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I made this simulation as a personal project from scratch using Cisco's Packet Tracer.

First, I made the diagram of what the small office looks like, followed by the simulation itself and documented everything I did to set this up.

In this setting we have:

- 5 PC's on VLAN 50 which is the SALES VLAN
- 5 PC's on VLAN 60 which is the HR VLAN
- Guest WIFI Access Point on VLAN 20
- All PC's will use the DHCP Server 192.168.0.20/24 on VLAN 70 to get an IP
- Router 192.168.1.1 is going to be considered as the internet router (won't be doing much to it)

First, I enabled IP routing on the L3 switch.

Then, I started setting up the VLANs and naming them according to the departments on the diagram, followed by assigning the VLANs to a range of ports on the switch for each department.

For VLAN 50:

Conf T

Interface range GigabitEthernet 1/0/5-9

Switchport mode access

Switchport access vlan 50

No shut

End

For VLAN 60:

Conf T

Interface range GigabitEthernet 1/0/10-14

Switchport mode access

Switchport access vlan 60

No shut

End

For VLAN 20:

Conf T

Interface GigabitEthernet 1/0/3

Switchport mode access

Switchport access vlan 20

No shut

End

For VLAN 70:

Conf T

Interface GigabitEthernet 1/0/2

Switchport mode access

Switchport access vlan 70

No shut

End

Now that the switchports are set to the respective VLANs, I set the SVI on each VLAN to act the default gateway for all devices as well as the management IP. I set the IP Helper Address on all VLANs as 192.168.0.20 (which is our DHCP server on VLAN 70). I also set the default gateway on the DHCP server as the SVI 192.168.0.2.

I created 3 IP Pools on the DHCP server, one for each VLAN.

I set Gig 1/0/5 to Gig 1/0/9 on VLAN 50 with SVI 10.0.50.2

Conf T

Interface VLAN 50

IP Address 10.0.50.2 255.255.255.0

IP helper-address 192.168.0.20

No shut

End

I set Gig 1/0/10 to Gig 1/0/14 on VLAN 60 with SVI 10.0.60.2

Conf T

Interface VLAN 60

IP Address 10.0.60.2 255.255.255.0

IP helper-address 192.168.0.20

No shut

End

I set Gig 1/0/3 to VLAN 20

Conf T

Interface VLAN 50

IP Address 192.168.20.2 255.255.255.0

IP helper-address 192.168.0.20

No shut

End

I set Gig 1/0/2 as VLAN 70 with SVI 192.168.0.2

Conf T

Interface VLAN 70

IP Address 192.168.0.2 255.255.255.0

No shut

End

DHCP Pull from devices on all VLANs was successful.

Configuring the ACL

By default, the VLANs were able to ping each other. So, I set an ACL as shown below:

access-list 101 permit ip any 192.168.0.0 0.0.0.255

access-list permit ip 192.168.0.0 0.0.0.255 any

access-list permit udp any 192.168.0.0 0.0.0.255

access-list permit udp 192.168.0.0 0.0.0.255 any

access-list permit udp any any eq 67

access-list permit udp any any eq 68

access-list deny ip any any

The above will permit any VLAN to interact with the VLAN 70 (Network Address 192.168.0.0) on which the DHCP Server is on and vice versa, also permitted UDP for the DHCP ports 67 and 68 as well as IP, followed by deny any any at the end to disable VLANs from interacting with each other.

Now if I want this network to be able to reach the Internet Router, I will have to edit the ACL before deny any any to permit any to the WAN port.

After creating the ACL, I went *"conf t >> Interface <VLAN> >> ip access-group 101 in"* on each VLAN

That applied the ACL I created above to each of the VLANs (Including the VLAN of the DHCP Server VLAN 70). At first, I made the mistake of not applying it to the DHCP Server's VLAN 70, so what happened is VLANs were not able to communicate with each other (Which is what we want) but also DHCP requests were being blocked. After applying the ACL to VLAN 70 everything worked as it should.

After that I tried pinging from each VLAN to another and now "Destination Host Unreachable" error shows, and using dynamic IP successfully did a DHCP request and pulled an IP.

Wireless AP Setup for Guest WIFI

I set up the AP on VLAN 20 which is on port GigabitEthernet 1/0/3 on the L3 switch and successfully connected two laptops to it that received an IP from the DHCP server.