Virtual LAN (VLAN) and Inter-VLAN Routing

1. Objectives

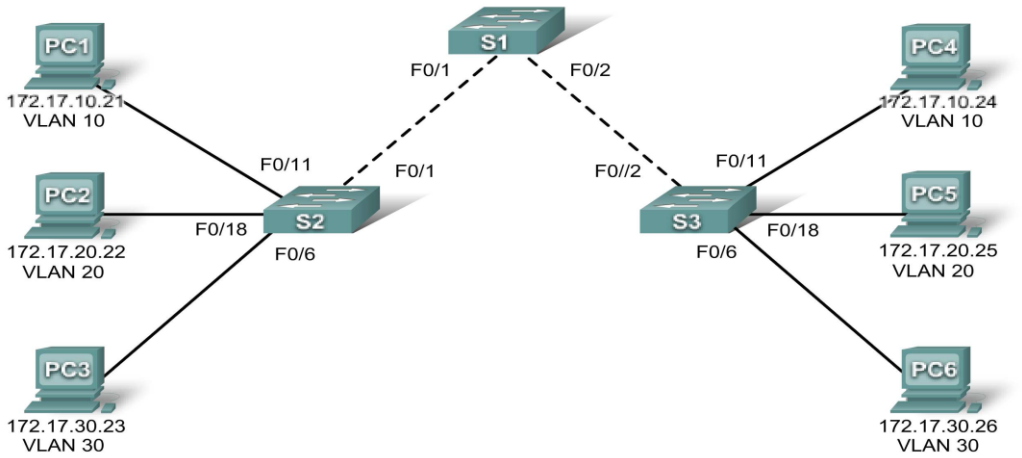
- To learn about **Virtual LAN (VLAN)**: why and how used?
- To implement **Inter-Vlan Routing** using **Packet Tracer**

2. Background: VLAN

Modern switches use virtual local-area networks (VLANs) to improve network performance by separating large Layer 2 broadcast domains into smaller ones. VLANs can also be used as a security measure by controlling which hosts can communicate. In general, VLANs make it easier to design a network to support the goals of an organization. VLAN trunks are used to span VLANs across multiple devices. Trunks allow the traffic from multiple VLANS to travel over a single link, while keeping the VLAN identification and segmentation intact.

In this lab, you will create VLANs on both switches in the topology, assign VLANs to switch access ports, verify that VLANs are working as expected, and then create a VLAN trunk between the two switches to allow hosts in the same VLAN to communicate through the trunk, regardless of which switch the host is actually attached to.

Topology



Addressing Table

Device (Hostname)	Interface	IP Address	Subnet Mask
PC1	NIC	172.17.10.21	255.255.255.0
PC2	NIC	172.17.20.22	255.255.255.0
PC3	NIC	172.17.30.23	255.255.255.0
PC4	NIC	172.17.10.24	255.255.255.0
PC5	NIC	172.17.20.25	255.255.255.0
PC6	NIC	172.17.30.26	255.255.255.0

Initial Port Assignments (Switches 2 and 3)

Ports	Assignment	Network
Fa0/1 – 0/5	802.1q Trunks (Native VLAN 99)	172.17.99.0 /24
Fa0/6 – 0/10	VLAN 30 – Guest (Default)	172.17.30.0 /24
Fa0/11 – 0/17	VLAN 10 – Faculty/Staff	172.17.10.0 /24
Fa0/18 – 0/24	VLAN 20 – Students	172.17.20.0 /24

Task 1: Prepare the Network

It is a good practice to disable any unused ports on the switches by putting them in shutdown. Disable allports on the switches:

```
Switch(config)#interface range fa0/1-24
Switch(config-if-range)#shutdown
Switch(config-if-range)#interface range gi0/1-2
Switch(config-if-range)#shutdown
```

Task 2: VLAN Configurations

- Configure the switch hostname
- Create VLANs on S2 and S3.

```
S1(config)#vlan 10
S1(config-vlan)#name faculty/staff
S1(config-vlan)#vlan 20
S1(config-vlan)#name students
S1(config-vlan)#vlan 30
S1(config-vlan)#name guest
S1(config-vlan)#end
```

Task 3: Verify that the VLANs have been created on S1.

```
S1#show vlan brief
VLAN Name Status Ports
---- -------------------------------- --------- -------------------------------
1 default active                       Fa0/1, Fa0/2, Fa0/4, Fa0/5, Fa0/6, Fa0/7,
                                  Fa0/8, Fa0/9, Fa0/10, Fa0/11, Fa0/12, Fa0/13,
                                  Fa0/14, Fa0/15, Fa0/16, Fa0/17, Fa0/18, Fa0/19,
                                  Fa0/20, Fa0/21, Fa0/22, Fa0/23,Fa0/24,Gi0/1,Gi0/2
10 faculty/staff active
20 students active
30 guest active
```

Task 4: Assign switch ports to VLANs on S2 and S3.

```
S3(config)#interface range fa0/6-10
S3(config-if-range)#switchport mode access
S3(config-if-range)#switchport access vlan 30
S3(config-if-range)#no shutdown

S3(config-if-range)#interface range fa0/11-17
S3(config-if-range)#switchport mode access
S3(config-if-range)#switchport access vlan 10
S3(config-if-range)#no shutdown

S3(config-if-range)#interface range fa0/18-24
S3(config-if-range)#switchport mode access
S3(config-if-range)#switchport access vlan 20
S3(config-if-range)#no shutdown
```

Task 5: Configure the Trunking ports on all switches.

```
S1(config)#interface range fa0/1-2
S1(config-if-range)#switchport mode trunk
S1(config-if-range)#no shutdown
S1(config-if-range)#end
```

Task 6: Add a Router R1 with the switch s1 and configure subinterfaces on R1 using the 802.1Q encapsulation.

a. Create the subinterface G0/0.10.

- Set the encapsulation type to 802.1Q and assign VLAN 10 to the subinterface.
- Refer to the **Address Table** and assign the correct IP address to the subinterface.

R1(config)# **int g0/0.10**
R1(config-subif)# **encapsulation dot1Q 10**
R1(config-subif)# **ip address 172.17.10.1 255.255.255.0**

b. Repeat for the G0/0.20 subinterface.

R1(config-subif)# **int g0/0.20**
R1(config-subif)# **encapsulation dot1Q 30**
R1(config-subif)# **ip address 172.17.20.1 255.255.255.0**

c. Repeat for the G0/0.30 subinterface.

R1(config-subif)# **int g0/0.30**
R1(config-subif)# **encapsulation dot1Q 30**
R1(config-subif)# **ip address 172.17.30.1 255.255.255.0**