**NETWORKING PROJECT 3: Hotel Management Network**

The Project Requirement

A screenshot of a computer

Description automatically generated

A screenshot of a computer

Description automatically generated

A close up of a computer

Description automatically generated

Basic Hardware Required

A diagram of a network

Description automatically generated

* Add HWIC-2T interface to one of the empty slots on each router to enable them to be connected using serial DCE cables.

Configuring The Network

* For the routers to forward traffic, we must enable the clock rate at the serial DCE interfaces. Since the routers are connected using Serial DCE cable. To do this, go to the router cli:
  + En
  + Config t
* Change status of the serial interfaces on the router to up
  + Int se0/3/0
  + No shutdown
  + Int se0/3/1
  + No shutdown
* Choose the serial DCE interface (one with the clock symbol next to it on the topology)
  + Int se0/3/0 [DCE interface]
* Set the clock rate for the above interface.
  + Clock rate 64000
* Repeat the above steps for all the other routers.
* Change the status of the gigabit ethernet interface to up
  + Int gig0/0
  + No shutdown

Configuring the VLANs for each floor

* Here we do not have to do subnetting manually as the range of IP addresses to be used by each department on a floor is specified in the problem statement.
* Typically, a VLAN is configured on a Switch. Here we start with the switch on floor 1. The departments and their respective VLANs from the problem statements are as follows:

|  |  |  |
| --- | --- | --- |
| Department | VLAN Network | VLAN No |
| Reception | 192.168.8.0/24 | 80 |
| Store | 192.168.7.0/24 | 70 |
| Logistics | 192.168.6.0/24 | 60 |

Configure Floor 1 VLAN

* En
* Config t
* Int range fa0/2-4
* Switchport mode access
* Switchport access vlan 80
* Exit
* Int range fa0/5-7
* Switchport mode access
* Switchport access vlan 70
* Exit
* Int range fa0/8-10
* Switchport mode access
* Switchport access vlan 60
* Exit
* Do wr
* For Floor 2 the VLAN information from the problem statement is as follows

|  |  |  |
| --- | --- | --- |
| Department | VLAN Network | VLAN No |
| Finance | 192.168.5.0/24 | 50 |
| HR | 192.168.4.0/24 | 40 |
| Sales | 192.168.3.0/24 | 30 |

* En
* Config t
* Int range fa0/2-4
* Switchport mode access
* Switchport access vlan 50
* Exit
* Int range fa0/5-7
* Switchport mode access
* Switchport access vlan 40
* Exit
* Int range fa0/8-10
* Switchport mode access
* Switchport access vlan 30
* Exit
* Do wr
* The VLAN information for the Admin and IT departments on Floor 3 are as follows

|  |  |  |
| --- | --- | --- |
| Department | VLAN Network | VLAN No |
| Admin | 192.168.2.0/24 | 20 |
| IT | 192.168.1.0/24 | 10 |

* En
* Config t
* Int range fa0/2-4
* Switchport mode access
* Switchport access vlan 10
* Exit
* Int range fa0/5-7
* Switchport mode access
* Switchport access vlan 20
* Exit
* Do wr

The VLAN interfaces on the switches are in access mode and for them to communicate with other networks, the traffic has to pass through the interface of the switch connected to the router. There for this interface should be a trunk interface on all switches.

* Int fa0/1
* Switchport mode trunk
* Do wr

Configuring IP Address for the Router Interfaces

In the problem statement we have been told that the routers are supposed to use the ips 10.10.10.0/30, 10.10.10.4/30, and 10.10.10.8/30 amongst themselves for communication. The routers are connected through the serial interfaces. The /30 subnet mask tells us that there are 30 network bits in the subnet mask which becomes 11111111.11111111.11111111.11111100 which in decimal form is 255.255.255.252 and that a total of 2 valid hosts are present out of 3 available addresses. This means that in the network 10.10.10.0/30 the ips range from 0 to 2 and 10.10.10.0 becomes the network address leaving 2 valid ips for hosts that can be assigned to the interfaces.

The steps to assign IP addresses to these interfaces are as follows:

* Floor 1
* En
* Config t
* Int se0/3/0
* Ip address 10.10.10.1 255.255.255.252
* Int se0/3/1
* Ip address 10.10.10.9 255.255.255.252
* Do wr
* Exit
* Floor 2
  + En
  + Config t
  + Int se0/3/0
  + Ip address 10.10.10.2 255.255.255.252
  + Int se0/3/1
  + Ip address 10.10.10.5 255.255.255.252
  + Do wr
  + Exit
* Floor 3
  + En
  + Config t
  + Int se0/3/0
  + Ip address 10.10.10.6 255.255.255.252
  + Int se0/3/1
  + Ip address 10.10.10.10 255.255.255.252
  + Do wr
  + Exit

Configuring InterVLAN routing The DHCP server on the router

Inter-VLAN routing is configured on the router.

* Floor 1
* En
* Config t
* Int gig0/0.80 [creates a subinteface for a VLAN]
* Encapsulation dot1q 80
* Ip address 192.168.8.1 255.255.255.0 [sets the ip address for the interface]
* Exit
* Int gig0/0.70 [creates a subinteface for a VLAN]
* Encapsulation dot1q 70
* Ip address 192.168.7.1 255.255.255.0 [sets the ip address for the interface]
* Exit
* Int gig0/0.60 [creates a subinteface for a VLAN]
* Encapsulation dot1q 60
* Ip address 192.168.6.1 255.255.255.0 [sets the ip address for the interface]
* Do wr
* Exit
* Floor 2
  + En
  + Config t
  + Int gig0/0.50 [creates a subinteface for a VLAN]
  + Encapsulation dot1q 50
* Ip address 192.168.5.1 255.255.255.0 [sets the ip address for the interface]
  + exit
  + Int gig0/0.40 [creates a subinterface for a VLAN]
  + Encapsulation dot1q 40
  + Ip address 192.168.4.1 255.255.255.0 [sets the ip address for the interface]
  + exit
  + Int gig0/0.30 [creates a subinterface for a VLAN]
  + Encapsulation dot1q 30
  + Ip address 192.168.3.1 255.255.255.0 [sets the ip address for the interface]
  + Do wr
  + exit
* Floor 3
* en
* config t
* int gig0/0.20 [creates a subinterface for a VLAN]
* encapsulation dot1q 20
* ip address 192.168.2.1 255.255.255.0 [sets the ip address for the interface]
* exit
* int gig0/0.10 [creates a subinterface for a VLAN]
* encapsulation dot1q 10
* ip address 192.168.1.1 255.255.255.0 [sets the ip address for the interface]
* do wr
* exit

DHCP configuration

Depending on the number of VLANs or departments we will need to create an equivalent number of IP-pools for the DHCP service to assign the IP addresses to the end devices from.

* Floor 1
* En
* Config t
* Service dhcp
* Ip dhcp pool reception [dhcp pool for reception department]
* Network 192.168.8.0 255.255.255.0 [assigning the network address]
* Default-router 192.168.8.1 [Sets default gateway]
* Dns 192.168.8.1
* Exit
* Ip dhcp pool store [dhcp pool for store department]
* Network 192.168.7.0 255.255.255.0 [assigning the network address]
* Default-router 192.168.7.1 [Sets default gateway]
* Dns 192.168.7.1
* Exit
* Ip dhcp pool logistics [dhcp pool for logistics department]
* Network 192.168.6.0 255.255.255.0 [assigning the network address]
* Default-router 192.168.6.1 [Sets default gateway]
* Dns 192.168.6.1
* Do wr
* Exit
* Floor 2
* En
* Config t
* Service dhcp
* Ip dhcp pool finance [dhcp pool for finance department]
* Network 192.168.5.0 255.255.255.0 [assigning the network address]
* Default-router 192.168.5.1 [Sets default gateway]
* Dns 192.168.5.1
* Exit
* Ip dhcp pool hr [dhcp pool for hr department]
* Network 192.168.4.0 255.255.255.0 [assigning the network address]
* Default-router 192.168.4.1 [Sets default gateway]
* Dns 192.168.4.1
* Exit
* Ip dhcp pool sales [dhcp pool for sales department]
* Network 192.168.3.0 255.255.255.0 [assigning the network address]
* Default-router 192.168.3.1 [Sets default gateway]
* Dns 192.168.3.1
* Do wr
* Exit
* Floor 3
* En
* Config t
* Service dhcp
* Ip dhcp pool admin [dhcp pool for admin department]
* Network 192.168.2.0 255.255.255.0 [assigning the network address]
* Default-router 192.168.2.1 [Sets default gateway]
* Dns 192.168.2.1
* Exit
* Ip dhcp pool IT [dhcp pool for IT department]
* Network 192.168.1.0 255.255.255.0 [assigning the network address]
* Default-router 192.168.1.1 [Sets default gateway]
* Dns 192.168.1.1
* Do wr
* Exit

Set the end devices to receive IP address automatically from the dhcp server on the router and check the settings.

A screenshot of a computer

Description automatically generated

The devices are receiving IP address from the DHCP server. Connections are working

Configuring Routing Protocol on the Routers

As per the problem statement, the routing protocol OSPF needs to be configured on the routers for the departments on each floor to communicate with each other. OSPF advertises the network on a router to other networks.

* Router- Floor 1
* En
* Config t
* Router ospf 10
* Network 10.10.10.0 255.255.255.252 area 0
* Network 10.10.10.8 255.255.255.252 area 0
* 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
* Do wr
* Exit
* Router- Floor 2
* Router ospf 10
* Network 10.10.10.0 255.255.255.252 area 0
* Network 10.10.10.4 255.255.255.252 area 0
* Network 192.168.5.0 255.255.255.0 area 0
* Network 192.168.4.0 255.255.255.0 area 0
* Network 192.168.3.0 255.255.255.0 area 0
* Do wr
* Exit
* Router- Floor 3
* Router ospf 10
* Network 10.10.10.4 255.255.255.252 area 0
* Network 10.10.10.8 255.255.255.252 area 0
* Network 192.168.1.0 255.255.255.0 area 0
* Network 192.168.2.0 255.255.255.0 area 0
* Do wr
* Exit

Configuring Wireless network on a Separate VLAN

* Create a new VLAN for the WAP
* Enable DHCP for the new VLAN on the router
* Advertise the New VLAN network using OSPF

Configuring SSH on the routers

* Floor1 Router
* En
* Config t
* Hostname F1R1 [configure hostname]
* Ip domain-name RDP1 [configure domain name]
* Username admin password admin [set user id and password]
* Crypto key generate rsa [sets up encryption]

A screenshot of a computer

Description automatically generated

* Line vty 0 15 [enable the vty interfaces to allow ssh or telnet connections to the device]
* Login local
* Transport input ssh
* Do wr
* Exit
* Floor 2 Router
* En
* Config t
* Hostname F2R1
* Ip domain-name RDP2
* Username admin password admin
* Crypto key generate rsa
* Line vty 0 15
* Login local
* Transport input ssh
* Do wr
* Exit
* Floor 3 Router
* En
* Config t
* Hostname F3R1
* Ip domain-name RDP3
* Username admin password admin
* Crypto key generate rsa
* Line vty 0 15
* Login local
* Transport input ssh
* Do wr
* Exit

A computer screen shot of a black and white computer screen

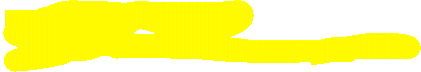
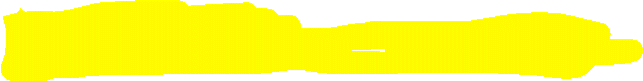
Description automatically generated

Setting up Port security on Fa0/2 for Test\_PC

* En
* Config t
* Int fa0/2
* Switchport port-security
* Switchport port-security maximum 1
* Switchport port-security mac-address sticky
* Switchport port-security violation shutdown
* Do wr
* Exit

A screenshot of a computer

Description automatically generated



A computer screen shot of a network

Description automatically generated

**Final Network Topology**