VoIP Network Design & Implementation Using Cisco Packet Tracer

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Enterprise Networking project

Ip Telephony(VoIP)and Dial-Peering Networking Project

Turtle Consultancy Limited specialized in delivering IT infrastructure solutions to medium.

Sized organizations worldwide.with the expansion of the company.a newly acquired branch needs a network. Your manager is faced with the demands of business and a plethora of technology challenges.

You have been recently hired as a Network Engineer and assigned the task of designing and implementing a VoIP network that is based on the requirements and specifications outlined by your manager.

Each group has been assigned the task of designing, and implementing a network infrastructure for Turtle Consultancy Limited by internetworking three departments which are as follows:

Finance: 10 phones + 10 PCs & 1 printer	**HR:** 10 phones +10 PCs & 1 printer
Sales: 10 phones + 10 PCs & 1 printer	**ICT:** 10 phones + 10 PCs & 1 printer

- All desktops have an associated telephone set (each PC is connecting directly to a phone, not a switch).

The network consists of four servers located at the server side site and is fully configured for the operations, and all servers are shared between all users.

• **HTTP**	• **Email**
• **DNS**	• **DHCP**

Requirements

The IT Manager emphasized scalability and availability, and hence you are required to provide a complete network infrastructure design and implementation.Turtle Consultancy Limited will be using the following IP address :192.168.100.0/24 for Data. 172.16.100.0/24 for Voice.

And 10.10.10.0/24 between the routers.

1- Design : a networked system to meet the given specifications. **USE Packet tracer** software to design your network.

2- Routers : Each department is to have VoIP enabled router with server-side LAN attached to the ICT department router. Note: use Cisco 2811 router.

3- Switches: Each department has an access layer switch.Note: use Cisco 2960 switch.

4- Connections : Use serial connections between a router and a router . then a straight through cable between the router to switch, Switch to hosts,phones to PCs.

5- Subnets : Each department will be accessing two subnetworks,for example, data and voice subnets, Note: carry out appropriate subnetting.

6- Basic settings : Configure basic device settings such as hostname, console,passwords, enable passwords, banner messages,encrypt all passwords,and disable IP domain lookup.

7- DHCP Server: For voice(VoIP).use the respective router as the DHCP server while for Data use the DHCP Server device at the server-side site.

8- VLANs : Each department will be in two VLANS. One for data and another for voice , Note: All IP phones in the network should be in VLAN 100.

9- Inter-VLAN Routing: Use router-on-a-stick to enable inter-VLAN routing on the network , Note: creat subinterfaces for both data and voice VLANs.

10- IP Addressing : All devices in the network are expected to obtain an IP

address dynamically from the respective DHCP servers while the devices in

the server room are to be allocated IP addresses statically.

11- Routing protocol : Use OSPF as the routing protocol to advertise routes on the routers.

12- Remote Access : Configure SSH in all the routers for remote login

13- Telephony service : Configure VoIP on the routers and allocate dial numbers in this format for the departments, Finance(1..).HR(2..).Sales(3..).and ICT(4..),(where 1.. can be 101 to 199)and so on.

14- Routing for VoIP : Configure dial-peering on the routers to allow IP phones from different routers to communicate.

15- Finalize : Test Communication, ensure everything configured is working as expected.

CONFIG STEPS

1- Network Design and beautification.

2- Basic settings to all devices puls ssh on the routers.

3- VLANa assignment plus all access and trunk ports on the switches.

4- Subnetting and IP addressing.

5- Static IP address to serverRoom devices.

6- DHCP server device configurations.

7- Configure DHCP for Voice.

8- Inter-VLAN routing on the Routers plus ip dhcp helper addresses.

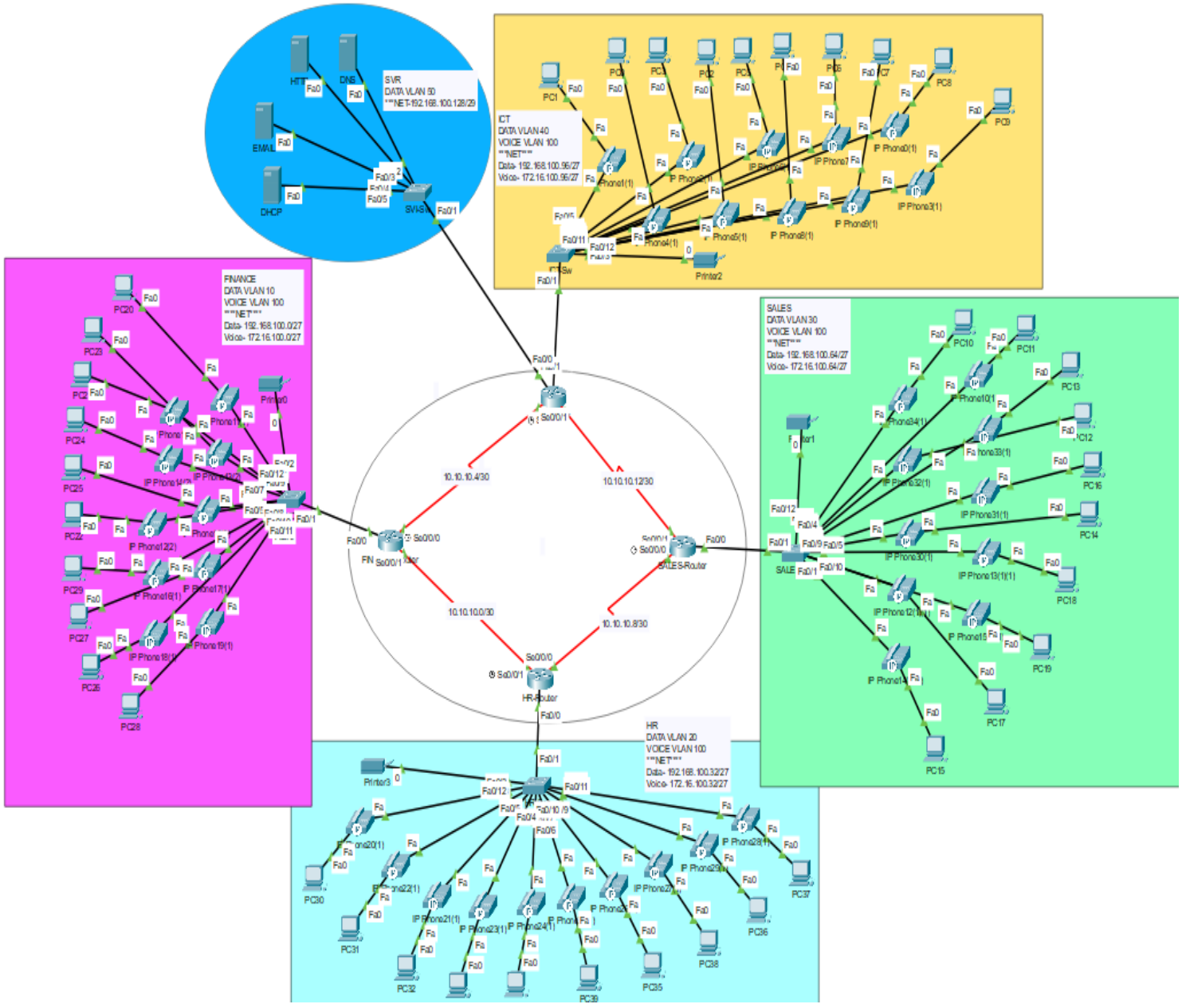
9- OSPF on the routers.

10- Configure VoIP configuration in all routers.

11- Dial peering configuration in all routers.

12- Verifying and testing configurations.

➢ Network Topology:



FIN-SW

```
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname FIN-SW
FIN-SW(config)#enable password cisco
FIN-SW(config)#lin con 0
FIN-SW(config-line)#password cisco
FIN-SW(config-line)#login
FIN-SW(config-line)#exit
FIN-SW(config)#banner motd #NO UNAUTHORISED ACCESS, THIS IS PUNISHABLE BY LAW!!!#
FIN-SW(config)#service password-en
FIN-SW(config)#service password-encryption
FIN-SW(config)#no ip domain-lookup
FIN-SW(config)#int f0/1
FIN-SW(config-if)#switchport mode trunk
FIN-SW(config-if)#int range f0/2-24
FIN-SW(config-if-range)#switchport mode access
FIN-SW(config-if-range)#exit
FIN-SW(config)#vlan 10
FIN-SW(config-vlan)#name DATA
FIN-SW(config-vlan)#vlan 100
FIN-SW(config-vlan)#name VOICE
FIN-SW(config-vlan)#ex
FIN-SW(config)#int range f0/2-24
FIN-SW(config-if-range)#switchport access vlan 10
FIN-SW(config-if-range)#switchport voice vlan 100
FIN-SW(config-if-range)#ex
```

FIN-SW(config)#do wr

Building configuration...

[OK]

FIN-SW(config)#

HR-SW

Switch>

Switch>en

Switch#conf t

Switch(config)#hostname HR-SW

HR-SW(config)#enable password cisco

HR-SW(config)#line console 0

HR-SW(config-line)#password cisco

HR-SW(config-line)#login

HR-SW(config-line)#exit

HR-SW(config)#banner motd #NO UNAUTHORISED ACCESS, THIS IS PUNISHABLE BY LAW!!!#

HR-SW(config)#service password-encryption

HR-SW(config)#no ip domain-lookup

HR-SW(config)#vlan 20

HR-SW(config-vlan)#name DATA

HR-SW(config-vlan)#vlan 100

HR-SW(config-vlan)#name VOICE

HR-SW(config-vlan)#

HR-SW(config-vlan)#int f0/1

HR-SW(config-if)#switchport mode trunk

HR-SW(config-if)#exit

HR-SW(config)#int range f0/2-24

HR-SW(config-if-range)#switchport mode access

```
HR-SW(config-if-range)#switchport access vlan 20
HR-SW(config-if-range)#switchport voice vlan 100
HR-SW(config-if-range)#exit
HR-SW(config)#do wr
Building configuration...
[OK]
HR-SW(config)#
```

ICT-SW

```
Switch>
Switch>en
Switch#conf t
Switch(config)#hostname SALES-SW
ICT-SW(config)#enable password cisco
ICT-SW(config)#line console 0
ICT-SW(config-line)#password cisco
ICT-SW(config-line)#login
ICT-SW(config-line)#exit
ICT-SW(config)#banner motd #NO UNAUTHORISED ACCESS, THIS IS PUNISHABLE BY LAW!!!#
ICT-SW(config)#service password-encryption
ICT-SW(config)#no ip domain-lookup
ICT-SW(config)#vlan 40
ICT-SW(config-vlan)#name DATA
ICT-SW(config-vlan)#vlan 100
ICT-SW(config-vlan)#name VOICE
ICT-SW(config-vlan)#
ICT-SW(config-vlan)#int f0/1
ICT-SW(config-if)#switchport mode trunk
```

```
ICT-SW(config-if)#exit
ICT-SW(config)#int range f0/2-24
ICT-SW(config-if-range)#switchport mode access
ICT-SW(config-if-range)#switchport access vlan 40
ICT-SW(config-if-range)#switchport voice vlan 100
ICT-SW(config-if-range)#exit
ICT-SW(config)#do wr
Building configuration...
[OK]
ICT-SW(config)#
```

SALES-SW

```
Switch>en
Switch#conf t
Switch(config)#hostname SALES-SW
SALES-SW(config)#enable password cisco
SALES-SW(config)#line console 0
SALES-SW(config-line)#password cisco
SALES-SW(config-line)#login
SALES-SW(config-line)#exit
SALES-SW(config)#banner motd #NO UNAUTHORISED ACCESS, THIS IS PUNISHABLE BY LAW!!!#
SALES-SW(config)#service password-encryption
SALES-SW(config)#no ip domain-lookup
SALES-SW(config)#
SALES-SW(config)#vlan 30
```

SALES-SW(config-vlan)#name DATA

SALES-SW(config-vlan)#vlan 100

SALES-SW(config-vlan)#name VOICE

SALES-SW(config-vlan)#

SALES-SW(config-vlan)#int f0/1

SALES-SW(config-if)#switchport mode trunk

SALES-SW(config-if)#exit

SALES-SW(config)#int range f0/2-24

SALES-SW(config-if-range)#switchport mode access

SALES-SW(config-if-range)#switchport access vlan 30

SALES-SW(config-if-range)#switchport voice vlan 100

SALES-SW(config-if-range)#exit

SALES-SW(config)#do wr

Building configuration...

[OK]

SVR-SW

Switch>en

Switch#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Switch(config)#hostname SVR-Router

SVR-Router(config)#enable password cisco

SVR-Router(config)#line console 0

SVR-Router(config-line)#password cisco

SVR-Router(config-line)#login

SVR-Router(config-line)#banner motd #NO UNAUTHORISED ACCESS, THIS IS PUNISHABLE BY LAW!!!#

SVR-Router(config)#service password-encryption

```
SVR-Router(config)#no ip domain lookup
SVR-Router(config)#username cisco password cisco
SVR-Router(config)#ip domain name cisco.net
SVR-Router(config)#crypto key generate rsa general-keys modulus 1024
SVR-Router(config)#ip ssh version 2
SVR-Router(config)#line vty 0 15
SVR-Router(config-line)#
SVR-Router(config-line)#login local
SVR-Router(config-line)#transport input ssh
SVR-Router(config-line)#exit
SVR-Router(config)#vlan 50
SVR-Router(config-vlan)#name DATA
SVR-Router(config-vlan)#int f0/1
SVR-Router(config-if)#switchport mode trunk
SVR-Router(config-if)#exit
SVR-Router(config)#int range f0/2-5
SVR-Router(config-if-range)#switchport mode access
SVR-Router(config-if-range)#switchport access vlan 50
SVR-Router(config-if-range)#exit
SVR-Router(config)#do wr
Building configuration...
[OK]
SVR-Router(config)#
```

FIN-ROUTER

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#host
Router(config)#hostname FIN-Router
FIN-Router(config)#enable password cisco
FIN-Router(config)#line c
FIN-Router(config)#line console 0
FIN-Router(config-line)#pas
FIN-Router(config-line)#password cisco
FIN-Router(config-line)#login
FIN-Router(config-line)#exit
FIN-Router(config)#banner motd #NO UNAUTHORISED ACCESS, THIS IS PUNISHABLE BY LAW!!!#
FIN-Router(config)#servi
FIN-Router(config)#service pa
FIN-Router(config)#service password-encryption
FIN-Router(config)#no ip domain lookup
FIN-Router(config)#username cisco password cisco
FIN-Router(config)#ip domain name cisco.net
BFIN-Router(config)#crypto key generate rsa general-keys mod
FIN-Router(config)#crypto key generate rsa general-keys modulus 1024
FIN-Router(config)#ip ssh version 2
FIN-Router(config)#
FIN-Router(config)#line vty 0 15
FIN-Router(config-line)#login
FIN-Router(config-line)#login local
```

```
FIN-Router(config-line)#transport input ss
FIN-Router(config-line)#exit
FIN-Router(config)#interface Serial0/0/0
FIN-Router(config-if)#no shutdown
FIN-Router(config-if)#
FIN-Router(config-if)#exit
FIN-Router(config)#interface Serial0/0/1
FIN-Router(config-if)#
FIN-Router(config-if)#exit
FIN-Router(config)#interface Serial0/0/1
FIN-Router(config-if)#no shutdown
FIN-Router(config-if)#
FIN-Router(config-if)#exit
FIN-Router(config)#interface FastEthernet0/0
FIN-Router(config-if)#no shutdown
FIN-Router(config-if)#
FIN-Router(config-if)#exit
FIN-Router(config)#interface FastEthernet0/1
FIN-Router(config-if)#no shutdown
FIN-Router(config-if)#
FIN-Router(config-if)#exit
FIN-Router(config)#int s0/0/1
FIN-Router(config-if)#ip add 10.10.10.1 255.255.255.252
FIN-Router(config-if)#int s0/0/0
FIN-Router(config-if)#ip add 10.10.10.5 255.255.255.252
FIN-Router(config-if)#ex
FIN-Router(config)#service dhcp
FIN-Router(config)#ip dhcp excluded-address 172.16.100.1
FIN-Router(config)#ip dhcp pool FINVOICE
```

```
FIN-Router(dhcp-config)#network 172.16.100.0 255.255.255.224
FIN-Router(dhcp-config)#default-router 172.16.100.1
FIN-Router(dhcp-config)#option 150 ip 172.16.100.1
FIN-Router(dhcp-config)#ex
FIN-Router(config)#int f0/0.10
FIN-Router(config-subif)#
FIN-Router(config-subif)#encapsulation dot1Q 10
FIN-Router(config-subif)#ip address 192.168.100.1 255.255.255.224
FIN-Router(config-subif)#ex
FIN-Router(config)#int f0/0.100
FIN-Router(config-subif)#
FIN-Router(config-subif)#encapsulation dot1Q 100
FIN-Router(config-subif)#ip address 172.16.100.1 255.255.255.224
FIN-Router(config-subif)#ex
FIN-Router(config)#
FIN-Router(config)#int f0/0.10
FIN-Router(config-subif)#ip helper-address 192.168.100.30
FIN-Router(config-subif)#ex

FIN-Router(config)#router ospf 10
FIN-Router(config-router)#network 10.10.10.4 0.0.0.3 area 0
FIN-Router(config-router)#network 10.10.10.0 0.0.0.3 area 0
FIN-Router(config-router)#network 192.168.100.0 0.0.0.31 area 0
FIN-Router(config-router)#network 172.16.100.0 0.0.0.31 area 0
FIN-Router(config-router)#ex
FIN-Router(config)#
FIN-Router(config)#
FIN-Router(config)#telephony-service
FIN-Router(config-telephony)#max-dn 20
```

```
FIN-Router(config-telephony)#max-ephones 20
FIN-Router(config-telephony)#ip source-address 172.16.100.1 port 2000
FIN-Router(config-telephony)#auto assign 1 to 20
FIN-Router(config-telephony)#ex
FIN-Router(config)#ephone-dn 1
FIN-Router(config-ephone-dn)#number 101
FIN-Router(config-ephone-dn)#ephone-dn 2
FIN-Router(config-ephone-dn)#number 102
FIN-Router(config-ephone-dn)#ephone-dn 3
FIN-Router(config-ephone-dn)#number 103
FIN-Router(config-ephone-dn)#ephone-dn 4
FIN-Router(config-ephone-dn)#number 104
FIN-Router(config-ephone-dn)#ephone-dn 5
FIN-Router(config-ephone-dn)#number 105
FIN-Router(config-ephone-dn)#ephone-dn 6
FIN-Router(config-ephone-dn)#number 106
FIN-Router(config-ephone-dn)#ephone-dn 7
FIN-Router(config-ephone-dn)#number 107
FIN-Router(config-ephone-dn)#ephone-dn 8
FIN-Router(config-ephone-dn)#number 108
FIN-Router(config-ephone-dn)#ephone-dn 9
FIN-Router(config-ephone-dn)#number 109
FIN-Router(config-ephone-dn)#ephone-dn 10
FIN-Router(config-ephone-dn)#number 110
FIN-Router(config)#dial-peer voice 1 vo
FIN-Router(config)#dial-peer voice 1 voip
FIN-Router(config-dial-peer)#des
FIN-Router(config-dial-peer)#destination-pattern 2..
FIN-Router(config-dial-peer)#ses
```

```
FIN-Router(config-dial-peer)#session tar
FIN-Router(config-dial-peer)#session target ip
FIN-Router(config-dial-peer)#session target ipv
FIN-Router(config-dial-peer)#session target ipv4:10.10.10.2
FIN-Router(config-dial-peer)#ex
FIN-Router(config)#dial-peer voice 2 voip
FIN-Router(config-dial-peer)#destination-pattern 4..
FIN-Router(config-dial-peer)#session target ipv4:10.10.10.6
FIN-Router(config-dial-peer)#ex
FIN-Router(config)#dial-peer voice 3 voip
FIN-Router(config-dial-peer)#destination-pattern 3..
FIN-Router(config-dial-peer)#session target ipv4:10.10.10.10
FIN-Router(config-dial-peer)#
FIN-Router(config-dial-peer)#ex
FIN-Router(config)#do wr
Building configuration...
[OK]
FIN-Router(config)#
FIN-Router(config)#
```

HR-ROUTER

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname HR-Router
HR-Router(config)#enable password cisco
HR-Router(config)#line console 0
HR-Router(config-line)#password cisco
```

```
HR-Router(config-line)#login
HR-Router(config-line)#banner motd #NO UNAUTHORISED ACCESS, THIS IS PUNISHABLE BY LAW!!!#
HR-Router(config)#service password-encryption
HR-Router(config)#no ip domain lookup
HR-Router(config)#username cisco password cisco
HR-Router(config)#ip domain name cisco.net
HR-Router(config)#crypto key generate rsa general-keys modulus 1024
HR-Router(config)#ip ssh version 2
HR-Router(config)#line vty 0 15
HR-Router(config-line)#
HR-Router(config-line)#login local
HR-Router(config-line)#transport input ssh
HR-Router(config-line)#exit
HR-Router(config)#
HR-Router(config)#interface FastEthernet0/0
HR-Router(config-if)#no shutdown
HR-Router(config-if)#

HR-Router(config-if)#exit
HR-Router(config)#interface FastEthernet0/1
HR-Router(config-if)#no shutdown
HR-Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up

HR-Router(config-if)#exit
HR-Router(config)#interface Serial0/0/0
HR-Router(config-if)#
HR-Router(config-if)#exit
HR-Router(config)#interface Serial0/0/0
```

```
HR-Router(config-if)#no shutdown
HR-Router(config-if)#shutdown
HR-Router(config-if)#
HR-Router(config-if)#exit
HR-Router(config)#interface Serial0/0/1
HR-Router(config-if)#
HR-Router(config-if)#exit
HR-Router(config)#interface Serial0/0/1
HR-Router(config-if)#no shutdown
HR-Router(config-if)#
HR-Router(config-if)#exit
HR-Router(config)#int s0/0/1
HR-Router(config-if)#ip add 10.10.10.2 255.255.255.252
HR-Router(config-if)#int s0/0/0
HR-Router(config-if)#ip add 10.10.10.9 255.255.255.252
HR-Router(config-if)#exit
HR-Router(config)#service dhcp
HR-Router(config)#ip dhcp excluded-address 172.16.100.33
HR-Router(config)#ip dhcp pool HRVOICE
HR-Router(dhcp-config)#network 172.16.100.32 255.255.255.224
HR-Router(dhcp-config)#default-router 172.16.100.33
HR-Router(dhcp-config)#option 150 ip 172.16.100.33
HR-Router(dhcp-config)#exit
HR-Router(config)#int f0/0.20
HR-Router(config-subif)#encapsulation dot1Q 20
HR-Router(config-subif)#ip add 192.168.100.33 255.255.255.224
HR-Router(config-subif)#ip helper-address 192.168.100.130
HR-Router(config-subif)#ex
HR-Router(config)#int f0/0.100
```

```
HR-Router(config-subif)#encapsulation dot1Q 100
HR-Router(config-subif)#ip add 172.16.100.33 255.255.255.224
HR-Router(config-subif)#ex
HR-Router(config)#do wr

HR-Router(config)#router ospf 10
HR-Router(config-router)#network 10.10.10.8 0.0.0.3 area 0
HR-Router(config-router)#network 10.10.10.0 0.0.0.3 area 0
HR-Router(config-router)#network 192.168.100.32 0.0.0.31 area 0
HR-Router(config-router)#network 172.16.100.32 0.0.0.31 area 0
HR-Router(config-router)#ex

HR-Router(config)#
HR-Router(config)#telephony-service
HR-Router(config-telephony)#max-dn 20
HR-Router(config-telephony)#max-ephones 20
HR-Router(config-telephony)#ip source-address 172.16.100.33 port 2000
HR-Router(config-telephony)#auto assign 1 to 20
HR-Router(config-telephony)#exit
HR-Router(config)#
HR-Router(config)#ephone-dn 1
HR-Router(config-ephone-dn)#number 201
HR-Router(config-ephone-dn)#ephone-dn 2
HR-Router(config-ephone-dn)#number 202
HR-Router(config-ephone-dn)#ephone-dn 3
HR-Router(config-ephone-dn)#number 203
HR-Router(config-ephone-dn)#ephone-dn 4
HR-Router(config-ephone-dn)#number 204
HR-Router(config-ephone-dn)#ephone-dn 5
```

```
HR-Router(config-ephone-dn)#number 205
HR-Router(config-ephone-dn)#ephone-dn 6
HR-Router(config-ephone-dn)#number 206
HR-Router(config-ephone-dn)#ephone-dn 7
HR-Router(config-ephone-dn)#number 207
HR-Router(config-ephone-dn)#ephone-dn 8
HR-Router(config-ephone-dn)#number 208
HR-Router(config-ephone-dn)#ephone-dn 9
HR-Router(config-ephone-dn)#number 209
HR-Router(config-ephone-dn)#ephone-dn 10
HR-Router(config-ephone-dn)#number 210
HR-Router(config)#dial-peer voice 1 voip
HR-Router(config-dial-peer)#destination-pattern 1..
HR-Router(config-dial-peer)#session target ipv4:10.10.10.1
HR-Router(config-dial-peer)#ex
HR-Router(config)#
HR-Router(config)#dial-peer voice 4 voip
HR-Router(config-dial-peer)#destination-pattern 3..
HR-Router(config-dial-peer)#session target ipv4:10.10.10.10
HR-Router(config-dial-peer)#ex
HR-Router(config)#dial-peer voice 6 voip
HR-Router(config-dial-peer)#destination-pattern 4..
HR-Router(config-dial-peer)#session target ipv4:10.10.10.14
HR-Router(config-dial-peer)#ex
HR-Router(config)#
```

SALES-ROUTER

```
Router>EN
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname SALES-Router
SALES-Router(config)#enable password cisco
SALES-Router(config)#line console 0
SALES-Router(config-line)#password cisco
SALES-Router(config-line)#login
SALES-Router(config-line)#banner motd #NO UNAUTHORISED ACCESS, THIS IS PUNISHABLE BY LAW!!!#
SALES-Router(config)#service password-encryption
SALES-Router(config)#no ip domain lookup
SALES-Router(config)#username cisco password cisco
SALES-Router(config)#ip domain name cisco.net
SALES-Router(config)#crypto key generate rsa general-keys modulus 1024
SALES-Router(config)#ip ssh version 2
SALES-Router(config)#line vty 0 15
SALES-Router(config-line)#
SALES-Router(config-line)#login local
SALES-Router(config-line)#transport input ssh
SALES-Router(config-line)#exit
SALES-Router(config)#
SALES-Router(config)#interface Serial0/0/0
SALES-Router(config-if)#no shutdown
SALES-Router(config-if)#
```

```
SALES-Router(config-if)#exit
SALES-Router(config)#interface Serial0/0/1
SALES-Router(config-if)#no shutdown
SALES-Router(config-if)#
SALES-Router(config-if)#exit
SALES-Router(config)#interface FastEthernet0/0
SALES-Router(config-if)#no shutdown
SALES-Router(config-if)#
SALES-Router(config-if)#exit
SALES-Router(config)#interface FastEthernet0/1
SALES-Router(config-if)#
SALES-Router(config-if)#exit
SALES-Router(config)#interface FastEthernet0/1
SALES-Router(config-if)#no shutdown
SALES-Router(config-if)#
SALES-Router(config-if)#exit
SALES-Router(config)#int s0/0/0
SALES-Router(config-if)#ip add 10.10.10.10 255.255.255.252
SALES-Router(config-if)#int s0/0/1
SALES-Router(config-if)#ip add 10.10.10.13 255.255.255.252
SALES-Router(config-if)#ex
SALES-Router(config)#
SALES-Router(config)#service dhcp
SALES-Router(config)#ip dhcp excluded-address 172.16.100.65
SALES-Router(config)#ip dhcp pool SALEVOICE
SALES-Router(dhcp-config)#network 172.16.100.64 255.255.255.224
SALES-Router(dhcp-config)#default-router 172.16.100.65
SALES-Router(dhcp-config)#option 150 ip 172.16.100.65
SALES-Router(dhcp-config)#exit
```

```
SALES-Router(config)#int f0/0.30
SALES-Router(config-subif)#encapsulation dot1Q 30
SALES-Router(config-subif)#ip add 192.168.100.65 255.255.255.224
SALES-Router(config-subif)#ip helper-address 192.168.100.130
SALES-Router(config-subif)#ex
SALES-Router(config)#int f0/0.100
SALES-Router(config-subif)#encapsulation dot1Q 100
SALES-Router(config-subif)#ip add 172.16.100.65 255.255.255.224
SALES-Router(config-subif)#ex
SALES-Router(config)#do wr
SALES-Router(config)#router ospf 10
SALES-Router(config-router)#network 10.10.10.8 0.0.0.3 area 0
SALES-Router(config-router)#network 10.10.10.12 0.0.0.3 area 0
SALES-Router(config-router)#network 192.168.100.64 0.0.0.31 area 0
SALES-Router(config-router)#network 172.16.100.64 0.0.0.31 area 0
SALES-Router(config-router)#ex
SALES-Router(config)#
SALES-Router(config)#telephony-service
SALES-Router(config-telephony)#max-dn 20
SALES-Router(config-telephony)#max-ephones 20
SALES-Router(config-telephony)#ip source-address 172.16.100.65 port 2000
SALES-Router(config-telephony)#auto assign 1 to 20
SALES-Router(config-telephony)#exit
SALES-Router(config)#
SALES-Router(config)#ephone-dn 1
SALES-Router(config-ephone-dn)#number 301
SALES-Router(config-ephone-dn)#ephone-dn 2
SALES-Router(config-ephone-dn)#number 302
SALES-Router(config-ephone-dn)#ephone-dn 3
```

```
SALES-Router(config-ephone-dn)#number 303
SALES-Router(config-ephone-dn)#ephone-dn 4
SALES-Router(config-ephone-dn)#number 304
SALES-Router(config-ephone-dn)#ephone-dn 5
SALES-Router(config-ephone-dn)#number 305
SALES-Router(config-ephone-dn)#ephone-dn 6
SALES-Router(config-ephone-dn)#number 306
SALES-Router(config-ephone-dn)#ephone-dn 7
SALES-Router(config-ephone-dn)#number 307
SALES-Router(config-ephone-dn)#ephone-dn 8
SALES-Router(config-ephone-dn)#number 308
SALES-Router(config-ephone-dn)#ephone-dn 9
SALES-Router(config-ephone-dn)#number 309
SALES-Router(config-ephone-dn)#ephone-dn 10
SALES-Router(config)#dial-peer voice 3 v
SALES-Router(config)#dial-peer voice 3 voip
SALES-Router(config-dial-peer)#destination-pattern 1..
SALES-Router(config-dial-peer)#session target ipv4:10.10.10.1
SALES-Router(config-dial-peer)#ex
SALES-Router(config)#dial-peer voice 4 voip
SALES-Router(config-dial-peer)#destination-pattern 2..
SALES-Router(config-dial-peer)#session target ipv4:10.10.10.9
SALES-Router(config-dial-peer)#ex
SALES-Router(config)#dial-peer voice 5 voip
SALES-Router(config-dial-peer)#destination-pattern 4..
SALES-Router(config-dial-peer)#session target ipv4:10.10.10.14
SALES-Router(config-dial-peer)#ex
SALES-Router(config)#
```

ICT-ROUTER

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname ICT-Router
ICT-Router(config)#enable password cisco
ICT-Router(config)#line console 0
ICT-Router(config-line)#password cisco
ICT-Router(config-line)#login
ICT-Router(config-line)#banner motd #NO UNAUTHORISED ACCESS, THIS IS PUNISHABLE BY LAW!!!#
ICT-Router(config)#service password-encryption
ICT-Router(config)#no ip domain lookup
ICT-Router(config)#username cisco password cisco
ICT-Router(config)#ip domain name cisco.net
ICT-Router(config)#crypto key generate rsa general-keys modulus 1024


ICT-Router(config)#ip ssh version 2
ICT-Router(config)#line vty 0 15
ICT-Router(config-line)#
ICT-Router(config-line)#login local
ICT-Router(config-line)#transport input ssh
ICT-Router(config-line)#exit
ICT-Router(config)#
ICT-Router(config)#interface Serial0/0/1
ICT-Router(config-if)#ip add 10.10.10.6 255.255.255.252
ICT-Router(config-if)#interface Serial0/0/0
ICT-Router(config-if)#ip add 10.10.10.14 255.255.255.252
```

```
ICT-Router(config-if)#ex
ICT-Router(config)#service dhcp
ICT-Router(config)#ip dhcp excluded-address 172.16.100.97
ICT-Router(config)#ip dhcp pool ICTVOICE
ICT-Router(dhcp-config)#network 172.16.100.96 255.255.255.224
ICT-Router(dhcp-config)#default-router 172.16.100.97
ICT-Router(dhcp-config)#option 150 ip 172.16.100.97
ICT-Router(dhcp-config)#exit
ICT-Router(config)#int f0/0.40
ICT-Router(config-subif)#encapsulation dot1Q 40
ICT-Router(config-subif)#ip add 192.168.100.97 255.255.255.224
ICT-Router(config-subif)#ip helper-address 192.168.100.130
ICT-Router(config-subif)#ex
ICT-Router(config)#int f0/0.100
ICT-Router(config-subif)#encapsulation dot1Q 100
ICT-Router(config-subif)#ip add 172.16.100.97 255.255.255.224
ICT-Router(config-subif)#ex
ICT-Router(config)#do wr
 ICT-Router(config)#int f0/1.50
ICT-Router(config-subif)#encapsulation dot1Q 50
ICT-Router(config-subif)#ip add 192.168.100.129 255.255.255.248
ICT-Router(config-subif)#ex
ICT-Router(config)#router ospf 10
ICT-Router(config-router)#network 10.10.10.4 0.0.0.3 area 0
ICT-Router(config-router)#network 10.10.10.12 0.0.0.3 area 0
ICT-Router(config-router)#network 192.168.100.128 0.0.0.7 area 0

ICT-Router(config-router)#network 192.168.100.96 0.0.0.31 area 0
ICT-Router(config-router)#network 172.16.100.96 0.0.0.31 area 0
```

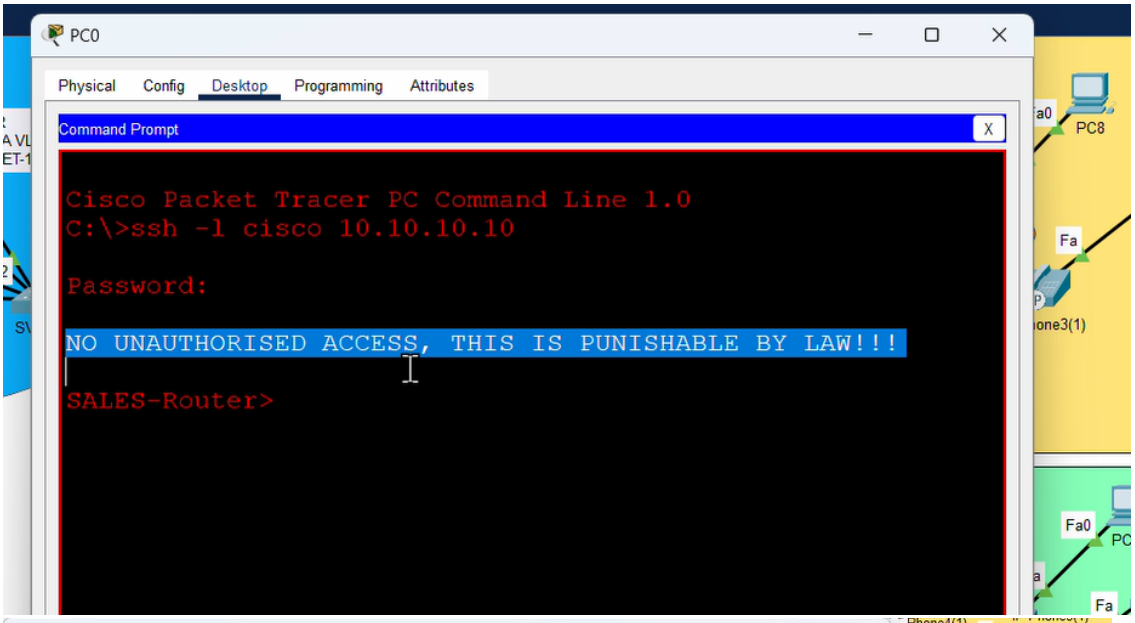
```
ICT-Router(config-router)#ex
CT-Router(config)#telephony-service
ICT-Router(config-telephony)#max-dn 20
ICT-Router(config-telephony)#max-ephones 20
ICT-Router(config-telephony)#ip source-address 172.16.100.97 port 2000
ICT-Router(config-telephony)#auto assign 1 to 20
ICT-Router(config-telephony)#exit
ICT-Router(config)#
ICT-Router(config)#ephone-dn 1
ICT-Router(config-ephone-dn)#number 401
ICT-Router(config-ephone-dn)#ephone-dn 2
ICT-Router(config-ephone-dn)#number 402
ICT-Router(config-ephone-dn)#ephone-dn 3
ICT-Router(config-ephone-dn)#number 403
ICT-Router(config-ephone-dn)#ephone-dn 4
ICT-Router(config-ephone-dn)#number 404
ICT-Router(config-ephone-dn)#ephone-dn 5
ICT-Router(config-ephone-dn)#number 405
ICT-Router(config-ephone-dn)#ephone-dn 6
ICT-Router(config-ephone-dn)#number 406
ICT-Router(config-ephone-dn)#ephone-dn 7
ICT-Router(config-ephone-dn)#number 407
ICT-Router(config-ephone-dn)#ephone-dn 8
ICT-Router(config-ephone-dn)#number 408
ICT-Router(config-ephone-dn)#ephone-dn 9
ICT-Router(config-ephone-dn)#number 409
ICT-Router(config-ephone-dn)#ephone-dn 10
ICT-Router(config-ephone-dn)#number 410
ICT-Router(config)#dial-peer voice 2 voip
```

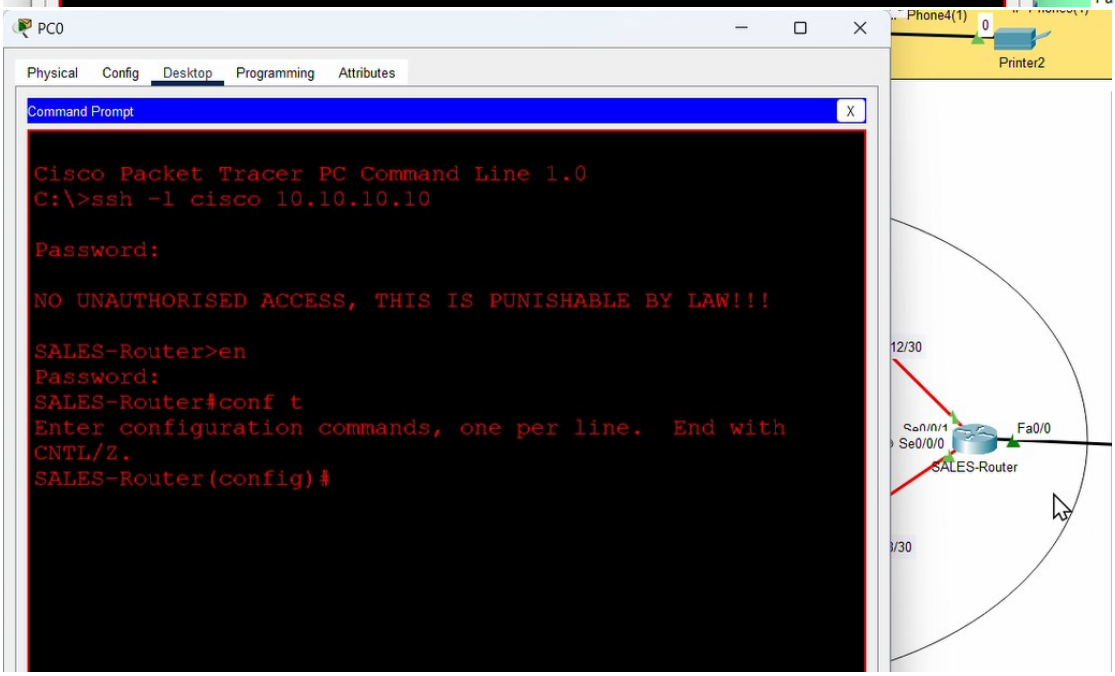
```
ICT-Router(config-dial-peer)#de
ICT-Router(config-dial-peer)#destination-pattern 1..
ICT-Router(config-dial-peer)#se
ICT-Router(config-dial-peer)#session te
ICT-Router(config-dial-peer)#session ter
ICT-Router(config-dial-peer)#session tar
ICT-Router(config-dial-peer)#session target ipv4:10.10.10.5
ICT-Router(config-dial-peer)#ex
ICT-Router(config)#dial-peer voice 5 voip
ICT-Router(config-dial-peer)#destination-pattern 3..
ICT-Router(config-dial-peer)#session target ipv4:10.10.10.13
ICT-Router(config-dial-peer)#ex
ICT-Router(config)#
ICT-Router(config)#dial-peer voice 6 voip
ICT-Router(config-dial-peer)#destination-pattern 2..
ICT-Router(config-dial-peer)#session target ipv4:10.10.10.9
ICT-Router(config-dial-peer)#ex
ICT-Router(config)#do wr
Building configuration...
[OK]
ICT-Router(config)#
```

Testing

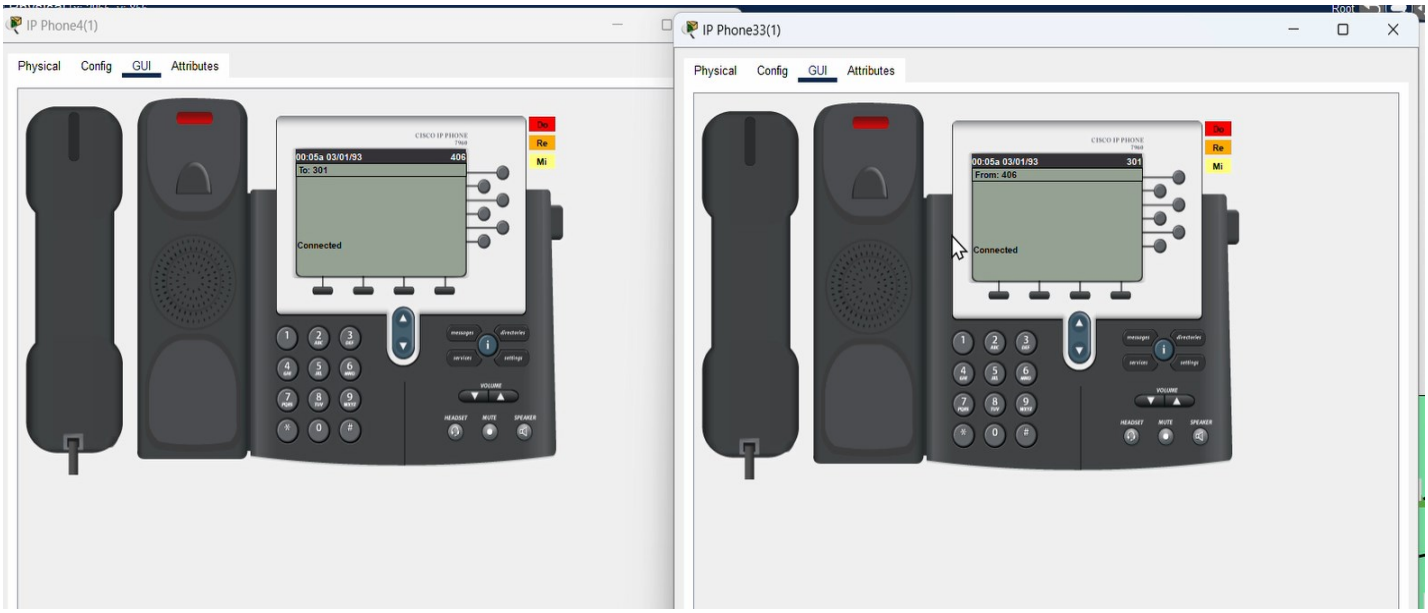
- I want to log into sales router remotely from PC0 [in ICT department]

so i'm going to use ip address of any sub interface on this router

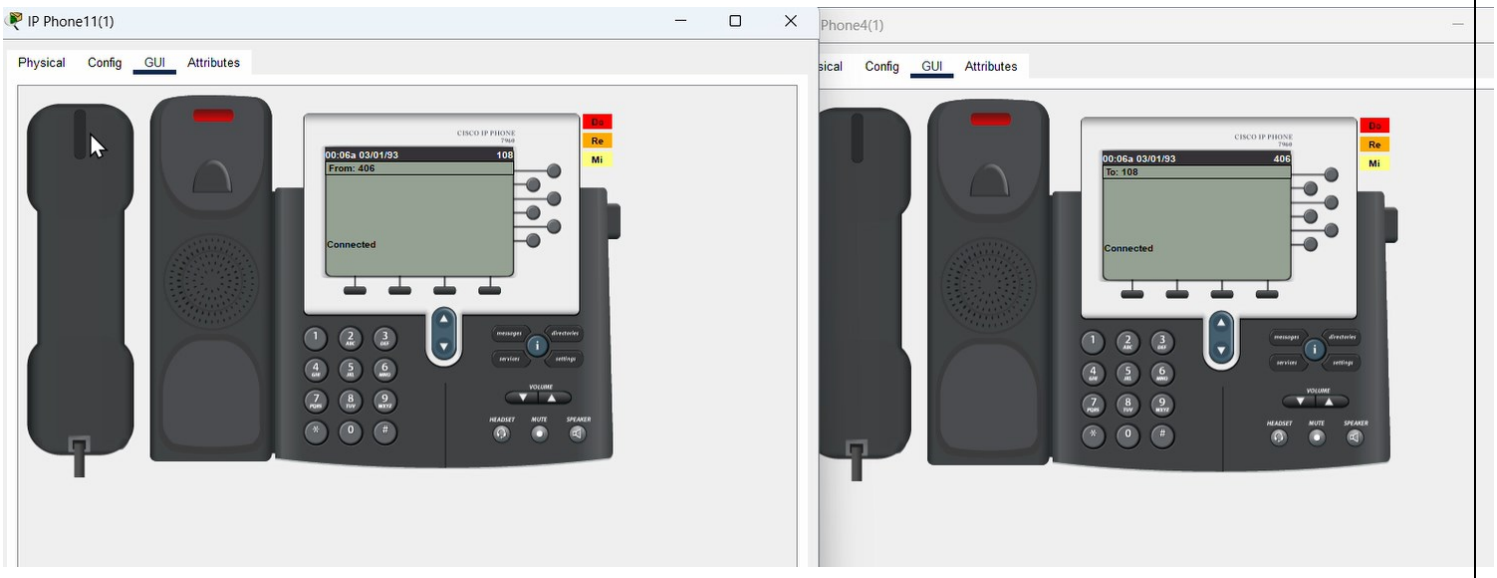




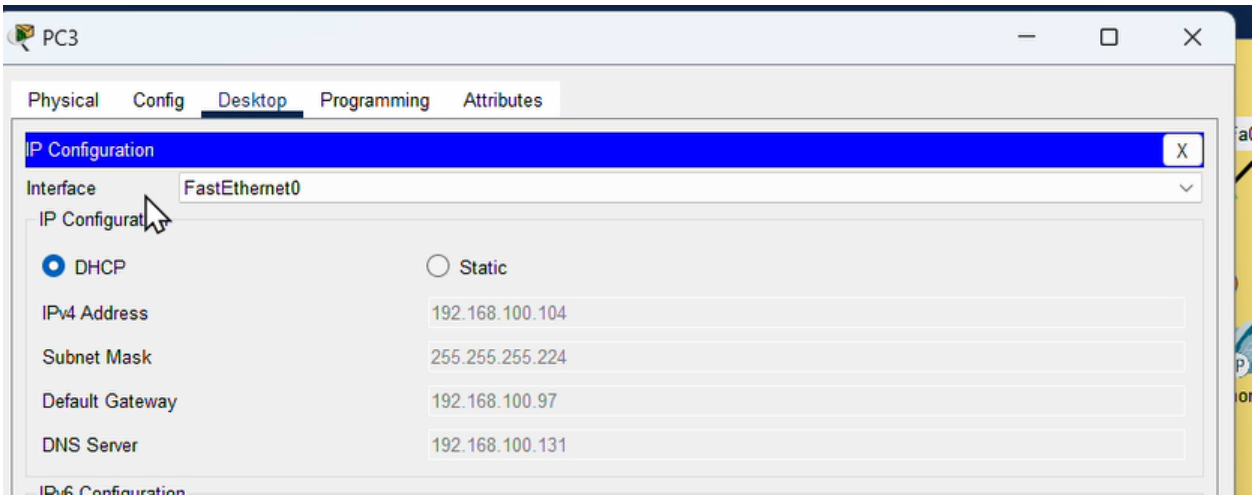
- **Call from IP Phone in ICT department [Line Number 406] to IP phone in Sales department[Line number 301].**

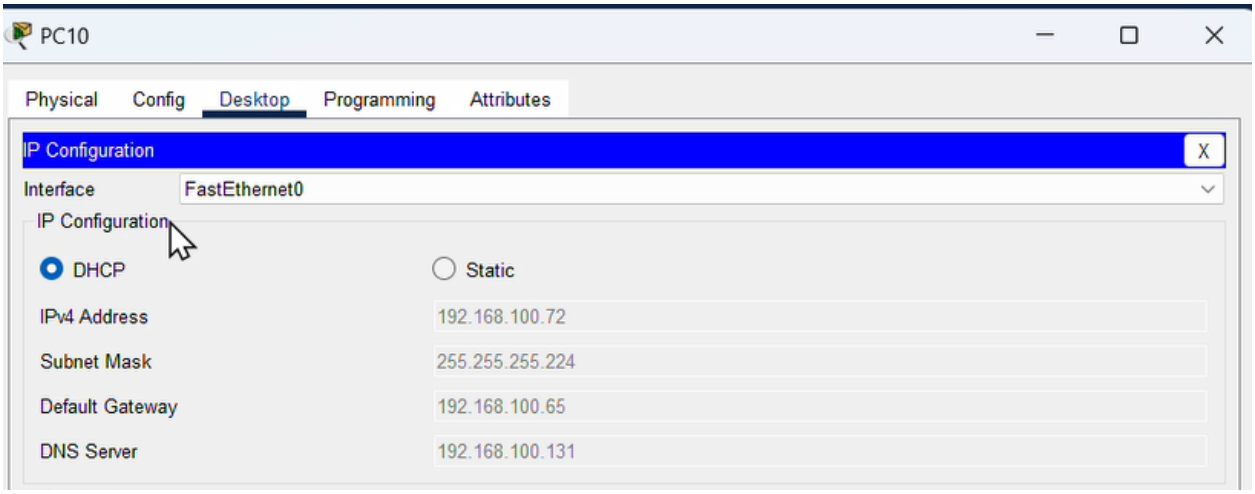


- **Call from IP Phone in ICT department [Line Number 406] to IP phone in Finance department [Line number 108].**



➢ Test Assign Ips [by DHCP Server]





Thanks