

Final Project : DHCP, VLAN, Inter-VLAN Routing, EtherChannel PAgP

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Topology recap

- Router2911 (Gig0/0) → Fa0/24 on Core Switch (multilayer/L2 switch, "Switch0")
 - Core Switch → Fa0/1-2 (EtherChannel 1, PAgP) → Access Switch 1 (2960) → PC1-PC6
 - Core Switch → Fa0/3-4 (EtherChannel 2, PAgP) → Access Switch 2 (2960) → PC7-PC12
 - VLAN 10 = 192.168.10.0/24 | VLAN 20 = 192.168.20.0/24 | VLAN 30 = 192.168.30.0/24
 - Router subinterfaces: G0/0.10, G0/0.20, G0/0.30 (router-on-a-stick does the inter-VLAN routing)
 - Port mapping on both access switches: Fa0/5-6 → VLAN10, Fa0/7-8 → VLAN20, Fa0/9-10 → VLAN30
 - VLAN names: VLAN10 = Administration, VLAN20 = Finance, VLAN30 = Student
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1. Router2911 — DHCP + Inter-VLAN Routing

```
enable
configure terminal
hostname Router

! --- Bring up physical interface ---
interface GigabitEthernet0/0
  no shutdown
exit

! --- Router-on-a-stick subinterfaces (Inter-VLAN Routing) ---
interface GigabitEthernet0/0.10
  encapsulation dot1Q 10
  ip address 192.168.10.1 255.255.255.0
exit

interface GigabitEthernet0/0.20
  encapsulation dot1Q 20
  ip address 192.168.20.1 255.255.255.0
exit

interface GigabitEthernet0/0.30
  encapsulation dot1Q 30
  ip address 192.168.30.1 255.255.255.0
exit

! --- DHCP: exclude gateway addresses, then create pools per VLAN ---
```

```

ip dhcp excluded-address 192.168.10.1 192.168.10.10
ip dhcp excluded-address 192.168.20.1 192.168.20.10
ip dhcp excluded-address 192.168.30.1 192.168.30.10

ip dhcp pool VLAN10_POOL
  network 192.168.10.0 255.255.255.0
  default-router 192.168.10.1
  dns-server 8.8.8.8
exit

ip dhcp pool VLAN20_POOL
  network 192.168.20.0 255.255.255.0
  default-router 192.168.20.1
  dns-server 8.8.8.8
exit

ip dhcp pool VLAN30_POOL
  network 192.168.30.0 255.255.255.0
  default-router 192.168.30.1
  dns-server 8.8.8.8
exit

end
write memory

```

2. Core Switch ("Switch0") — VLANs + Trunk to Router + EtherChannel PAgP

```

enable
configure terminal
hostname CoreSwitch

! --- VLANs ---
vlan 10
  name Administration
exit
vlan 20
  name Finance
exit
vlan 30
  name Student
exit

! --- Trunk to Router (carries all 3 VLANs for router-on-a-stick) ---
interface FastEthernet0/24
  switchport trunk encapsulation dot1q
  switchport mode trunk
  switchport trunk allowed vlan 10,20,30
exit

! --- EtherChannel 1 (PAgP) to Access Switch 1, Fa0/1-2 ---
interface range FastEthernet0/1-2
  channel-group 1 mode desirable

```

```
exit

! --- EtherChannel 2 (PAgP) to Access Switch 2, Fa0/3-4 ---
interface range FastEthernet0/3-4
channel-group 2 mode desirable
exit

end
write memory
```

3. Access Switch 1 (2960 — PC1 to PC6) — VLANs + EtherChannel PAgP

```
enable
configure terminal
hostname AccessSwitch1

! --- VLANs ---
vlan 10
    name Administration
exit
vlan 20
    name Finance
exit
vlan 30
    name Student
exit

! --- EtherChannel 1 (PAgP) uplink to Core Switch, Fa0/1-2 ---
interface range FastEthernet0/1-2
    switchport mode trunk
    switchport trunk allowed vlan 10,20,30
    channel-group 1 mode desirable
exit

! --- Access ports to PCs ---
interface range FastEthernet0/5-6
    switchport mode access
    switchport access vlan 10
    no shutdown
exit

interface range FastEthernet0/7-8
    switchport mode access
    switchport access vlan 20
    no shutdown
exit

interface range FastEthernet0/9-10
    switchport mode access
    switchport access vlan 30
    no shutdown
```

```
exit

end
write memory
```

4. Access Switch 2 (2960 — PC7 to PC12) — VLANs + EtherChannel PAgP

```
enable
configure terminal
hostname AccessSwitch2

! --- VLANs ---
vlan 10
    name Administration
exit
vlan 20
    name Finance
exit
vlan 30
    name Student
exit

! --- EtherChannel 2 (PAgP) uplink to Core Switch, Fa0/3-4 ---
interface range FastEthernet0/3-4
    switchport mode trunk
    switchport trunk allowed vlan 10,20,30
    channel-group 2 mode desirable
exit

! --- Access ports to PCs ---
interface range FastEthernet0/5-6
    switchport mode access
    switchport access vlan 10
    no shutdown
exit

interface range FastEthernet0/7-8
    switchport mode access
    switchport access vlan 20
    no shutdown
exit

interface range FastEthernet0/9-10
    switchport mode access
    switchport access vlan 30
    no shutdown
exit

end
write memory
```

PCs (PC1–PC12)

Set each PC's IP Configuration to **DHCP** — they should pull an address from the matching VLAN10/20/30 pool once the trunks and Port-channels are up.

Verification commands

```
! On Router
show ip interface brief
show ip dhcp binding
```

```
! On CoreSwitch / AccessSwitch1 / AccessSwitch2
show vlan brief
show interfaces trunk
show etherchannel summary
```

```
! On a PC
ipconfig /all           ! confirm DHCP address in the right VLAN subnet
ping 192.168.10.1       ! (or .20.1 / .30.1) – tests inter-VLAN routing
configure terminal
```

show etherchannel summary should show SU next to each Port-channel once PAgP has successfully bundled the links.