

Configuring VoIP lab in Packet Tracer



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Video Demo:
You can find this Topology at: <https://github.com/attaullahshafiq10/voip>

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1 Introduction

In this project I am describing Voice network calling partners include devices, routers and gateways within a network that are VoIP capable. The term dial peer is sometimes used to refer to a programmed that matches a specific dialed sequence of digits to an addressable call endpoint. In the VoIP world, dial peers can be categorized as either voice-network dial peers or POTS dials (Plain Old Telephone Service). Voice network calling partners include devices, routers and gateways within a network that are VoIP capable.

2 Tasks:

2.1 Switches

- Vlan database configuration (switch)
- 2.switchport configuration Access, Trunk (switch)

2.2 Routers:

- 1.DHCP pool creation Voice, Data
- 2.Assign IP Address to sub interfaces(Voice ,Data)
- 3.Telephony Service (CME Router)
- 4. RIP configuration
- 5.verify connectivity

3 For Objectives:

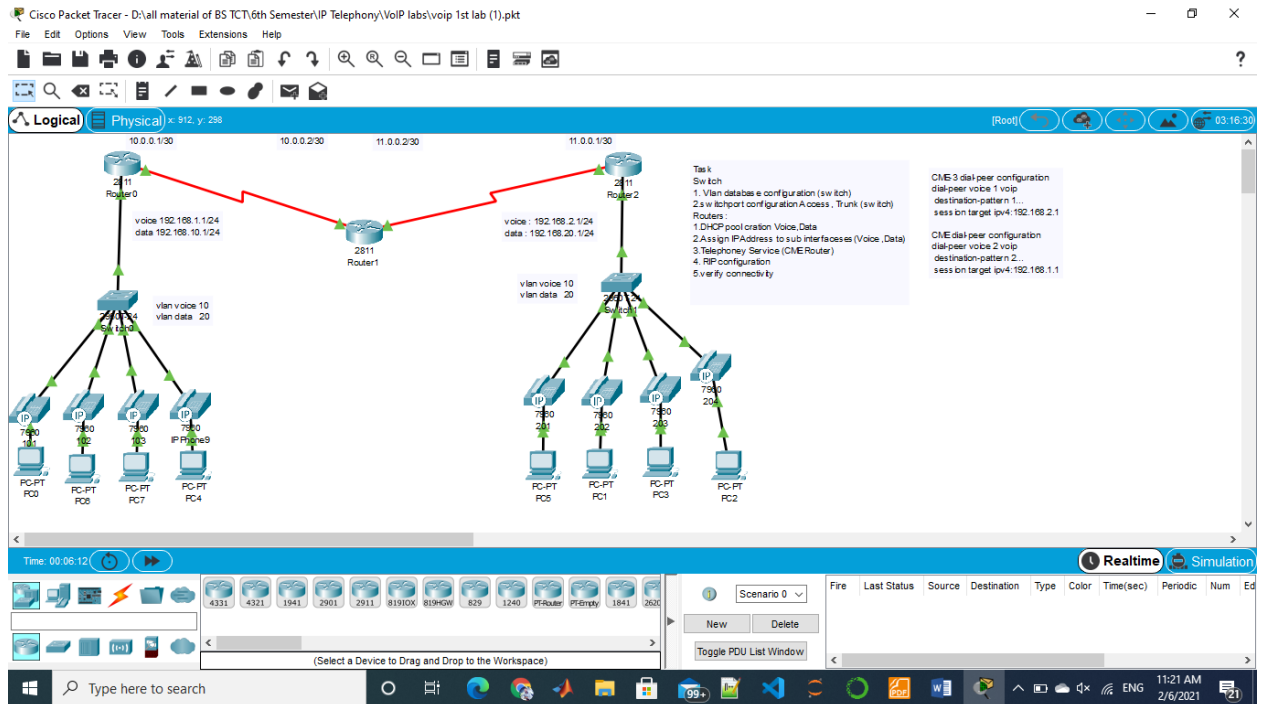
CME-3 dial-peer configuration
dial-peer voice 1 voip
destination-pattern 1...
session target ipv4:192.168.2.1

CME dial-peer configuration
dial-peer voice 2 voip
destination-pattern 2...
session target ipv4:192.168.1.1

4 Topology:

This is the topology we will be using in our lab:

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4.1 Topology Details:

For our laboratory (you can expand if you want), we have three locations: three Branches. (As seen in the image above), the network scheme for the headquarters is:

VLAN Voice: 50

VLAN Data: 10

Voice Network: 192.168.50.0/24 Network: 192.168.50.0

Network of Data: 192.168.10.0/24 Network of Data:

For the branch, the network scheme is:

VLAN voice: 20

VLAN Data: 5

Speech Network: 172.16.20.0/24 Network: 172.16.20.0

Network of Data: 172.16.5.0/24

5 Configuration:

5.1 Network-1

5.1.1 SW-1

```
Switch#  
Switch#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
Switch(config)#int fa0/1  
Switch(config-if)#switchport mode trunk  
Switch(config-if)#
```

The fa0/1 interface is the one attached to the router.

As we are going to configure more than one VLAN, this interface needs to be configured as a trunk to allow multiple VLAN traffic.

The next move is to build the above-described VLANs:

```
Switch#conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
Switch(config)#vlan 10  
Switch(config-vlan)#name DATA  
Switch(config-vlan)#exit  
Switch(config)#vlan 50  
Switch(config-vlan)#name VOICE
```

Now, we will assign these VLANs to the ports linked to the IP phones (access and voice VLANs).

```
Switch(config)#int range fastEthernet 0/2 - 4  
Switch(config-if-range)#switchport mode access  
Switch(config-if-range)#switchport access vlan 10  
Switch(config-if-range)#switchport voice vlan 50  
Switch(config-if-range)#spanning-tree portfast  
%Warning: portfast should only be enabled on ports connected to a single  
host. Connecting hubs, concentrators, switches, bridges, etc... to this  
interface when portfast is enabled, can cause temporary bridging loops.  
Use with CAUTION  
  
%Portfast will be configured in 3 interfaces due to the range command  
but will only have effect when the interfaces are in a non-trunking mode.  
Switch(config-if-range)#
```

By design, the average STP convergence time is about 50 seconds, so essentially every port takes around 50 seconds to initialise and be in the forwarding state. This is a great deal of time and does not need to be spent on a switch's access ports. In our LAB, we configured the spanning-tree portfast command to disable the STP search on the access ports where we have the IP phones linked.

5.1.2 Router configuration:

We're done with the turn, and now we're doing some configurations on the router:

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
Router(config)#ip dhcp pool VOICE
Router(dhcp-config)# network 192.168.50.0 255.255.255.0
Router(dhcp-config)# default-router 192.168.50.1
Router(dhcp-config)# option 150 ip 192.168.50.1
Router(dhcp-config)#exit
Router(config)#ip dhcp pool DATA
Router(dhcp-config)# network 192.168.10.0 255.255.255.0
Router(dhcp-config)# default-router 192.168.10.1
Router(dhcp-config)# option 150 ip 192.168.50.1
Router(dhcp-config)#exit
Router(config)#ip dhcp excluded-address 192.168.50.1 192.168.50.10
Router(config)#ip dhcp excluded-address 192.168.10.1 192.168.10.10
Router(config)#
```

Both VOICE and DATA DHCP pools (for IP Phones and PC's) were setup. We omitted some addresses from the pools just to prevent conflicts with some IPs that we might use. We used only the first IPs from both networks in our LAB (VOICE and DATA). But, one day we may want to use another. That's the reason I reserved 10.

Currently, on the router, we are configuring the sub-ifs:

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0.10
Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)# ip address 192.168.10.1 255.255.255.0
Router(config-subif)#exit
Router(config)#int fa0/0.50
Router(config-subif)#encapsulation dot1Q 50
Router(config-subif)# ip address 192.168.50.1 255.255.255.0
Router(config-subif)#
```

This is completed, we will now go to the telephony-service configurations.

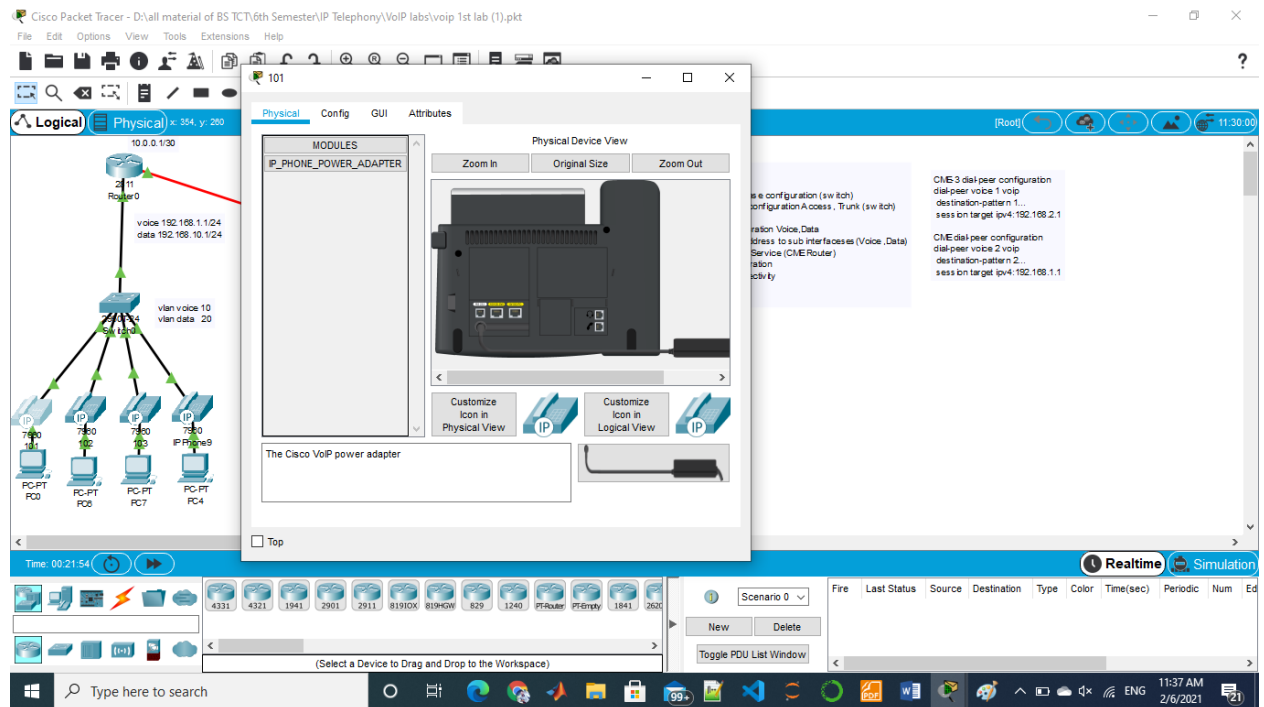
```
Router(config)#telephony-service
Router(config-telephony)#max-ephones 10
Router(config-telephony)# max-dn 10
Router(config-telephony)# ip source-address 192.168.50.1 port 2000
Router(config-telephony)# auto assign 1 to 10
Router(config-telephony)#
```

We have configured 10 maximum telephones, 10 maximum telephone lines, the IP address from which the telephones are registered, the port used for the telephones, the default one is 2000 (for SCCP telephones) and we have configured the telephones to be registered automatically, in this case from 1 to 10.

Lets configure the DNs that will be auto-registered for IP Phones.

```
Router(config)#ephone-dn 1
Router(config-ephone-dn)#number 10
Router(config-ephone-dn)#exit
Router(config)#ephone-dn 2
Router(config-ephone-dn)#number 20
Router(config-ephone-dn)#exit
Router(config)#ephone-dn 3
Router(config-ephone-dn)#number 30
Router(config-ephone-dn)#
```

This is done at the Network-1, we can power up the phones and wait for them to be reported.



We're going to do the same on the branch side after successfully registering at the HQ.

5.2 Network-2

I will only insert screenshots of commands for the branch hand, since the clarification is already stated.

5.2.1 SW:


```
Switch#
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#int fa0/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#
```

```
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 5
Switch(config-vlan)#name DATA
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name
Switch(config-vlan)#name VOICE
Switch(config-vlan)#
```

```
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#int range fa0/2 - 4
Switch(config-if-range)#switchport access vlan 5
Switch(config-if-range)# switchport mode access
Switch(config-if-range)# switchport voice vlan 20
Switch(config-if-range)# spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a single
host. Connecting hubs, concentrators, switches, bridges, etc... to this
interface when portfast is enabled, can cause temporary bridging loops.
Use with CAUTION

%Portfast will be configured in 3 interfaces due to the range command
but will only have effect when the interfaces are in a non-trunking mode.
Switch(config-if-range)#
```

5.2.2 Router:

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip dhcp pool VOICE
Router(dhcp-config)# network 172.16.20.0 255.255.255.0
Router(dhcp-config)# default-router 172.16.20.1
Router(dhcp-config)# option 150 ip 172.16.20.1
Router(dhcp-config)#exit
Router(config)#ip dhcp pool DATA
Router(dhcp-config)# network 172.16.5.0 255.255.255.0
Router(dhcp-config)# default-router 172.16.5.1
Router(dhcp-config)# option 150 ip 172.16.20.1
Router(dhcp-config)#exit
Router(config)#ip dhcp excluded-address 172.16.20.1 172.16.20.10
Router(config)#ip dhcp excluded-address 172.16.5.1 172.16.5.10
Router(config)#
```



```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/0.5
Router(config-subif)#encapsulation dot1Q 5
Router(config-subif)# ip address 172.16.5.1 255.255.255.0
Router(config-subif)#exit
Router(config)#int fa0/0.20
Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip address 172.16.20.1 255.255.255.0
Router(config-subif)#
```

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#tele
Router(config)#telephony-service
Router(config-telephony)#max-ephones 10
Router(config-telephony)# max-dn 10
Router(config-telephony)# ip source-address 172.16.20.1 port 2000
Router(config-telephony)# auto assign 1 to 10
Router(config-telephony)#
```

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ephone-dn 1
Router(config-ephone-dn)#number 1000
Router(config-ephone-dn)#exit
Router(config)#ephone-dn 2
Router(config-ephone-dn)#number 2000
Router(config-ephone-dn)#exit
Router(config)#ephone-dn 3
Router(config-ephone-dn)#number 3000
Router(config-ephone-dn)#end
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#
```

This is done on the branch side, the phones can be powered up and wait until they are registered.

5.3 Network-3

I have used static routes for this LAB. So, first I formed the /30 connection between the two routers.

For 1st network

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/1
Router(config-if)#ip address 10.10.10.1 255.255.255.252
Router(config-if)# duplex auto
Router(config-if)# speed auto
Router(config-if)#
```

For 2nd :

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fa0/1
Router(config-if)#ip address 10.10.10.2 255.255.255.252
Router(config-if)# duplex auto
Router(config-if)# speed auto
Router(config-if)#
```

The only request here is that both sides should access the telephony networks. But, we can also allow connections on the DATA networks for this LAB.

For first

```
Router(config)#ip route 172.16.20.0 255.255.255.0 10.10.10.2
Router(config)#ip route 172.16.5.0 255.255.255.0 10.10.10.2
Router(config)#
```

For 2nd:

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip route 192.168.10.0 255.255.255.0 10.10.10.1
Router(config)#ip route 192.168.50.0 255.255.255.0 10.10.10.1
Router(config)#
```

Noe Set the dial-peer:

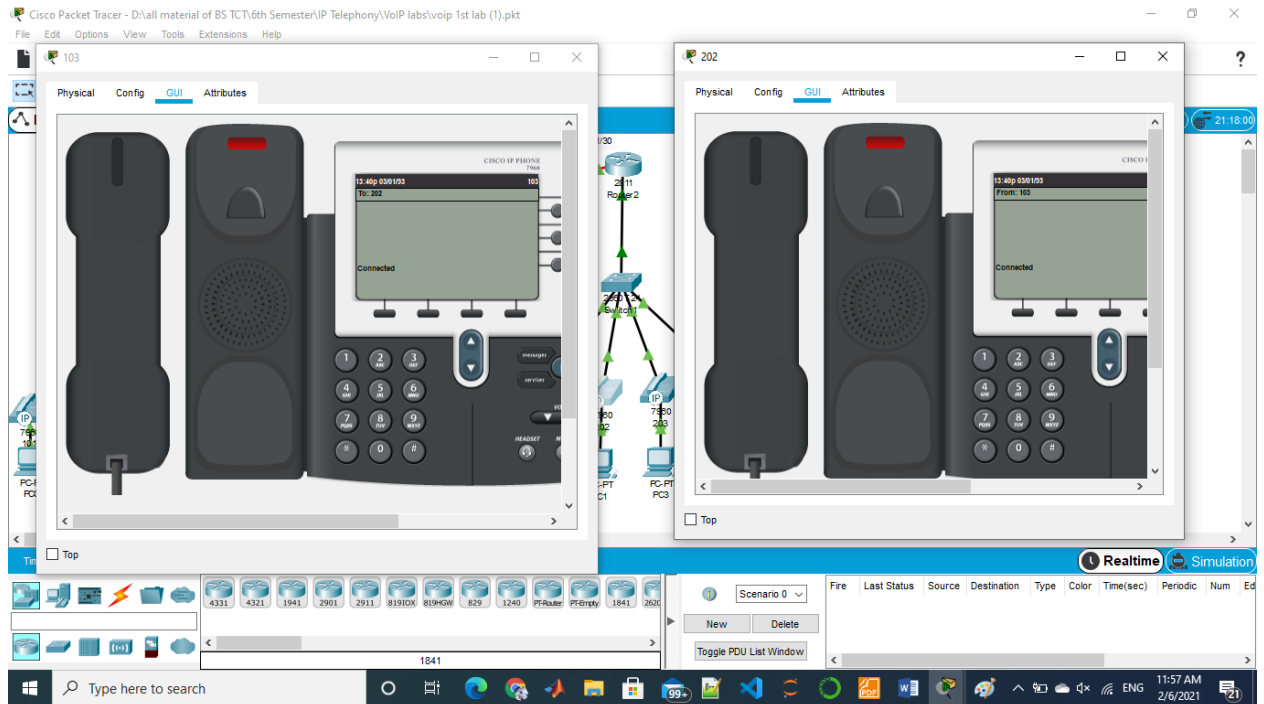
```
Router(config)#dial-peer voice 1 voip
Router(config-dial-peer)#destination-pattern .000
Router(config-dial-peer)#session target ipv4:10.10.10.2
Router(config-dial-peer)#
```

Same for 2nd:

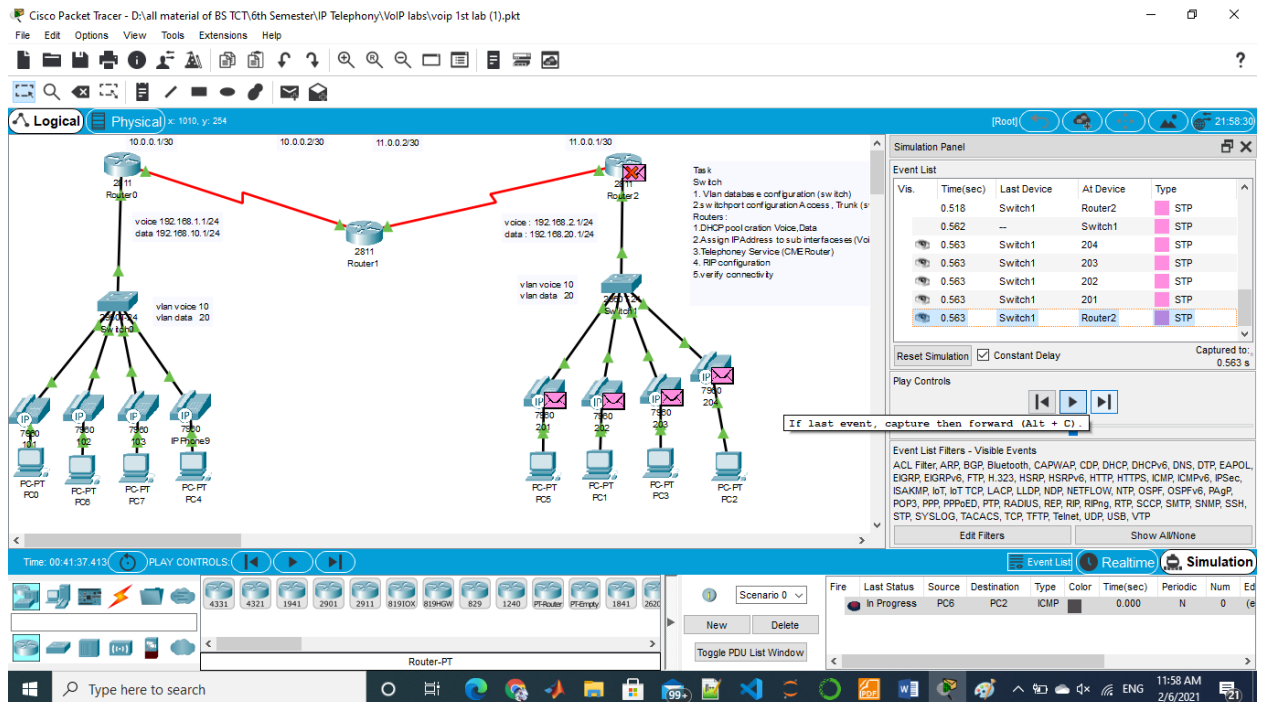
```
Router(config)#dial-peer voice 1 voip
Router(config-dial-peer)#destination-pattern .0
Router(config-dial-peer)# session target ipv4:10.10.10.1
Router(config-dial-peer)#
```

The only thing that's left is... TEST what we did... (I'm trembling...)

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Simulation mode:



So, this is it....over...for it's the time being.

You can find this topology at: <https://github.com/attaullahshafiq10/voip>

The End

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Thank you!!!!!!