port for Enabling and Disabling MWIs', and 'Force All MWIs Off for this Phone System'. A 'Run' button is provided for 'Synchronize All MWIs on This Phone System'.
- Call Loop Detection by Using DTMF:** Includes checkboxes for 'Enable for Supervised Transfers' and 'Enable for Forwarded Message Notification Calls (by Using DTMF)'. A dropdown menu for 'DTMF Tone To Use' is set to 'A', and a 'Guard Time' of '2500' milliseconds is specified.
- Call Loop Detection by Using Extension:** Includes a checked checkbox for 'Enable for Forwarded Message Notification Calls (by Using Extension)'.
- Phone View Settings:** Includes a checkbox for 'Enable Phone View' and two text input fields for 'CTI Phone Access Username' and 'CTI Phone Access Password'.
- Outgoing Call Restrictions:** Includes radio buttons for 'Enable outgoing calls' (selected), 'Disable all outgoing calls immediately', and 'Disable all outgoing calls between'.



## Port Group

**Navigation:** Telephony Integration → Port Group.

Set Display Name\* = CME-1. This Name used for this example.

Check Register with SIP server.

The screenshot displays the Cisco Unity Connection Administration interface. The left sidebar shows the navigation tree with 'Port Group' selected under 'Telephony Integrations'. The main content area is titled 'Port Group Basics (CME-1)'. The 'Port Group' section shows 'Display Name\*' as 'CME-1', 'Integration Method' as 'SIP', and 'Reset Status' as 'Reset Not Required'. The 'Session Initiation Protocol (SIP) Settings' section has 'Register with SIP Server' checked. The 'Advertised Codec Settings' table lists G.711 mu-law and G.729 with a packet size of 20. The 'Message Waiting Indicator Settings' section has 'Enable Message Waiting Indicators' checked, with delay and retry intervals set to 0 milliseconds.

**Port Group Basics (CME-1)**

Port Group Edit Refresh Help

Save Delete Previous Next

**Port Group**

Display Name\* CME-1

Integration Method SIP

Reset Status Reset Not Required Reset

**Session Initiation Protocol (SIP) Settings**

Register with SIP Server

Authenticate with SIP Server

Authentication Username

Authentication Password

Contact Line Name

SIP Security Profile 5060

SIP Transport Protocol UDP

**Advertised Codec Settings**

Change Advertising

Display Name	Packet Size
G.711 mu-law	20
G.729	20

Change Advertising

**Message Waiting Indicator Settings**

Enable Message Waiting Indicators

Delay between Requests 0 milliseconds

Maximum Concurrent Requests 0

Retries After Successful Attempt 0

Retry Interval After Successful Attempt 5 milliseconds

Save Delete Previous Next

Fields marked with an asterisk (\*) are required.



Navigation Path: Telephony Integration → Port Group → Edit → Servers.

The screenshot displays the 'Edit Servers' configuration page in Cisco Telephony Integration. The left sidebar shows a navigation tree with 'Telephony Integrations' expanded to 'Port Group'. The main content area is titled 'Edit Servers' and includes a 'Save' button at the top left. Below this, there are sections for 'SIP Servers' and 'TFTP Servers', each with 'Delete Selected' and 'Add' buttons. The 'SIP Servers' table has columns for 'Order', 'IPv4 Address or Host Name', 'IPv6 Address or Host Name', 'Port', and 'TLS Port'. The first row is highlighted with a red box, showing 'Order' as 0, 'IPv4 Address or Host Name' as 10.70.24.10, and 'Port' as 5060. The 'TFTP Servers' table has columns for 'Order', 'IPv4 Address or Host Name', and 'IPv6 Address or Host Name'. At the bottom, there are 'IPv6 Addressing Mode' settings for 'Preference for Signaling' and 'Preference for Media', both set to 'IPv4', and a 'Save' button.

Order	IPv4 Address or Host Name	IPv6 Address or Host Name	Port	TLS Port
0	10.70.24.10		5060	5061



## Port

Set Port Name = CME-1-001. This Name used for this example.

Phone System = CME.

Port Group = CME-1.

Server = unity-unity2.lab.tekvizion.com. This Name used for this example.

The screenshot displays the Cisco Unity Connection Administration web interface. The top navigation bar includes the Cisco logo, the title "Cisco Unity Connection Administration", and the tagline "For Cisco Unified Communications Solutions". On the right, it shows the user role "administrator" and links for "Search Documentation", "About", and "Sign Out".

The main content area is titled "Port Basics (CME-1-001)". On the left, a navigation tree under "Cisco Unity Connection" lists various settings, with "Port" highlighted in red. The main configuration area contains the following fields:

- Phone System Port** (highlighted with a red box):
  - Enabled
  - Port Name: CME-1-001 (with a Restart button)
  - Phone System: CME
  - Port Group: CME-1
  - Server: unity-unity2.lab.tekvizion.com (dropdown menu)
- Port Behavior**:
  - Answer Calls
  - Perform Message Notification
  - Send MWI Requests (may also be disabled by the port group)
  - Allow TRAP Connections

Buttons for "Save", "Delete", "Previous", and "Next" are present at the top and bottom of the configuration sections.



## Acronyms

SIP	Session Initiation Protocol
MGCP	Media Gateway Control Protocol
SCCP	Skinny Client Control Protocol
Cisco Unified CME	Cisco Unified Communications Manager Express
SP	Service Provider
PSTN	Public switched telephone network
DTMF	Dual Tone Multi-Frequency
CUC	Cisco Unity Connection
VOIP	Voice Over Internet Protocol
IP	Internet Protocol
TDM	Time-division multiplexing
BTN	Billed (or Billing) Telephone Number
CODEC	Coder-Decoder (in this document a device used to digitize and un digitize voice signals)



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