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

**Project #3 Case Study and Requirements**  
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;

* There should be three routers connecting each floor (all placed in the server room in IT department).
* All routers should be connected to each other using serial DCE cable.
* 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 in 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 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 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.
2. Hierarchical Network Design.
3. Connecting Networking devices with Correct cabling.
4. Creating VLANs and assigning ports VLAN numbers.
5. Subnetting and IP Addressing.
6. Configuring Inter-VLAN Routing (Router on a stick).
7. Configuring DHCP Server (Router as the DHCP Server).
8. Configuring SSH for secure Remote access.
9. Configuring switchport security or Port-Security on the switches.
10. Configuring WLAN or wireless network (Cisco Access Point).
11. Host Device Configurations.
12. Test and Verifying Network Communication.

**Configuring Clock rates**

Configuring the clock rate on a DCE (Data Communications Equipment) cable, typically a serial connection, is necessary when you're connecting two routers and one of them acts as a DCE device. The DCE device provides clocking to the line. Here's how you can configure the clock rate on a DCE interface

Router(config)# int se0/3/0

Router(config-if)# clock rate 64000

It's important to note that clock rates should only be configured on DCE interfaces

**Inter-VLAN routing configuration**

To configure Inter-VLAN routing on a Cisco router you typically need to use subinterfaces on a physical interface

Following are steps to configure inter-vlan routing

* ****Create VLAN:**** Ensure that your VLANs are configured on your switch. You can do this using the vlan command in global configuration mode. For Example Switch(config)# vlan <vlan\_number> Switch(config-vlan)# name <vlan\_name>
* ****Assign VLANs** to Switch Ports**: Assign the switch ports to the respective VLANs using the switchport access vlan command in interface configuration mode
* **Create Subinterfaces**: Now, you'll create subinterfaces on the router's interface that connects to the switch. Each subinterface corresponds to a VLAN

EXAMPLE

Router(config)# int gig/0/0.10

Router(config)# encapsulation dot1q 10

Router(config)# ip add 192.168.1.0 255.255.255.0

**Configuring DHCP server on the router**  
To configure a DHCP server on a Cisco router, you need to define a DHCP pool and specify the parameters for IP address allocation

Following are steps to configure DHCP server

* **Define DHCP Pool**: Create a DHCP pool and specify the network range from which IP addresses will be allocated.
* **Configure DHCP Parameters**: Define other DHCP parameters such as default gateway, DNS server, lease duration

EXAMPLE

Router(config)# service dhcp

Router(config)# ip dhcp pool Reception

Router(dhcp-config)# network 192.168.1.1 255.255.255.0

Router(dhcp-config)# default-router 192.168.1.1

Router(dhcp-config)# dns-server <192.168.1.1

Router(dhcp-config)# lease 1 0 0 (This configuration sets the lease duration to 1 day. The format for the lease command is days hours minutes, so 1 0 0 represents 1 day)

**STEPS TO CONFIGURE OSPF**

* **Enable OSPF**: Enable OSPF routing process.
* **Configure OSPF on Interfaces**: Enable OSPF on interfaces that will participate in OSPF routing

EXAMPLE

Router(config)# router ospf 1

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)# network 192.168.1.0 255.255.255.0 area 0

Router(config-router)# network 192.168.2.0 255.255.255.0 area 0

Router(config-router)# network 192.168.3.0 255.255.255.0 area 0

**CONFIGURING SSH ON ROUTER**

SSH (Secure Shell) is a network protocol that provides a secure means of accessing and managing remote devices over an unsecured network, such as the internet

EXAMPLE

Router(config)# ip domain-name sweethome

Router(config)# username sweethome privilege 15 secret \*\*\*\*\*\*\*\*

Router(config)# crypto key generate rsa (when promted input 1024 as rsa)

Router(config)# line vty 0 15

Router(config)# login local

Router(config)# transport input ssh

**CONFIGURING PORT SECURITY**Configuring port security on Cisco switches helps in securing the physical ports by controlling which devices can connect to them.

EXAMPLE

Switch(config)# interface fa0/3

Switch(config-if)# switchport port-security (enabling port security on the interface with default settings, which allow one MAC address per port.)

Switch(config-if)# switchport port-security maximum 1 (Define the maximum number of MAC addresses allowed on the interface in this case “1”)

Switch(config-if)# switchport port-security violation shutdown (Specify the action to be taken when a violation occurs I.e “shutdown”)

Switch(config-if)# switchport port-security mac-address sticky (specify how MAC addresses are learned and stored on the interface)

Switch(config-if)# switchport port-security aging time 300 (Set the aging time for dynamically learned MAC addresses)