As 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 are three departments Reception, store, and logistics, In the 2nd floor there are three departments(Finance, HR, and Sales), while the 3rd floor hosts IT and Admin.

1. There should be three routers connecting each floor (all placed in the server room in IT department)
2. All routers should be connected using serial DCE cable
3. The network between the routers should be 10.10.10.0/30, 10.10.10.4/30, and 10.10.10.8/30
4. Each floor is expected to have one switch (placed in the
5. respective floor)
6. Each floor is expected to have WIFI networks connected to laptop and phones
7. Each department is expected to have a printer
8. Each department is expected to be in a different VLAN

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

9. Use OSPF as the routing protocol to advertise routes.

1. All devices are expected to obtain ip addresses dynamically with their respective routers configured as the DHCP server
2. All devices are expected to communicate with each other.
3. Configure SSH in all the routers for remote login
4. 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)

Step 2 - After putting 3 routers, we need to connect them using serial DCE cable. We cannot use the cable directly we must first enable serial interfaces on the routers.

First turn of the router(click on router, and click the circle above the green line), and then drag and drop “HWIC-2T” from the left column and place it, turn on the router again. Do this for all routers.

Now when we click on the router we can see the serial interfaces.

Connect them.

Side note – Serial interfaces provide a physical layer connection that can be used to connect routers across long distances.

Connect the switches to the routers

Floor 1 has 3 departments. Each dept must have 1 printer. Do that

Place the appropriate number of end devices for each on each floor. Also, put on Wi-Fi on each floor and connect it to the switch.

We are now done labelling everything and our diagram looks like this.

A diagram of a computer network

Description automatically generated

One thing to note is, we must enable clock rate on Serial Dce interfaces. If we hover over the red lines we see the interface name. if it has a clock beside it then we enable it on that interface only.

A diagram of a graph

Description automatically generated

Before enabling the clock rate, we must also use no shutdown since routers interfaces are shutdown by default.

For R3

A screenshot of a computer program

Description automatically generated

For R1

No config needed except turning the interfaces on

For R2

The config is almost same

**Now we setup vlans. Since there are diff vlan, we will configure them using access port, but the link between router and switch will be trunk.**

For respective interfaces we use switcport mode accesss, followed by sw access vlan “number”

For switch one f0/1 is connected to router. Hence it’s the trunk link.

Do the same for all other switches.

**Configuring ip addresses in router**.

Now we have /30 notations on the routers, so that smeans there will be 2 ip addresses.

A screen shot of a graph

Description automatically generated

So se0/2/0 gets 10.10.10.5.

And se0/2/1 gets 10.10.10.9 since it has the network 10.10.10.8/30

A red line between black and white lines

Description automatically generated

We go on router and use the command ip address 10.10.10.9 followed by subnet mask which is 255.255.255.252

Do this for all 3 routers

Once done setting the ip addresses, we can check which interface has which ip add using do s hip int br

**Setting up inter-vlan routing**

To set this up we will need to create sub interfaces on the router, and assign an ip address (default gateway) according to the given range.

Set-up for first floor

For Vlan 80 –

A screenshot of a computer program

Description automatically generated

Vlan 70 –

A screenshot of a computer

Description automatically generated

I noticed later on that I assigned the wrong subnet mask. It should be 255.255.255.0. I did a no ip add 192.168.7.1 255.255.255.252 to undo the command.

A screenshot of a computer screen

Description automatically generated

**The setup is exactly similar for all other routers and interfaces**.

I have a habit of setting up the default gateway as the first usable ip address.

But first I completed the whole setup for first floor, whats reaminng is setting up dhcp for the end devices.

Go on the router and use these commands

I had some issues with dhcp as shown below. So for now I used a static Ip address for a device that cant use dhcp.

A screenshot of a computer

Description automatically generated

I did some pings and everything works.

A red screen with white text

Description automatically generated

Summary on steps on how we configured inter vlan routing.

Go on the router, if its for vlan80 use thebelow commands

Int g0/0.80

Encapsulation dot1q 80

Ip add 192.168.8.1 255.255.255.0 (this is the default gateway)

That’s all. If later you wanna set dhcp server or static ip use the above default gateway.

I did the same for 3rd and 1st floor. Pings were successful

A red screen with white text

Description automatically generated

A red screen with white text

Description automatically generated

One thing to notice is we still cannot communicate with devices in other vlans. To solve this we need to enable ospf on the routers.

Configuing OSPF

For R1 we see its connected to 5 networks.

A diagram of a computer network

Description automatically generated

We use the command, router ospf 2 followed by

A computer screen shot of a computer program

Description automatically generated

For R2,

A computer network diagram with red and green circles

Description automatically generated

Same commands are router 1.

A screenshot of a computer program

Description automatically generated

Fo R3, it’s the same.

I tried pinging devices in other network and everything works.

Wifi config is left

**Configuring SSh on routers**

R1

Steps

1 – Configure host name of router

2 – configure domain name

3 – now configure username and password

4 – use crypto key generate command now

5 – followed by line vty 0 15

6 – login local

7 – transport input ssh

A screenshot of a computer program

Description automatically generated

Other routers have the same command