

As a part of your end year networking project, you are required to design and implement Vic Modern Hotel network. The hotel has three floors; in the first floor there three departments (Reception, store and Logistics), in 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.

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 a printer.
7. Each department is expected to be in 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

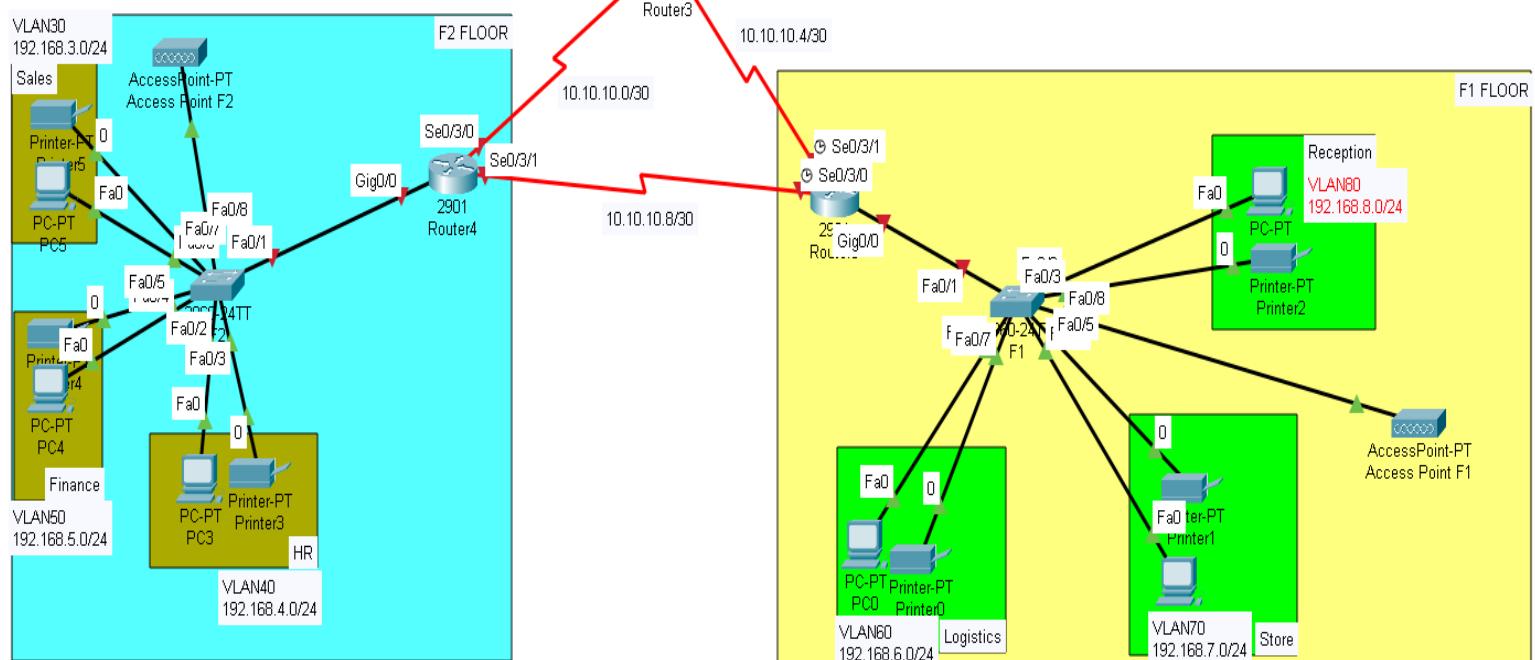
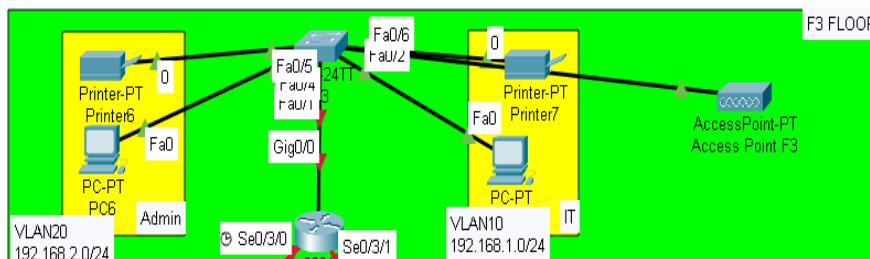
2nd Floor;

- 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

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.)



VLAN ID	VLAN Name / Location	Network	Gateway (default GW)	Usable host range
10	IT (3rd floor)	192.168.1.0 /24	192.168.1.1	192.168.1.2 – 192.168.1.254
20	Administration (3rd floor)	192.168.2.0 /24	192.168.2.1	192.168.2.2 – 192.168.2.254
30	Sales (2nd floor)	192.168.3.0 /24	192.168.3.1	192.168.3.2 – 192.168.3.254
40	HR (2nd floor)	192.168.4.0 /24	192.168.4.1	192.168.4.2 – 192.168.4.254
50	Finance (2nd floor)	192.168.5.0 /24	192.168.5.1	192.168.5.2 – 192.168.5.254
60	Logistics (1st floor)	192.168.6.0 /24	192.168.6.1	192.168.6.2 – 192.168.6.254
70	Store (1st/2nd floor)	192.168.7.0 /24	192.168.7.1	192.168.7.2 – 192.168.7.254
99	Reception (1st floor)	192.168.8.0 /24	192.168.8.1	192.168.8.2 – 192.168.8.254

I recommend you understand the requirements and implement it on your own wish you the best 😊

What is a Serial Connection?

A **serial connection** is a **point-to-point WAN link** that transmits data **bit by bit (serially)** over a communication line — usually used to connect **two remote routers** or **branch offices** over a **Wide Area Network (WAN)**.

DTE vs DCE in Serial Links

When you connect two routers using a **serial cable**, one end must provide the **clock rate (timing signal)** — this is the **DCE** (Data Communications Equipment) end.

- **DTE (Data Terminal Equipment):** Receives clock rate
- **DCE (Data Communications Equipment):** Provides clock rate

So the DCE Interface must provide the Clock rate for the DTE interface

Modern Alternatives

Today, serial links are mostly replaced by:

- **Ethernet-based WANs** (Metro Ethernet)
- **VPNs over the Internet**
- **MPLS or SD-WAN**
- **Fiber connections**

But **serial links remain essential in labs and learning**, especially in:

- **CCNA/CCNP practice**
- **Simulating WAN topologies**
- **Understanding OT network backhaul or field-device communication**

First of all one of the requirements is to make a serial connections and to achieve that in packet tracer



Press on that button to turn off the Router then we can add the serial port cause by default it is not allowed

Then add the Serial port by this Module add it in Empty Slot then turn on the Power Button:



First thing we gonna configure the DCE and DTE interfaces on the Routers we gonna configure the interface that shows the clock shape besides the interface label:

```
R1#enable
```

```
#Conf t
```

```
#interface se0/3/0
```

```
#no shutdown
```

```
#clock rate 64000 (Recommended)
```

```
#do Write
```

Do the same for all the routers and make sure they all not shutdown

Configure the DHCP Pools:

```
#conf t
```

```
#service dhcp
```

```
#ip dhcp pool <name>
```

```
#network 192.168.x.0 255.255.255.0
```

```
#default-router 192.168.x.1
```

Switch Conf:

The trunk port with the router interface to let him carry traffic for multiple VLANS:

```
#switchport mode trunk
```

The Access port for each department or for each vlan

```
#interface range f0/x-x
```

```
#switchport mode access
```

```
#switchport access vlan <Num>
```

But the link between the router the serial links their ip address gonna be as follows cause it's CIDR /30

```
#ip address 10.10.10.x 255.255.255.252
```

Router Conf for it's VLANs:

```
#interface gig0/0.<VLAN-NUM>
#encapsulation dot1q <VLAN-ID>
#ip address 192.168.x.1 255.255.255.0
```

Right now we have enabled the communications between the vlans of each floor but still every floor is separated so we need to configure Dynamic routing to enable the communications between all floors .

OSPF (Open Shortest Path First) is a **link-state routing protocol** used to automatically discover and share routes between routers in an **Autonomous System (AS)**.

It's an **open standard protocol** (not proprietary like EIGRP) and supports **large, complex enterprise networks**.

For Neighbour Discovery we need to make them to have the same area ID

Every router is connected to 5 networks except third floor connected to just 4 networks

These are the Conf of the F1 Router :

```
#enable
#conf t
#router ospf 10
#network 192.168.8.0 255.255.255.0 area 0
#network 192.168.7.0 255.255.255.0 area 0
#network 192.168.6.0 255.255.255.0 area 0
#network 10.10.10.8 255.255.255.252 area 0
#network 10.10.10.4 255.255.255.252 area 0
#do write
```

To verify :

```
#show ip ospf neighbor
```

To enable the SSH :

```
-hostname  
      #hostname r1  
  
-dns  
      #ip domain-name cisco.com  
  
-ssh key  
      #crypto key generate rsa  
      then type 1024
```

*Basic user for SSH

```
#username admin privilege 15 secret AdminPass1
```

```
-enable the ssh on the vty lines  
#line vty 0 15  
#login local  
#transport input ssh  
#exec-timeout 5 (the session will end in 5 mins of inactivity)
```

To connect to the router or Switch that you have configured the SSH from a PC:

```
#ssh -l <username> <ip_of_the_interface>
```

Then enter the password

If you want the exact steps to understand more you can follow The video from this link from GuruTech:

<https://www.youtube.com/watch?v=z4uTWsXbZaM&list=PLyEymK89ZUabd7h9FK4dGVdONbxFEJoyk&index=3>