

## Scenario Connecting local CME site via VoIP

its own IP telephony infrastructure based on Cisco Call Manager Express. In each site, configure local VoIP connection that includes hw IP phones, soft IP phones (Cisco IP Communicator) and analog phones (not every site). Connect your local IP phone network with other sites using dial-peers. Configure advanced features on your local network – network directory, call park, paging, etc.

## Task 1 Pre-configure the network topology

### 1. Prepare your network.

Step 1: Cable network topology except hardware IP phones. Connect PCs and IP phones to the L3 switch.

### 2. Perform basic router configuration. Don't save the configuration on the router to the startup-config!

Connect to a router using terminal connection – putty on COM1 (A).

### 3. Configure

router> enable

router# configure terminal

router(conf)#interface f0/0.X0

router(conf-if)#encapsulation dot1q X0

router(conf-if)#ip address 192.168.X0.1 255.255.255.0

router(conf-if)# exit

router(conf)#interface f0/0

router(conf-if)# no shutdown

router(conf)#interface f0/0.X5

router(conf-if)#encapsulation dot1q X5

router(conf-if)#ip address 192.168.X5.1 255.255.255.0

## 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 192.168.X5.1
router(conf)# ip dhcp pool <Pool Name>
router(conf-dhcp)# network 192.168.X5.0 255.255.255.0
router(conf-dhcp)# default-router 192.168.X5.1
router(conf-dhcp)# option 150 ip 192.168.X5.1
router(conf-dhcp)# end
```

### 2. Check configuration: router# show running-config router#sh ip dhcp binding

## Task 3

## Basic Phone Configuration

### 1. Enter and configure telephony service mode.

```
router(conf)# telephony-service
router(conf-telephony)# max-ephones 6
router(conf-telephony)# max-dn 11
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 192.168.X5.1 port 2000
```

### 2. Define system message displayed on all IP phones

```
router(conf-telephony)# system message <message>
```

### 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 <ephone-dn> dual-line
router(conf-ephone-dn)# number X001
router(conf-ephone-dn)# name <first name> <family name>
router(conf-ephone-dn)# label <label_on_the_display>
router(conf-ephone-dn)# description <IP-phone-header-bar>
```

### 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 for VLAN Data (192.168.X0.0/24, GW: 192.168.X0.1)

Start and configure Cisco IP Communicator.

Set proper network interface to connect to the CME. Set TFTP to 192.168.X5.1.

### 3. Verify phone connection.

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

## Task 5

## Configure Analog Phone (optional).

### 1. Connect Analog Phone to the FXS port on the router.

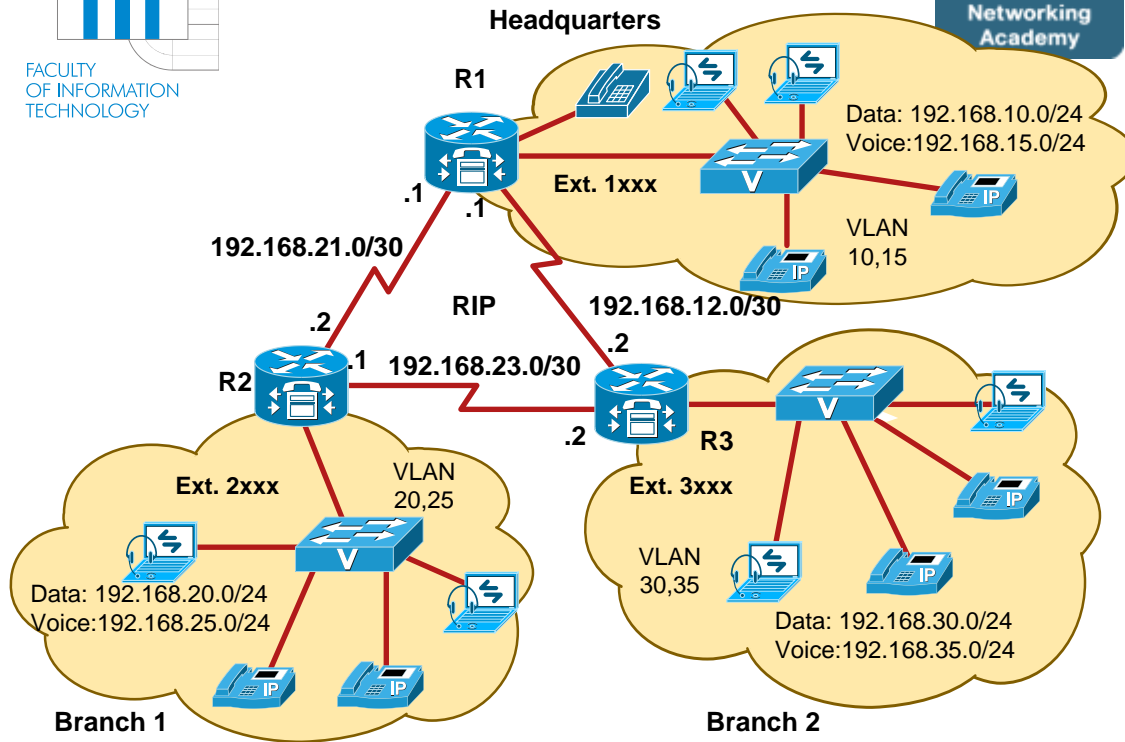
### 2. Check FXS ports on the router.

```
router# sh voice port summary
```

### 3. Configure dial-peer for POTS.

```
router(conf)# dial-peer voice 1 pots
router(conf)# destination-pattern <phone-number>
router(conf)# no digit-strip
router(conf)# port <voice-port> -
router(conf)# end
```

Make a test call from the VoIP phone to analog phone and vice versa.



## Task 6

### Connect your local CME infrastructure to remote CMEs.

#### 1. Configure VoIP dial-peers.

```
router(config)# dial-peer voice <dial-peer_no> voip
router(config)# destination-pattern <wildcard_number>
router(config)# session target ipv4:<remote_router_serial_IP>
router(config)# end
```

Make a test call from your local phones to remote destination and vice versa.

## Task 7

### Configuring network directory

#### 1. Configure local directory on CME.

```
router(config)# telephone-service
router(conf-telephone)# directory last-name-first
router(conf-telephone)# directory entry <no_id> <phone_no> name <name>
```

#### 2. Restart the IP phone – switch to configuration menu and press \*\*#\*.

#### 3. Search phone directory on the IP phone (works properly on IP phones 7960 only).

## Task 8

### Call Forwarding, Call Transfer

#### Call Transfer:

1. Dial a select number. Answer the call. Press key Trnsfr.
2. Dial a new number.
3. Talk to the third party if he is willing to accept the call.
4. Trnsfr the call using the key Trnfr second time.
5. Repeat the procedure with Wireshark analysis. Check how data are transmitted.
6. **Enable transfer to remote numbers** `router(conf)#telephone-service`  
`router(conf-telephone-service)# transfer-pattern X...`

#### Call Forwarding:

1. Define call forwarding rule for a selected dn.  
`router(conf)# ephone-dn <no>`  
`router(conf-ephone-dn)# call-forward busy <destination_no>`  
`router(conf-ephone-dn)# call-forward noan <destination_no> timeout <sec>`
2. Make a test call to the selected number. Check what happens using Wireshark.

## Task 9

### Configure Call Park

#### 1. Create a new ephone-dn with a special number for call park.

```
router(conf)#ephone-dn <no>
router(conf-ephone-dn)# number <nnnn>
router(conf-ephone-dn)# park-slot
```

#### 2. Reset phones.

#### 3. Call one of the IP phones with a defined number and answer the call.

#### 4. Use key Park to park the call.

#### 5. From the other local IP phone pick up the call using PickUP function. Dial the number of the parked call.

## Task 10

### Configure Paging

Configure all IP phones in your local CME to an Emergency Paging group.

#### 1. Create a special paging dn with the paging number:

```
router(conf)#ephone-dn <paging_dn>
router(conf-ephone-dn)# number <special_phone_no>
router(conf-ephone-dn)# name Emergency
router(conf-ephone-dn)# paging
```

#### 2. Add every (physical) phone to the paging group defined above.

```
router(conf)#ephone <no>
router(conf-ephone)# paging-dn <paging_dn>
```

#### 3. From any IP phone dial the paging number.

## Task 11

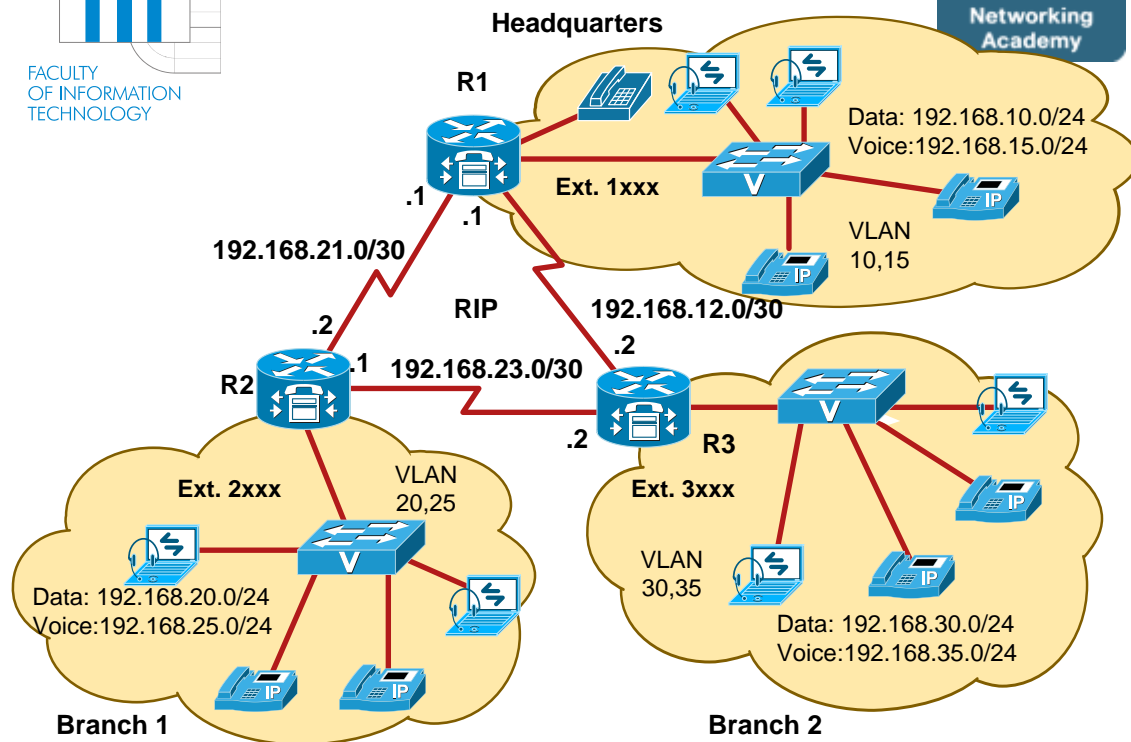
### Closing the work in the lab.

#### 1. Reboot the router. Don't save the configuration!

```
router#reload
```

#### 2. Disconnect all your devices – PCs, IP phones. Don't disconnect trunks and serial cables.

#### 3. Complete the form with answers on the following page.



## Call Forward:

### Call Transfer:

**Call Park:**

## Paging:

## Review 1 Fill following table

**Phone Line    Ephone-dn    Ephone Mac-Address    Advanced Functions**

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