Green University of Bangladesh
Department of Computer Science and Engineering (CSE)
Faculty of Sciences and Engineering
Semester: Fall, 2022, B.Sc. in CSE (Day)

Course Title	**:**	**Data Communication Lab**
Course Code	**:**	**CSE 308**
Section	**:**	**203D1**

Lab Project Name: Design & Implementation of a Hotel Network using Cisco Packet Tracer.

Student Details

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Submission Date	**:**	**23rd December, 2022**
Course Teacher's Name	**:**	**Sobhana Jahan**

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Lab Project Status

Marks: …… **Signature: .....**

Comments: ..... **Date: .....**

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Chapter 1

Introduction

1.1 Introduction

Computer network can be defined as a number of computer system and other computing hardware devices that linked together for sharing information in form massage, files, data based in organization that may be in one building or spread over large campus.

This Hotel Network is about designing a topology of a network that is a Local Area Network (LAN) for a Hotel in which various computers of different departments are set up so that they can interact and communicate with each other by interchanging data.

1.2 Design Goals/Objective

The aim of this project is to design the topology of the hotel network using the software Cisco Packet Tracer with the implementation of wire networking systems. The main purpose of the Cisco Packet Tracer is to help students learn the principles of networking with hands-on experience as well as develop Cisco technology-specific skills.

1.3 Hotel Infrastructure

The hotel has three floor's;

- **First floor -** there are three departments
  - ✓ Reception
  - ✓ Store
  - ✓ Logistics
- **Second floor** - there are three departments
  - ✓ Finance
  - ✓ HR
  - ✓ Sales / Marketing
- **Third floor –** there are two departments
  - ✓ IT
  - ✓ Admin.

Chapter 2

Design/Development/Implementation of the Project

2.1 Project Analysis

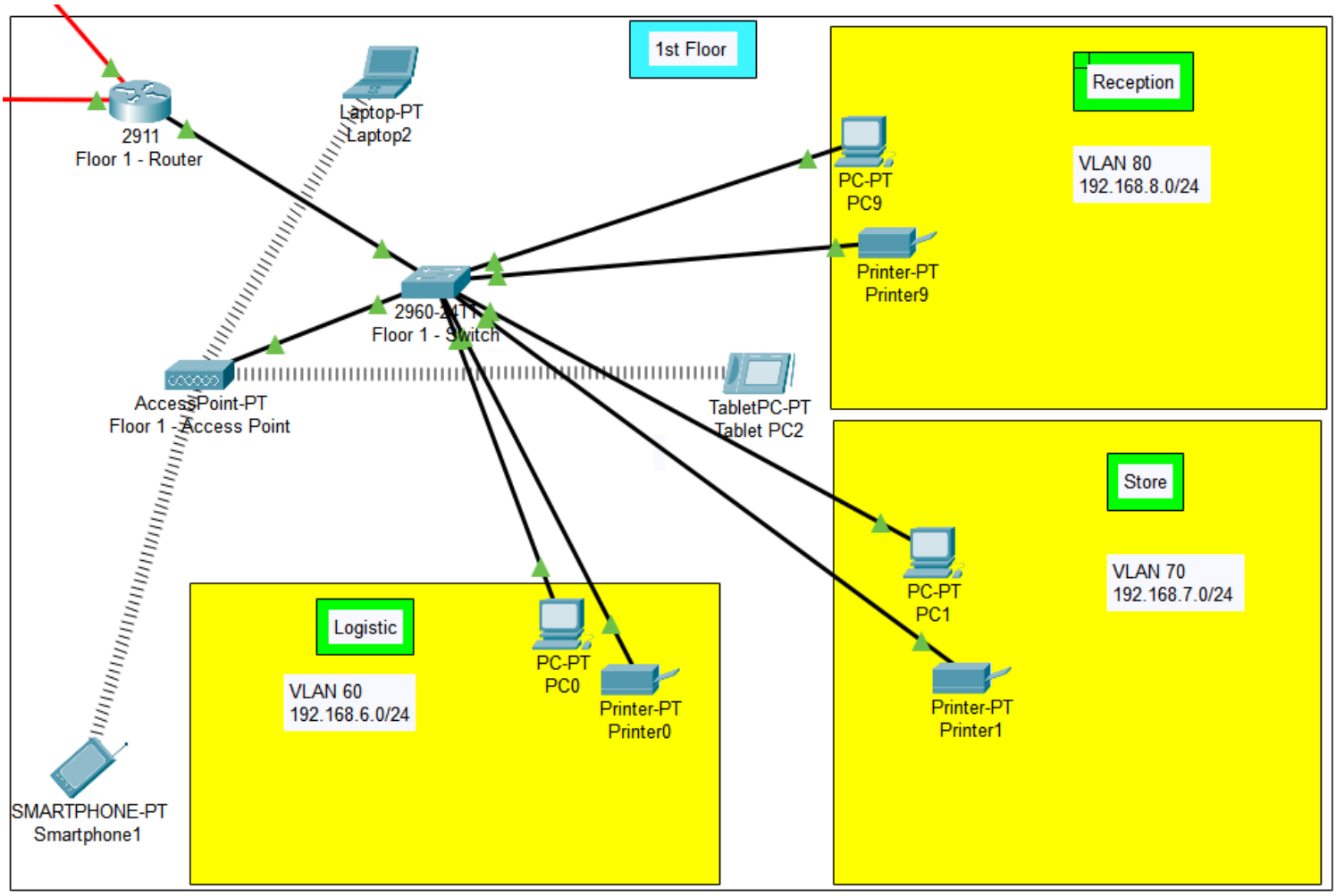
1. There should be three routers connecting each floor
   (All placed in the server room in IT department)
2. All routers should be connected to each other using serial DCE cable.
3. The network between the routers should be 10.10.10.0/30,10.10.10.4/30, 10.10.10.8/30
4. Each floor is expected to have one switch (placed in the respective floor).
5. Each floor is expected to have WIFI networks connected to laptops and phones.
6. Each department is expected to have printer.
7. Each department is expected to be in different VLAN.
8. Use OSPF as the routing protocol to advertise routes.
9. All devices in the network are expected to obtain IP address dynamically with their respective router configured as the DHCP server.
10. All the devices in the network are expected to communicate with each other.
11. Configure SSH in all the routers for remote login.
12. In IT Department, add PC called Test-PC to port fa0/1 and use it to test remote login.
13. 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)

Tools & Technology in Used

- Cisco Packet Tracer (Software)
  - ✓ 3 Router
  - ✓ 3 Switch
  - ✓ 3 Access Point
  - ✓ 8 PC's
  - ✓ 8 Printer's
  - ✓ Cables
  - ✓ Phone's , Laptop's and Tablet's

2.2 Design / Development

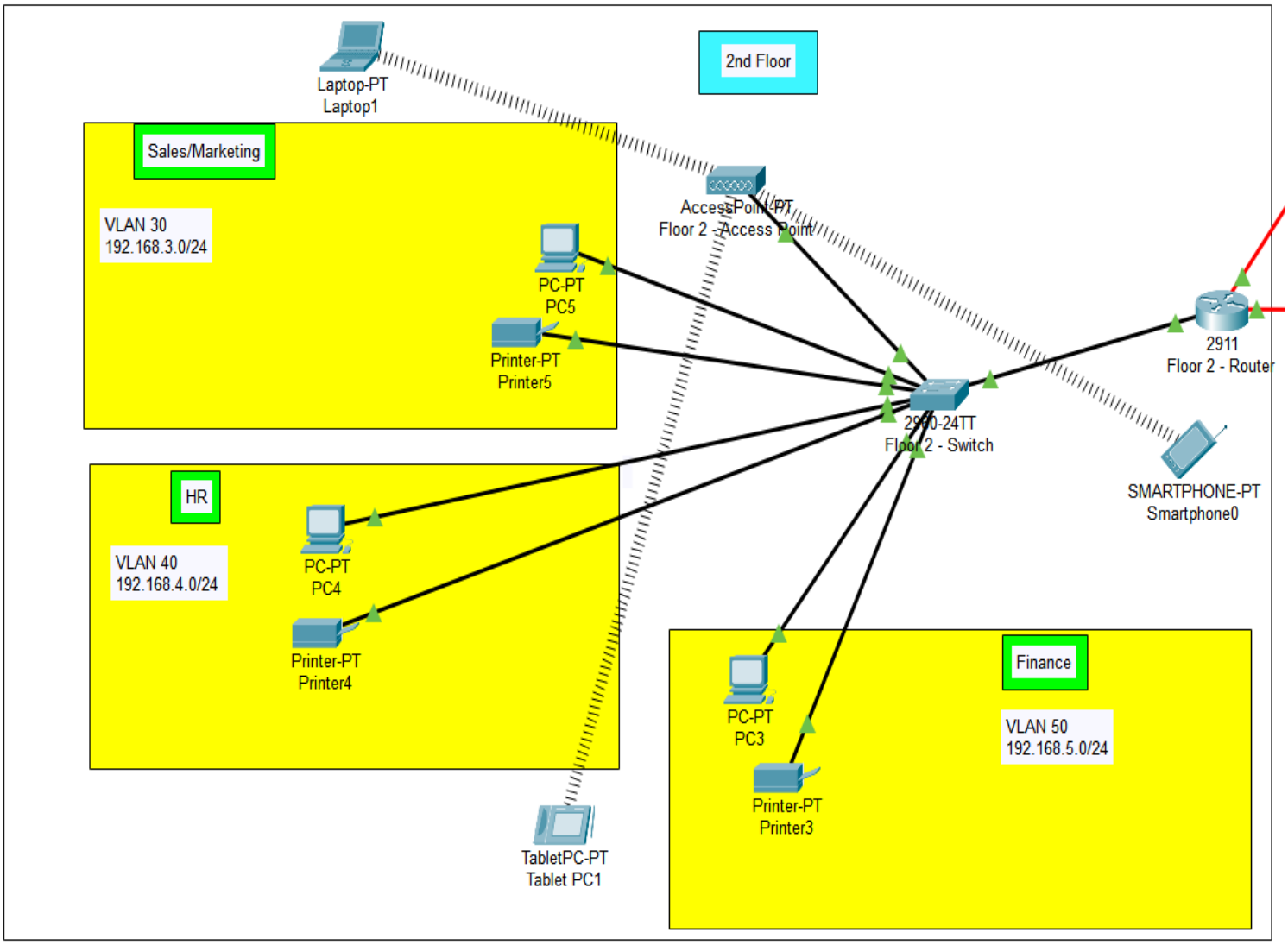
1st Floor:



VLAN –

- 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

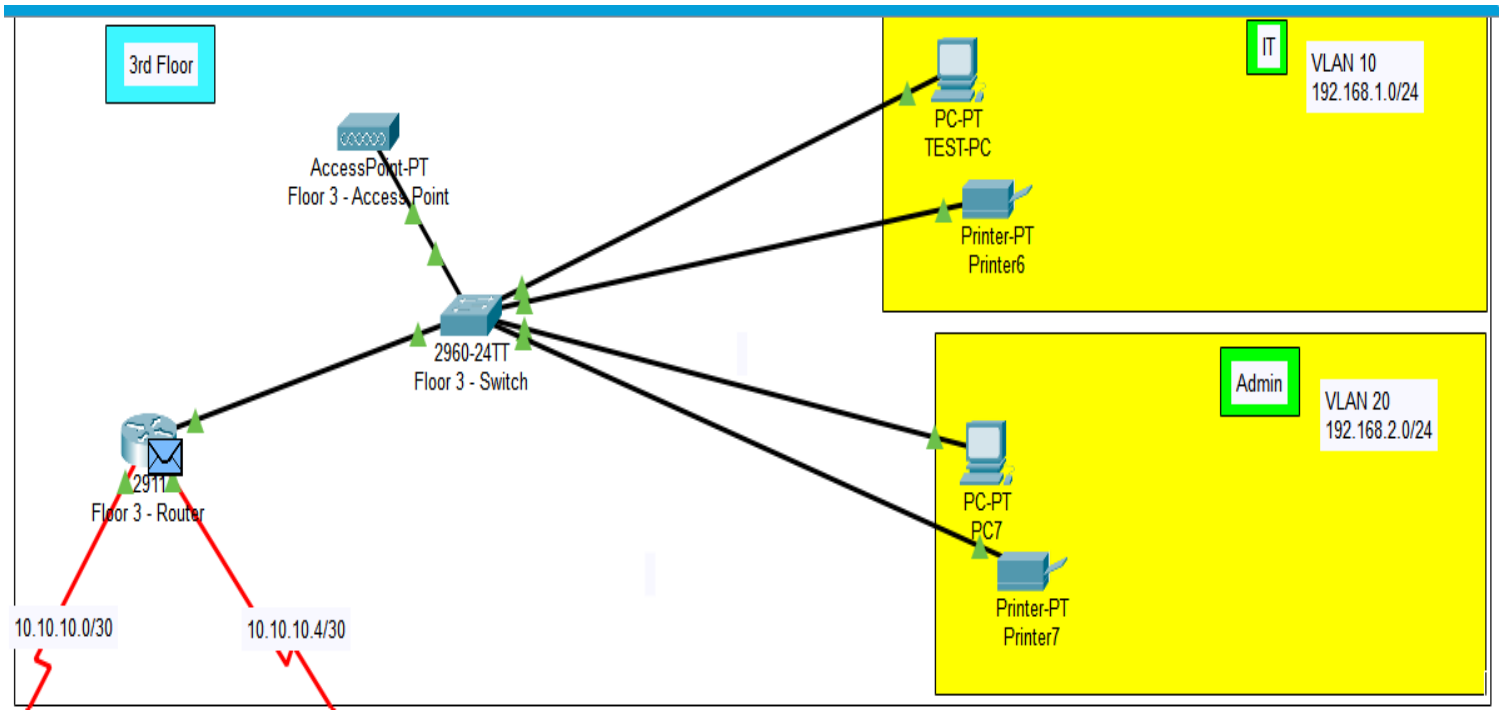
2nd Floor – Finance , HR & Sales / Marketing



VLAN –

- Finance – VLAN 50, Network of 192.168.5.0/24
- HR – VLAN 40, Network of 192.168.4.0/24
- Sales / Marketing – VLAN 30, Network of 192.168.3.0/24

3rd Floor – IT & Admin



VLAN –

- Admin – VLAN 20, Network of 192.168.2.0/24
- IT – VLAN 10, Network of 192.168.1.0/24

❑ Implementation

Configuration of Routers:

1st Floor Router

```
Press RETURN to get started!

%LINK-5-CHANGED: Interface Serial0/2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.60, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.70, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.80, changed state to up

%LINK-5-CHANGED: Interface Serial0/2/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/1, changed state to up

00:00:10: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.5.1 on Serial0/2/1 from LOADING to FULL, Loading Done

00:00:10: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.2.1 on Serial0/2/0 from LOADING to FULL, Loading Done
%DHCPD-4-PING_CONFLICT: DHCP address conflict:  server pinged 192.168.6.1.
%DHCPD-4-PING_CONFLICT: DHCP address conflict:  server pinged 192.168.7.1.

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to down

04:07:31: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.2.1 on Serial0/2/0 from FULL to DOWN, Neighbor Down: Interface down or detached

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/1, changed state to down

04:07:37: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.5.1 on Serial0/2/1 from FULL to DOWN, Neighbor Down: Interface down or detached

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/1, changed state to up

04:07:50: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.2.1 on Serial0/2/0 from LOADING to FULL, Loading Done

04:07:50: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.5.1 on Serial0/2/1 from LOADING to FULL, Loading Done
```

Ctrl+F6 to exit CLI focus

2nd Floor Router

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to down

04:07:37: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.2.1 on Serial0/2/0 from FULL to DOWN, Neighbor Down: Interface down or detached

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/1, changed state to down

04:07:38: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.8.1 on Serial0/2/1 from FULL to DOWN, Neighbor Down: Interface down or detached

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to up

04:07:40: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.2.1 on Serial0/2/0 from LOADING to FULL, Loading Done

04:07:50: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.8.1 on Serial0/2/1 from LOADING to FULL, Loading Done
```

Ctrl+F6 to exit CLI focus

3rd Floor Router

```
Press RETURN to get started!


%LINK-5-CHANGED: Interface Serial0/2/0, changed state to up

%LINK-5-CHANGED: Interface Serial0/2/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.20, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to up

00:00:10: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.5.1 on Serial0/2/1 from LOADING to FULL, Loading Done

00:00:10: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.8.1 on Serial0/2/0 from LOADING to FULL, Loading Done
%DHCPD-4-PING_CONFLICT: DHCP address conflict:  server pinged 192.168.1.1.
%DHCPD-4-PING_CONFLICT: DHCP address conflict:  server pinged 192.168.2.1.

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/1, changed state to down

04:07:22: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.5.1 on Serial0/2/1 from FULL to DOWN, Neighbor Down: Interface down or detached

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to down

04:07:38: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.8.1 on Serial0/2/0 from FULL to DOWN, Neighbor Down: Interface down or detached

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/2/0, changed state to up

04:07:40: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.5.1 on Serial0/2/1 from LOADING to FULL, Loading Done

04:07:50: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.8.1 on Serial0/2/0 from LOADING to FULL, Loading Done
```

Ctrl+F6 to exit CLI focus

Configure the switch interface:

```
Switch > enable
Switch > config
Enter configuration commands, one per line.   End with CNTL/Z. t
Switch(config)#int range fa0/2-3
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 80
% Access VLAN does not exist. Creating vlan 80
Switch(config-if-range)#
Switch(config-if-range)#
Switch(config-if-range)#
Switch(config)#int range fa0/4-5
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 70
% Access VLAN does not exist. Creating vlan 70
Switch(config-if-range)#
```

```
Switch(config-if-range)#
Switch(config)#int range fa0/6-8
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 60
% Access VLAN does not exist. Creating vlan 60
Switch(config-if-range)#
Switch(config-if-range)#
Switch(config-if-range)#int range fa0/1
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#
Switch(config-if-range)#
Switch(config-if-range)#do wr
Building configuration…
[OK]
```

Do the same thing with the 2nd floor and 3rd floor switch.

Configure the IP addresses to connect the other router:

```
Router > enable
Router > config t
Router(config-if)#int se0/2/0
Router(config-if)#
Router(config-if)#id address 10.10.10.5   255.255.255.252
Router(config-if)#
Router(config-if)#
Router(config-if)#int se0/2/1
Router(config-if)#ip address 10.10.10.9   255.255.255.252
Router(config-if)#
Router(config-if)#do wr
Building configuration
[OK]
```

Do the same thing with the rest of the routers with their respective IP addresses.

Configure devices in the network are expected to obtain IP address dynamically with their respective router configured as the DHCP server:

```
Router > enable
Router > config
Enter configuration commands, one per line.   End with CNTL/Z. t
Router(config)#
Router(config)# int gig0/0.80
Router(config-subif)#
% Link-5-CHANGED: Interface GigabitEthernet0/0.80, changed state to up
```

% Link-5-UPDOWN: Lone protocol on Interface GigabitEthernet0/0.80, changed state to up

Router(config-subif)#encapsulation dot1Q 80
Router(config-subif)#ip address 192.168.8.1 255.255.255.0
Router(config-subif)#
Router(config-subif)#
Router(config-subif)#ex
Router(config)#
Router(config)#
Router(config)#
Router(config)#int gig0/0.70
Router(config-subif)#
% Link-5-CHANGED: Interface GigabitEthernet0/0.70, changed state to up

% Link-5-UPDOWN: Lone protocol on Interface GigabitEthernet0/0.70, changed state to up
Router(config-subif)#
Router(config-subif)#
Router(config-subif)#encapsulation dot1Q 70
Router(config-subif)#ip address 192.168.7.1 255.255.255.0
Router(config-subif)#
Router(config-subif)#ex
Router(config)#
Router(config)#int gig0/0.60
Router(config-subif)#
% Link-5-CHANGED: Interface GigabitEthernet0/0.60, changed state to up

% Link-5-UPDOWN: Lone protocol on Interface GigabitEthernet0/0.60, changed state to up
Router(config-subif)#
Router(config-subif)#
Router(config-subif)#encapsulation dot1Q 60
Router(config-subif)#ip address 192.168.6.1 255.255.255.0
Router(config-subif)#
Router(config-subif)#
Router(config-subif)#do wr
Building configuration …
[OK]
Router(config-subif)#ex
Router(config)#
Router(config)#
Router(config)# service dhcp
Router(config)# ip dhcp pool Reception
Router(dhcp-config)# network 192.168.8.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.8.1
Router(dhcp-config)#dns-server 192.168.8.1
Router(dhcp-config)#ex
Router(config)#
Router(config)#
Router(config)# ip dhcp pool Store
Router(dhcp-config)# network 192.168.7.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.7.1
Router(dhcp-config)#dns-server 192.168.7.1
Router(dhcp-config)#ex
Router(config)#
Router(config)#

```
Router(config)#
Router(config)#  ip dhcp pool Logistics
Router(dhcp-config)# network 192.168.6.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.6.1
Router(dhcp-config)#dns-server 192.168.6.1
Router(dhcp-config)#ex
Router(config)#
Router(config)#  do wr
Building configuration …
[OK]
```

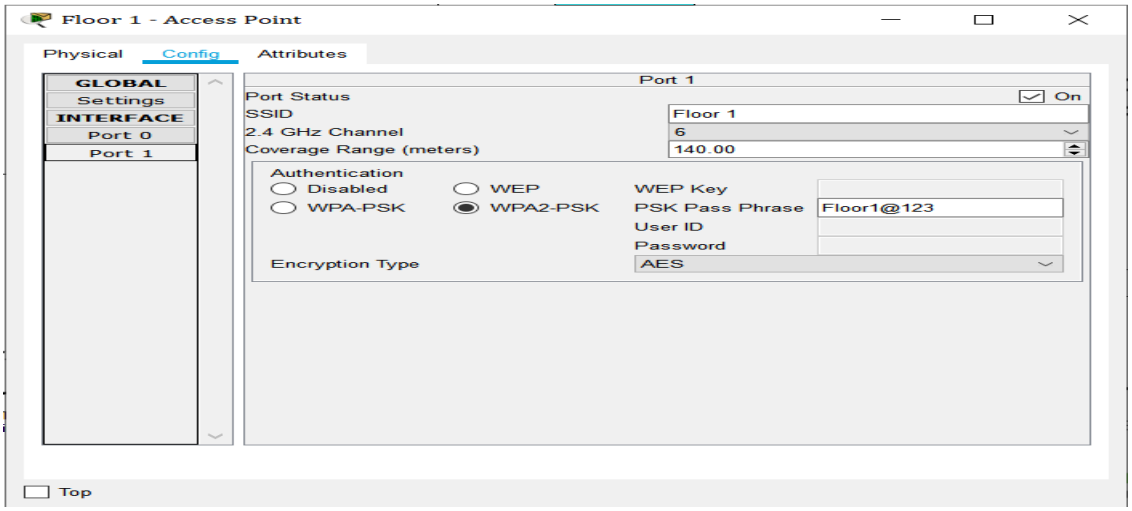
Do the same thing with the rest of the routers with their respective IP addresses.

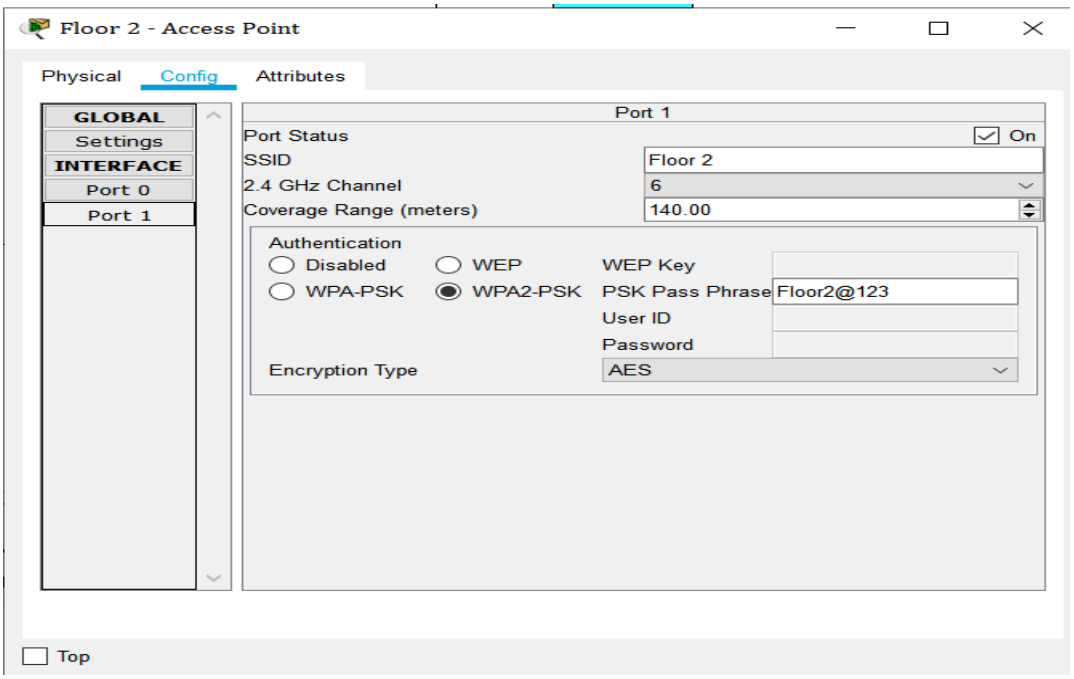
Configuration of connect all the devices from their id addresses:

```
Router >
Router > en
Router > conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
Router(config)#router ospf 10
Router(config-router)#network 10.10.10.4  255.255.255.252 area 0
Router(config-router)#network 10.10.10.8  255.255.255.252 area 0
Router(config-router)#
Router(config-router)#
Router(config-router)#network 192.168.8.0  255.255.255.252 area 0
Router(config-router)#network 192.168.7.0  255.255.255.252 area 0
Router(config-router)#network 192.168.6.0  255.255.255.252 area 0
Router(config-router)#
Router(config-router)#do wr
Building configuration …
[OK]
```

Do the same thing with the 2nd and 3rd floor router.

- **Configuration of the Access point for the connect the wireless such as Laptop, phones and tablets-**





Configure SSH in all the routers for remote login.

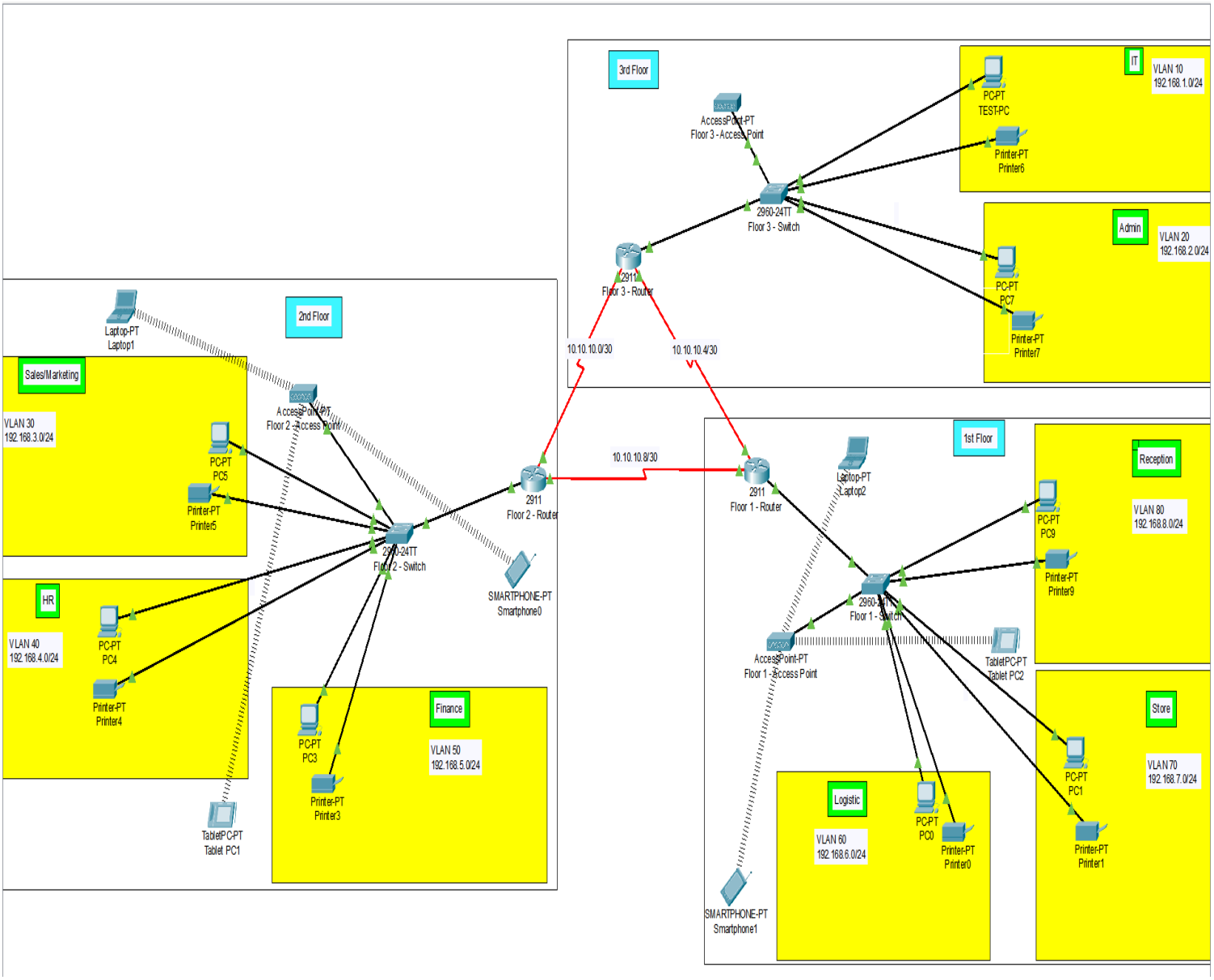
```
Router > en
Router > conf t
Enter configuration commands, one per line.   END with CNTL/Z.
Router(config-router)#
Router(config-router)#
Router(config-router)#
Router(config-router)#hostname F1-Router
F1-Router(config)#
F1-Router(config)#
F1-Router(config)#username joypal password joypal
F1-Router(config)#
F1-Router(config)#
F1-Router(config)#crypto key generate rsa

The name for the keys will e: F1-Router.joypal
Choose the size of the key modules in the range of 360 to 2048 for your
General Purpose keys. Choosing a key modules greater than 512 may take a few minutes.
How many bits in the modules [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable…[OK]

F1-Router(config)#
F1-Router(config)#
F1-Router(config)#line vty 0 15
F1-Router(config-line)#login local
F1-Router(config-line)#transport input ssh
F1-Router(config-line)#
F1-Router(config-line)#
F1-Router(config-line)#do wr
Building configuration …
[OK]
F1-Router(config-line)#ex
```

Do the same thing with the 2nd and 3rd floor router.

Chapter 3

Performance Evaluation

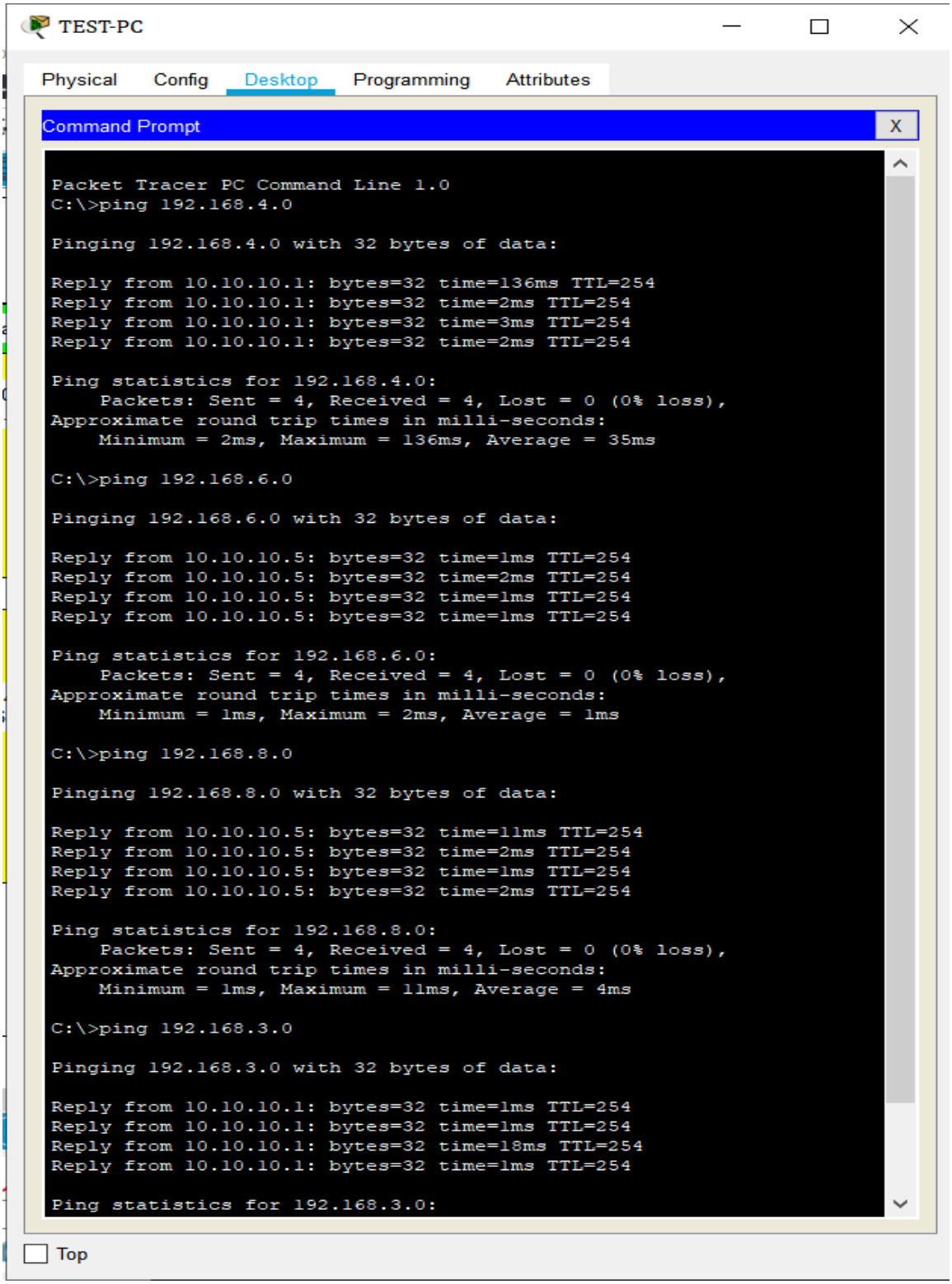
3.1 Full scenario of the network



3.2 Results and Discussions

3.2.1 Results

Link from 3rd floor Text PC to 2nd floor and 1st floor PC's



3.2.2 Discussion

During implement this project, I faced many problems but later they were solved. From that, I learned many things. Here I used Class C network numbers using 24 bits for the network number and 8 bits for host numbers. Class C network numbers are appropriate for networks with few hosts--the maximum being 254. A class C network number occupies the first three bytes of an IP address. Only the fourth byte is assigned at the discretion of the network owners. The first byte of a class C network number covers the range 192-223. The second and third each cover the range 1- 255. Class C IP addresses range from 192.0.0.x to 223.255.255.x. The default subnet mask for Class C is 255.255.255.x.

There must be careful about setting the IP addresses and carefully writing the command to connect to the PCs each other.

The Network Design Testing stage which greatly determines the success of the design that has been built.

Chapter 4

Conclusion

To design the network outlook for the community Hotel Network produce the substructure for all other exposure in the service framework such as security of the network, wireless area network, mobility as well as putting the justification to provide safety and security, operational efficiencies, virtual environments and secure rooms. Key network foundation such as switching, routing, multicast and high availability are given for the full Hotel network.

4.1 Scope of Future Work

This project is give us an efficient methodology connected among all computers that are used in a respective Hotel. Apart from interconnection, the project economical is made the topology by keeping in mind about the cost. The most important points is authentication and security to prevent the unauthorized access. This project will be used in several industries, college campus or university with high level security.

References

1. **Author:** Benard Otom, https://otombenard.com/
2. https://gurutechnetworks.otombenard.com/projects/
3. https://www.youtube.com/watch?v=RwFJTJTe-OM