- Lab 4 : Routing and switching
- Lecturer : Prof. Oumaima FADI
- T.A: Prof. Abdoulghaniyu HARAZEEM

Lab 4 – Routing and switching

Objective:

The goal of this lab is to set up a network containing Virtual local area networks and learn how to perform the necessary network configurations.

We will focus on the following:

- Create VLANs on the switch
- Assign switch ports to VLANs
- Configure trunk link between switch and router
- Configure router subinterfaces for inter-VLAN routing
- Test and verify connectivity

Instructions:

1. The lab report must be submitted one week after the session in electronic format to Moodle platform
2. The lab must be done in class in groups of maximum 2 students.
3. Groups should remain the same for both reports and upcoming labs.

1. SIMPLE VLAN NETWORK SETUP

Requirement

4 PCs, 1 switch, 1 Router

Selection of the End Devices

1. Select ‘End Devices’
2. Select and drag 4 ‘PCs’
3. Select and drag 1‘Switch’
4. Select drag and drop ‘Router’

Connecting the Devices

Note: Cross-Over Cables are used for Connection between the same devices, while Straight-through Cables are used for connections between different devices

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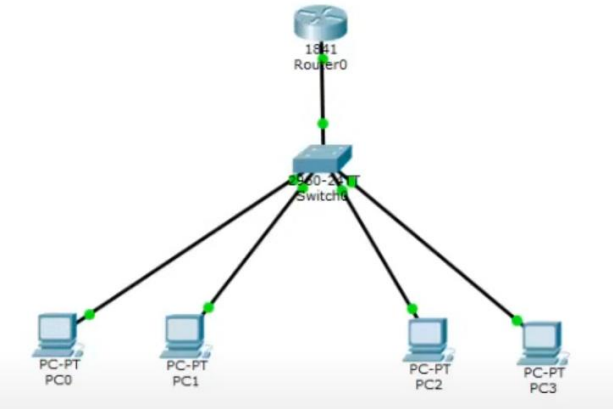
2. Ip table & topology

Device	Inter-face	VLAN	IP Address	Subnet Mask	Default Gateway
PC1	NIC	10	192.168.10.11	255.255.255.0	192.168.10.1
PC2	NIC	10	192.168.10.12	255.255.255.0	192.168.10.1
PC3	NIC	20	192.168.20.21	255.255.255.0	192.168.20.1
PC4	NIC	20	192.168.20.22	255.255.255.0	192.168.20.1
Router	G0/0.10	10	192.168.10.1	255.255.255.0	—
Router	G0/0.20	20	192.168.20.1	255.255.255.0	—



1. Create VLANs on the Switch

```
Switch> enable
Switch# configure terminal
Switch(config)# vlan 10
Switch(config-vlan)# name VLAN10
Switch(config-vlan)# exit
Switch(config)# vlan 20
Switch(config-vlan)# name VLAN20
Switch(config-vlan)# exit
Switch(config)# end
Switch# show vlan brief
```

2. Assign switch ports to VLANs

Assuming ports Fa0/2 & Fa0/3 are for VLAN 10; Fa0/4 & Fa0/5 for VLAN 20:

```
Switch(config)# interface range fa0/2 - 3
Switch(config-if-range)# switchport mode access
Switch(config-if-range)# switchport access vlan 10
Switch(config-if-range)# exit
```

```
Switch(config)# interface range fa0/4 - 5
Switch(config-if-range)# switchport mode access
Switch(config-if-range)# switchport access vlan 20
Switch(config-if-range)# exit
```

3. Configure the trunk port toward router

Assume the switch port connecting to router is Fa0/1:

```
Switch(config)# interface fa0/1
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport trunk encapsulation dot1q
   ! (in some switches dot1q is the only option, others need to set trunk encapsulation)
Switch(config-if)# exit
```

You can verify trunk:

```
Switch# show interfaces fa0/1 switchport
Switch# show vlan brief
```

4. Configure the router (router-on-a-stick)

On the router:

```
Router> enable
Router# configure terminal
```

Subinterfaces for VLANs

Assume router's interface is GigabitEthernet0/0 (or it may be FastEthernet0/0). Use subinterfaces:

```
Router(config)# interface g0/0.10
Router(config-subif)# encapsulation dot1Q 10
Router(config-subif)# ip address 192.168.10.1 255.255.255.0
Router(config-subif)# exit

Router(config)# interface g0/0.20
Router(config-subif)# encapsulation dot1Q 20
Router(config-subif)# ip address 192.168.20.1 255.255.255.0
Router(config-subif)# exit
```

Make sure the physical interface is no shutdown:

```
Router(config)# interface g0/0
Router(config-if)# no shutdown
Router(config-if)# exit
```

5. Testing

On the Switch :

```
Switch# show vlan brief
Switch# show interfaces trunk
```

```
Switch# show interfaces fa0/2 switchport
```

On the router :

```
Router# show ip interface brief
Router# show running-config
```

Verify the ping between different pcs and justify why it is successful.