



Scenario Configuring IP Telephony Using Cisco Call Manager Express

A small company decided to have IP telephony network at his offices. Configure Cisco Call Manager Express on the router with support of hardware and software IP phones. Separate traffic into independent VLANs – data X0 for data transmission and X5 for voice packets. Configure CME to support phone numbers in range X001-X004 and local directory offered to IP phones.

Task 1 Pre-configure the network topology

1. Prepare your network.

Step 1: Cable network topology except hardware IP phones.

2. Perform basic router configuration.

Connect to a router using terminal connection (putty, e.g., COM1).

Enter configuration mode:

```
router> enable
router# configure terminal
router(conf)#
```

3. Configure VLAN trunk 802.1q on Fast Ethernet interface on the router.

```
router(conf)# interface f0/0.X0
router(conf-if)# encapsulation dot1q <Data VLAN ID>
router(conf-if)# ip address 10.X0.0.1 255.255.255.0
router(conf-if)# exit
router(conf)# interface f0/0.X5
router(conf-if)# encapsulation dot1q <Voice VLAN ID>
router(conf-if)# ip address 10.X5.0.1 255.255.255.0
router(conf-if)#no shutdown
```

Task 2 Configure DHCP for IP phones.

1. Configure IP address, default gateway and tftp server address for Voice VLAN.

```
router(conf)# ip dhcp excluded-address 10.X5.0.1
router(conf)# ip dhcp pool <Pool Name>
router(conf-dhcp)# network 10.X5.0.0 255.255.255.0
router(conf-dhcp)# default-router 10.X5.0.1
router(conf-dhcp)# option 150 ip 10.X5.0.1
```

2. Check configuration.

```
router# show running-config
```

Task 3 Basic Phone Configuration

1. Enter and configure telephony service mode.

```
router(conf)# telephony-service
router(conf-telephony)# max-ephones 4
router(conf-telephony)# max-dn 4
router(conf-telephony)# keepalive 10
```

2. Define IP address and port where CallManager Express is listening for registration (Skinny)

```
router(conf-telephony)# ip source-address 10.X5.0.1 port 2000
```

3. Create XML configuration files for IP phones (ignore warning concerning clock synchron.)

```
router(conf-telephony)# create cnf-files
```

4. Configure Ethernet phone directory number (ephone-dn) for each number X001-X004

```
router(conf)# ephone-dn 1 dual-line
router(conf-ephone-dn)# number X001
router(conf-ephone-dn)# name <first name> <family name>
```

5. Define and configure each physical phone (both software and hardware).

```
router(conf)# ephone 1
router(conf-ephone)#mac-address <xxxx.xxxx.xxxx>
router(conf-ephone)# button 1:<ephone-dn>
```

Task 4 Connect and configure IP Phones.

1. Connect hardware IP Phones to the switch. Check connectivity.

2. Configure PC address and software IP Phone (Cisco IP Communicator).

Configure IP address on PC that is in Data VLAN.

Start and configure Cisco IP Communicator. Set proper network interface to connect to the CME.

3. Verify phone connection.

4. Test IP Phone capabilities: Hold, Redial, Transfer Call.

Task 5 Communication Analysis.

1. Run Wireshark Analyser on the PC.

2. Check Skinny and RTP communication with IP Phone.

1. Describe what kind of data are exchange
 - a. during registration phase
 - b. during dialing
 - c. during ringing
 - d. during voice communication
 - e. during the termination phase

3. In each phase select typical data exchange and describe in the figure (next page).

Task 5

Communication Analysis (cont.) – depict important packets

Registration

Dialing

Ringing

**Voice
Transmission**

RTP communication:

Codec: _____

SSRC1: _____

SSRC2: _____

Call Termination

Task 6

Fill the following table

1. Final Phone Settings:

Phone	Type (hw/sw+type)	IP address	Phone no.	Ephone ID	User name
no.1					
no.2					
no.3					
no.4					

Task 7

Delete configuration and restart devices

1. Delete configuration file on the router.

router# delete running-config

router# reload

2. Disconnect your devices.

3. Shut down your PC.