Design and Implementation of a Hotel System Network Design

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Design and Implementation of a Hotel System Network Design (Project #3)

Project #3 Case Study and Requirements

As a part of your end-of-year networking project, you are required to design and implement the Vic Modern Hotel network. The hotel has three floors; on the first floor there three departments (Reception, store and Logistics), on the second floor there are three departments (Finance, HR and Sales/Marketing), while the third floor hosts the IT and Admin. Therefore, the following are part of the considerations during the design and implementation;

- There should be three routers connecting each floor (all placed in the server room in the IT department).
- All routers should be connected to each other using serial DCE cables.
- The network between the routers should be 10.10.10.0/30,10.10.10.4/30 and 10.10.10.8/30.
- Each floor is expected to have one switch (placed on the respective floor).
- Each floor is expected to have WIFI networks connected to laptops and phones.
- Each department is expected to have a printer.
- Each department is expected to be in a different VLAN with the following details.
  1st Floor.
  - Reception- VLAN 80, Network of 192.168.8.0/24
  - Store- VLAN 70, Network of 192.168.7.0/24
  - Logistics- VLAN 60, Network of 192.168.6.0/24
  2nd Floor.
  - Finance- VLAN 50, Network of 192.168.5.0/24
  - HR- VLAN 40, Network of 192.168.4.0/24
  - Sales- VLAN 30, Network of 192.168.3.0/24
  3rd Floor.
  - Admin- VLAN 20, Network of 192.168.2.0/24
  - IT- VLAN 10, Network of 192.168.1.0/24
- Use OSPF as the routing protocol to advertise routes.
- All devices in the network are expected to obtain IP address dynamically with their respective router configured as the DHCP server.
- All the devices in the network are expected to communicate with each other.
- Configure SSH in all the routers for remote login.
- In the IT department, add PC called Test-PC to port fa0/1 and use it to test remote login.
- Configure port security to IT-dept switch to allow only Test-PC to access port fa0/1 (use sticky method to obtain mac-address with violation mode of shutdown.)

Technologies Implemented

1. Creating a network topology using Cisco Packet Tracer.

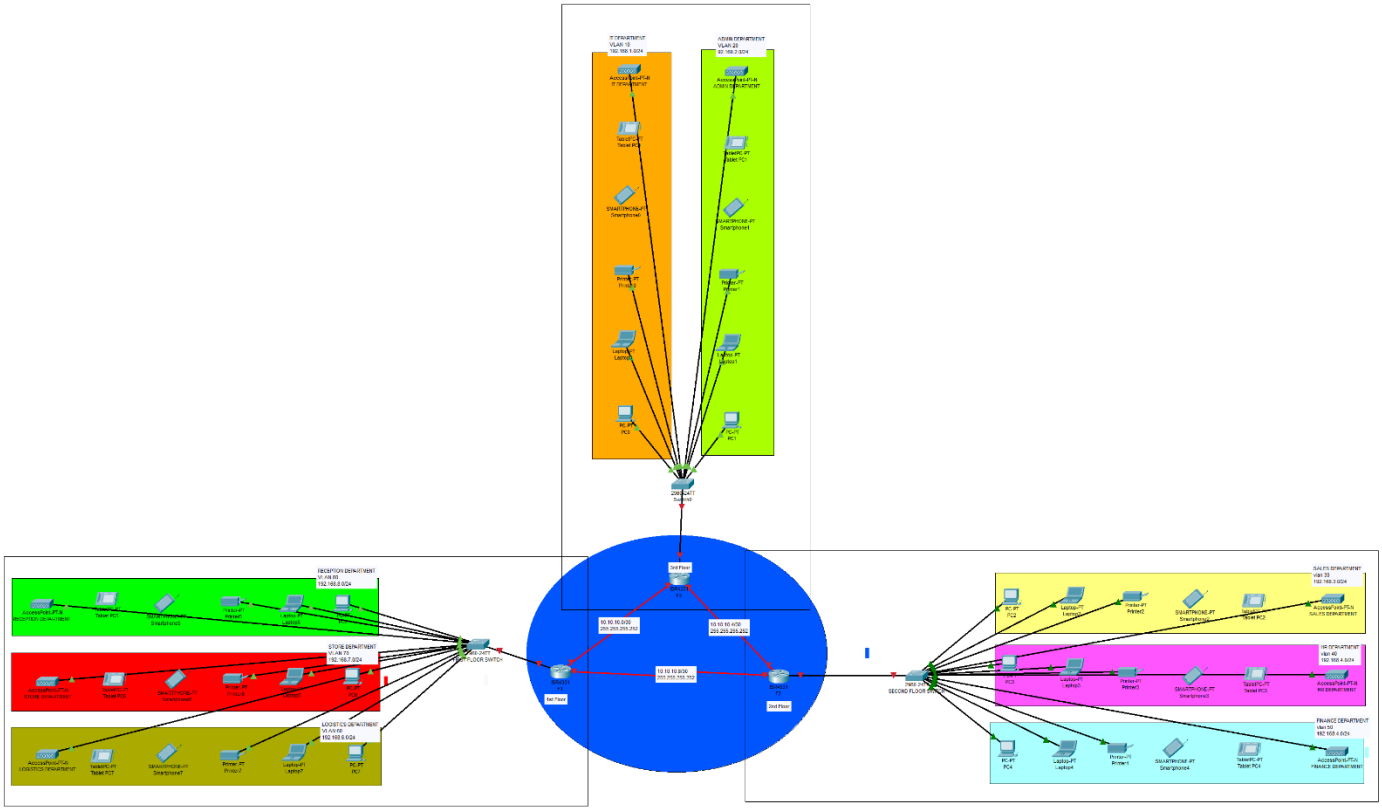

Figure 1

2. Connecting Networking devices with Correct cabling.

Copper straight cable

Serial cable

3. Creating VLANs and assigning ports VLAN numbers.

CREATE FIRST FLOOR VLAN

1st-floor-switch(config)#vlan 80 1st-floor-switch(config-vlan)#name Reception_Department 1st-floor-switch(config-vlan)#exit
1st-floor-switch(config)#vlan 70 1st-floor-switch(config-vlan)#name Stored_Department 1st-floor-switch(config-vlan)#exit
1st-floor-switch(config)#vlan 60 1st-floor-switch(config-vlan)#name Logistics_Department 1st-floor-switch(config-vlan)#exit

CREATE SECOND FLOOR VLAN

2nd-floor-switch(config)#vlan 30 2nd-floor-switch(config-vlan)#name Sales_Department 2nd-floor-switch(config-vlan)#exit
2nd-floor-switch(config)#vlan 40 2nd-floor-switch(config-vlan)#name Hr_Department 2nd-floor-switch(config-vlan)#exit
2nd-floor-switch(config)#vlan 50 2nd-floor-switch(config-vlan)#name Finance_Department 2nd-floor-switch(config-vlan)#exit

CREATE THIRD FLOOR VLAN

3rd-floor-switch(config)#vlan 10 3rd-floor-switch(config-vlan)#name IT_Department 3rd-floor-switch(config-vlan)#exit
3rd-floor-switch(config)#vlan 20 3rd-floor-switch(config-vlan)#name Admin_Department 3rd-floor-switch(config-vlan)#exit

ASSIGNING PORTS VLAN

1ST FLOOR

1st-floor-switch(config)#interface range fastEthernet 0/1-8 1st-floor-switch(config-if-range)#description $THIS LAN IS FOR RECEPTION VLAN-80$ 1st-floor-switch(config-if-range)#switchport mode access 1st-floor-switch(config-if-range)#switchport access vlan 80 1st-floor-switch(config-if-range)#exit
1st-floor-switch(config)#interface range fastEthernet 0/9-16 1st-floor-switch(config-if-range)#description $THIS LAN IS FOR STORED VLAN-70$ 1st-floor-switch(config-if-range)#switchport mode access 1st-floor-switch(config-if-range)#switchport access vlan 70 1st-floor-switch(config-if-range)#exit
1st-floor-switch(config)#interface range fastEthernet 0/17-24 1st-floor-switch(config-if-range)#description $THIS LAN IS FOR LOGISTICS VLAN-60$ 1st-floor-switch(config-if-range)#switchport mode access 1st-floor-switch(config-if-range)#switchport access vlan 60 1st-floor-switch(config-if-range)#exit
TRUNK INTERFACE 1st-floor-switch(config)#interface range gigabitEthernet 0/1-2 1st-floor-switch(config-if-range)#description $THIS LAN IS FOR TRUNK$ 1st-floor-switch(config-if-range)#switchport mode trunk 1st-floor-switch(config-if-range)#exit

2ND FLOOR

2nd-floor-switch(config)#interface range fastEthernet 0/1-8 2nd-floor-switch(config-if-range)#description $THIS LAN IS FOR SALES VLAN-30$ 2nd-floor-switch(config-if-range)#switchport mode access 2nd-floor-switch(config-if-range)#switchport access vlan 30 2nd-floor-switch(config-if-range)#exit
2nd-floor-switch(config)#interface range fastEthernet 0/9-16 2nd-floor-switch(config-if-range)#description $THIS LAN IS FOR HR VLAN-40$ 2nd-floor-switch(config-if-range)#switchport mode access 2nd-floor-switch(config-if-range)#switchport access vlan 40

2nd-floor-switch(config-if-range)#exit
2nd-floor-switch(config)#interface range fastEthernet 0/17-24 2nd-floor-switch(config-if-range)#description $THIS LAN IS FOR FINANCE VLAN-50 $ 2nd-floor-switch(config-if-range)#switchport mode access 2nd-floor-switch(config-if-range)#switchport access vlan 50 2nd-floor-switch(config-if-range)#exit
TRUNK INTERFACE 2nd-floor-switch(config)#interface range gigabitEthernet 0/1-2 2nd-floor-switch(config-if-range)#description $THIS LAN IS FOR TRUNK$ 2nd-floor-switch(config-if-range)#switchport mode trunk 2nd-floor-switch(config-if-range)#exit

3RD FLOOR

3rd-floor-switch(config)#interface ran fa 0/1-12 3rd-floor-switch(config-if-range)#description $THIS LAN IS FOR IT VLAN-10$ 3rd-floor-switch(config-if-range)#switchport mode access 3rd-floor-switch(config-if-range)#switchport access vlan 10 3rd-floor-switch(config-if-range)#exit 3rd-floor-switch(config)#do wr
3rd-floor-switch(config)#interface range fastEthernet 0/13-24 3rd-floor-switch(config-if-range)#description $THIS LAN IS FOR ADMIN VLAN-20$ 3rd-floor-switch(config-if-range)#switchport mode access 3rd-floor-switch(config-if-range)#exit
TRUNK PORT 3rd-floor-switch(config)#interface range gigabitEthernet 0/1-2 3rd-floor-switch(config-if-range)#description $THIS LAN IS TRUNK $ 3rd-floor-switch(config-if-range)#switchport mode trunk 3rd-floor-switch(config-if-range)#exit

4. Subnetting and IP Addressing.

Floor	DEPARTMENT	NETWORK ID	GATEWAYS / STARTING IP	LAST IP	BROADCAST ID	SUBNET MASK
3rd Floor	IT Department	192.168.1.0/24	192.168.1.1	192.168.1.254	192.168.1.255	255.255.255.0
	Admin Department	192.168.2.0/24	192.168.2.1	192.168.2.254	192.168.2.255	255.255.255.0
2nd Floor	Sales Department	192.168.3.0/24	192.168.3.1	192.168.3.254	192.168.3.255	255.255.255.0
	HR Department	192.168.4.0/24	192.168.4.1	192.168.4.254	192.168.4.255	255.255.255.0
	Finance Department	192.168.5.0/24	192.168.5.1	192.168.5.254	192.168.5.255	255.255.255.0
1st Floor	Logistics Department	192.168.6.0/24	192.168.6.1	192.168.6.254	192.168.6.255	255.255.255.0
	Store Department	192.168.7.0/24	192.168.7.1	192.168.7.254	192.168.7.255	255.255.255.0
	Reception Department	192.168.8.0/24	192.168.8.1	192.168.8.254	192.168.8.255	255.255.255.0

5. Configuring Inter-VLAN Routing (Router on a stick).

FRIST FLOOR ROUTER

```
1st-Floor-Router(config)#interface gigabitEthernet 0/0/0.60
1st-Floor-Router(config-subif)#encapsulation dot1Q 60
1st-Floor-Router(config-subif)#ip address 192.168.6.1 255.255.255.0
1st-Floor-Router(config-subif)#no shutdown
1st-Floor-Router(config-subif)#exit
```

```
1st-Floor-Router(config)#interface gigabitEthernet 0/0/0.70
1st-Floor-Router(config-subif)#encapsulation dot1Q 70
1st-Floor-Router(config-subif)#ip address 192.168.7.1 255.255.255.0
1st-Floor-Router(config-subif)#no shutdown
```

```
1st-Floor-Router(config)#interface gigabitEthernet 0/0/0.80
1st-Floor-Router(config-subif)#encapsulation dot1Q 80
1st-Floor-Router(config-subif)#ip add 192.168.8.1 255.255.255.0
1st-Floor-Router(config-subif)#no shutdown
1st-Floor-Router(config-subif)#exit
```

SECOND FLOOR ROUTER

```
2nd-Floor-Router(config)#interface gigabitEthernet 0/0/0.30
2nd-Floor-Router(config-subif)#encapsulation dot1Q 30
2nd-Floor-Router(config-subif)#ip address 192.168.3.1 255.255.255.0
2nd-Floor-Router(config-subif)#no shutdown
2nd-Floor-Router(config-subif)#exit
```

```
2nd-Floor-Router(config)#interface gigabitEthernet 0/0/0.40
2nd-Floor-Router(config-subif)#encapsulation dot1Q 40
2nd-Floor-Router(config-subif)#ip address 192.168.4.1 255.255.255.0
2nd-Floor-Router(config-subif)#no shutdown
2nd-Floor-Router(config-subif)#exit
```

```
2nd-Floor-Router(config)#interface gigabitEthernet 0/0/0.50
2nd-Floor-Router(config-subif)#encapsulation dot1Q 50
2nd-Floor-Router(config-subif)#ip address 192.168.5.1 255.255.255.0
2nd-Floor-Router(config-subif)#no shutdown
2nd-Floor-Router(config-subif)#exit
```

THIRD FLOOR ROUTER

2nd-Floor-Router(config)#interface gigabitEthernet 0/0/0.10 2nd-Floor-Router(config-subif)#encapsulation dot1Q 10 2nd-Floor-Router(config-subif)#ip address 192.168.1.1 255.255.255.0 2nd-Floor-Router(config-subif)#no shutdown 2nd-Floor-Router(config-subif)#exit
2nd-Floor-Router(config)#interface gigabitEthernet 0/0/0.20 2nd-Floor-Router(config-subif)#encapsulation dot1Q 20 2nd-Floor-Router(config-subif)#ip address 192.168.2.1 255.255.255.0 2nd-Floor-Router(config-subif)#no shutdown 2nd-Floor-Router(config-subif)#exit

6. Configuring DHCP Server (Router as the DHCP Server).

FRIST FLOOR ROUTER

1st-Floor-Router(config)#service dhcp
1st-Floor-Router(config)#ip dhcp pool Logistic-Pool 1st-Floor-Router(dhcp-config)#network 192.168.6.0 255.255.255.0 1st-Floor-Router(dhcp-config)#dns-server 8.8.8.8 1st-Floor-Router(dhcp-config)#default-router 192.168.6.1 1st-Floor-Router(dhcp-config)#exit
1st-Floor-Router(config)#ip dhcp pool Store-pool 1st-Floor-Router(dhcp-config)#network 192.168.7.0 255.255.255.0 1st-Floor-Router(dhcp-config)#default-router 192.168.7.1 1st-Floor-Router(dhcp-config)#dns-server 8.8.8.8 1st-Floor-Router(dhcp-config)#domain-name store.com 1st-Floor-Router(dhcp-config)#exit
1st-Floor-Router(config)#ip dhcp pool Reception-pool 1st-Floor-Router(dhcp-config)#network 192.168.8.0 255.255.255.0 1st-Floor-Router(dhcp-config)#default-router 192.168.1.1 1st-Floor-Router(dhcp-config)#dns-server 8.8.8.8 1st-Floor-Router(dhcp-config)#exit

SECOND FLOOR ROUTER

2nd-Floor-Router(config)#service dhcp
2nd-Floor-Router(config)#ip dhcp pool Sales-pool 2nd-Floor-Router(dhcp-config)#network 192.168.3.0 255.255.255.0 2nd-Floor-Router(dhcp-config)#default-router 192.168.3.1 2nd-Floor-Router(dhcp-config)#dns-server 8.8.8.8 2nd-Floor-Router(dhcp-config)#domain-name sales.com 2nd-Floor-Router(dhcp-config)#exit
2nd-Floor-Router(config)#ip dhcp pool HR-Pool 2nd-Floor-Router(dhcp-config)#network 192.168.4.0 255.255.255.0 2nd-Floor-Router(dhcp-config)#default-router 192.168.4.1 2nd-Floor-Router(dhcp-config)#dns-server 8.8.8.8 2nd-Floor-Router(dhcp-config)#domain-name hr.com 2nd-Floor-Router(dhcp-config)#exit
2nd-Floor-Router(config)#ip dhcp pool Finance-Pool

```
2nd-Floor-Router(dhcp-config)#network 192.168.5.0 255.255.255.0
2nd-Floor-Router(dhcp-config)#default-router 192.168.5.1
2nd-Floor-Router(dhcp-config)#dns-server 8.8.8.8
2nd-Floor-Router(dhcp-config)#domain-name finance.com
2nd-Floor-Router(dhcp-config)#exit
```

THIRD FLOOR ROUTER

```
3rd-Floor-Router(config)#service dhcp
```

```
3rd-Floor-Router(config)#ip dhcp pool IT-Pool
3rd-Floor-Router(dhcp-config)#network 192.168.1.0 255.255.255.0
3rd-Floor-Router(dhcp-config)#default-router 192.168.1.1
3rd-Floor-Router(dhcp-config)#dns-server 8.8.8.8
3rd-Floor-Router(dhcp-config)#domain-name it.com
3rd-Floor-Router(dhcp-config)#exit
```

```
3rd-Floor-Router(config)#ip dhcp pool Admin-pool
3rd-Floor-Router(dhcp-config)#network 192.168.2.0 255.255.255.0
3rd-Floor-Router(dhcp-config)#default-router 192.168.2.1
3rd-Floor-Router(dhcp-config)#dns-server 8.8.8.8
3rd-Floor-Router(dhcp-config)#domain-name admin.com
3rd-Floor-Router(dhcp-config)#exit
```

7. Configuring SSH for secure Remote access.

First Floor

```
1st-Floor-Router(config)#ip domain-name 1st-floor-router.com
1st-Floor-Router(config)#crypto key generate rsa

How many bits in the modulus [512]: 2048

1st-Floor-Router(config)#ip ssh version 2
1st-Floor-Router(config)#username admin privilege 5 secret admin
1st-Floor-Router(config)#username cisco privilege 5 secret cisco

1st-Floor-Router(config)#line vty 0 4
1st-Floor-Router(config-line)#transport input ssh
1st-Floor-Router(config-line)#login local
1st-Floor-Router(config-line)#exit
```

Second Floor

```
2nd-Floor-Router(config)#ip domain-name 2nd-floor-router.com
2nd-Floor-Router(config)#crypto key generate rsa

How many bits in the modulus [512]: 2048

2nd-Floor-Router(config)#ip ssh version 2
2nd-Floor-Router(config)#username admin privilege 5 secret admin
2nd-Floor-Router(config)#username cisco privilege 5 secret cisco

2nd-Floor-Router(config)#line vty 0 4
2nd-Floor-Router(config-line)#transport input ssh
2nd-Floor-Router(config-line)#login local
2nd-Floor-Router(config-line)#exit
```

Third Floor

```
3rd-Floor-Router(config)#ip domain-name 3rd-floor-router.com
3rd-Floor-Router(config)#crypto key generate rsa

How many bits in the modulus [512]: 2048

3rd-Floor-Router(config)#ip ssh version 2
3rd-Floor-Router(config)#username admin privilege 5 secret admin
3rd-Floor-Router(config)#username cisco privilege 5 secret cisco

3rd-Floor-Router(config)#line vty 0 4
3rd-Floor-Router(config-line)#transport input ssh
3rd-Floor-Router(config-line)#login local
3rd-Floor-Router(config-line)#exit
```

8. Configuring switchport security or Port-Security on the switches.

First Floor Switch

```
1st-floor-switch(config)#interface range fastEthernet 0/1-24
1st-floor-switch(config-if-range)#switchport port-security
1st-floor-switch(config-if-range)#switchport port-security maximum 1
1st-floor-switch(config-if-range)#switchport port-security violation shutdown
1st-floor-switch(config-if-range)#switchport port-security mac-address sticky
1st-floor-switch(config-if-range)#end
```

Second Floor Switch

```
2nd-floor-switch(config)#interface range fastEthernet 0/1-24
2nd-floor-switch(config-if-range)#switchport port-security
2nd-floor-switch(config-if-range)#switchport port-security maximum 1
2nd-floor-switch(config-if-range)#switchport port-security violation shutdown
2nd-floor-switch(config-if-range)#switchport port-security mac-address sticky
2nd-floor-switch(config-if-range)#end
```

Third Floor

```
3rd-floor-switch(config)#interface range fastEthernet 0/1-24
3rd-floor-switch(config-if-range)#switchport port-security
3rd-floor-switch(config-if-range)#switchport port-security maximum 1
3rd-floor-switch(config-if-range)#switchport port-security violation shutdown
3rd-floor-switch(config-if-range)#switchport port-security mac-address sticky
3rd-floor-switch(config-if-range)#end
```

9. Configure OSPF inn cisco router

First Floor

```
1st-Floor-Router(config)#router ospf 1
1st-Floor-Router(config-router)#network 10.10.10.8 0.0.0.3 area 0
1st-Floor-Router(config-router)#network 10.10.10.8 0.0.0.3 area 0
1st-Floor-Router(config-router)#network 192.168.6.0 0.0.0.255 area 0
1st-Floor-Router(config-router)#network 192.168.7.0 0.0.0.255 area 0
1st-Floor-Router(config-router)#network 192.168.8.0 0.0.0.255 area 0
1st-Floor-Router(config-router)#exit
```

Second Floor

```
2nd-Floor-Router(config)#router ospf 1
2nd-Floor-Router(config-router)#network 10.10.10.4 0.0.0.3 area 0
2nd-Floor-Router(config-router)#network 10.10.10.8 0.0.0.3 area 0
2nd-Floor-Router(config-router)#network 192.168.3.0 0.0.0.255 area 0
2nd-Floor-Router(config-router)#network 192.168.4.0 0.0.0.255 area 0
2nd-Floor-Router(config-router)#network 192.168.5.0 0.0.0.255 area 0
2nd-Floor-Router(config-router)#exit
```

Third Floor

```
3rd-Floor-Router(config)#router ospf 1
3rd-Floor-Router(config-router)#network 10.10.10.4 0.0.0.3 area 0
3rd-Floor-Router(config-router)#network 10.10.10.0 0.0.0.3 area 0
3rd-Floor-Router(config-router)#network 192.168.1.0 0.0.0.255 area 0
3rd-Floor-Router(config-router)#network 192.168.2.0 0.0.0.255 area 0
3rd-Floor-Router(config-router)#exit
```

10. Test and Verifying Network Communication.

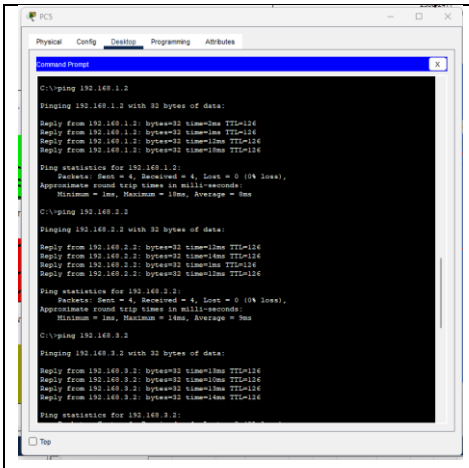

Figure 2

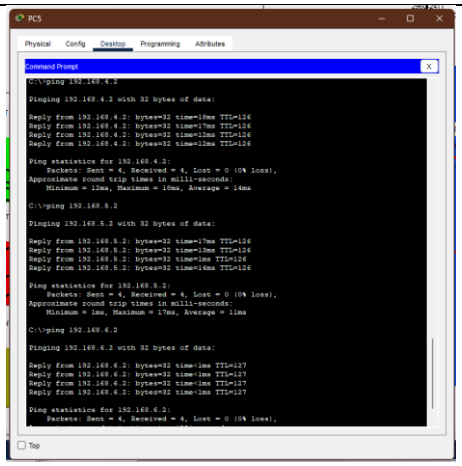

Figure 3

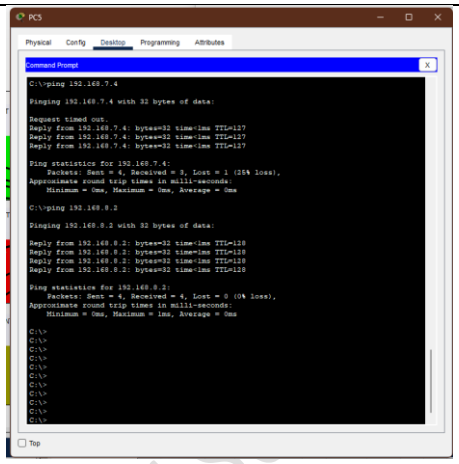

Figure 4