Experiment No. : 08

Experiment Name : Configure Virtual Local Area Network (VLAN).

Required Software : Cisco Packet Tracer 7.2

Description:

A virtual LAN (Local Area Network) is a logical subnetwork that can group together a collection of devices from different physical LANs. Larger business computer networks often set up VLANs to re-partition their network for improved traffic management. Several different kinds of physical networks support virtual LANs including both Ethernet and Wi-Fi.

When set up correctly, virtual LANs can improve the overall performance of busy networks. VLANs are intended to group together client devices that communicate with each other most frequently. The traffic between devices split across two or more physical networks ordinarily needs to be handled by a network's core routers, but with a VLAN that traffic can be handled more efficiently by network switches instead. VLANs also bring additional security benefits on larger networks by allowing greater control over which devices have local access to each other. Wi-Fi guest networks are often implemented using wireless access points that support VLANs.

In this experiment we are using two switches which are located in different places under a same network. Each switch has four PCs under it, two for IT department and two for HR department of an office. We have to connect the IT department's PCs together and HR department's PCs together, so that same department's PCs can communicate with each other although they belong to different switches.

IP addresses assigned to each department are given below:

IT department	198.168.1.1 – 198.168.1.10
HR department	198.168.1.11 – 198.168.1.20

Configuration Procedure:

1. Open Cisco Packet Tracer.
2. Pick up two switches from the network devices.
3. We have picked up four PCs for each switch from end devices.
4. Connect the switches with each other using Copper Cross-Over.
5. Connect remaining components using Copper Straight-Through.
6. Let us consider the name of the VLAN under IT department as "vlan 10" and VLAN under HR department as "vlan 20".
7. In figure 01 we have indicated the IT department's PCs and HR department's PCs as desired.

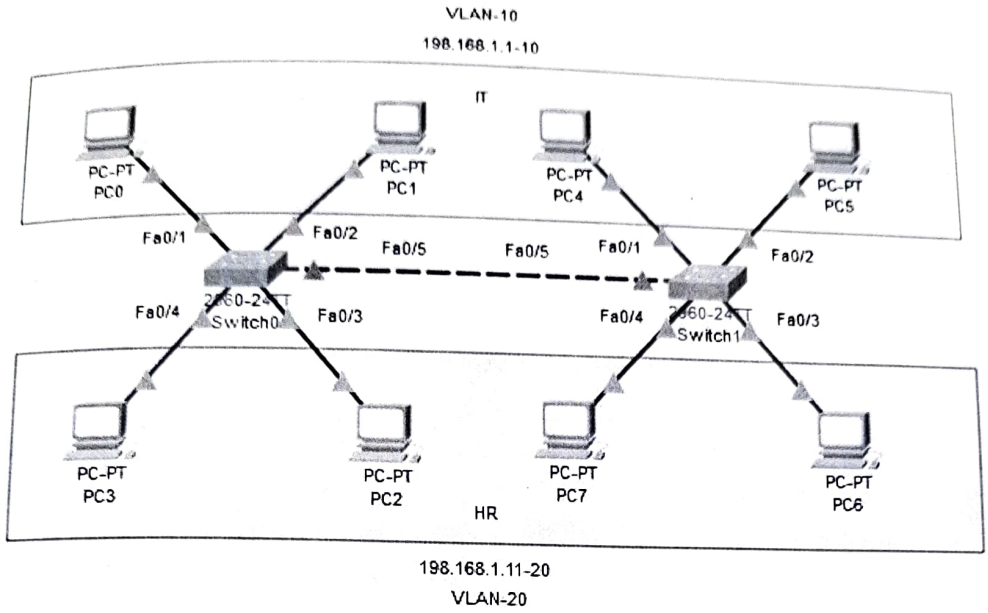


Figure 01: Configuration of Virtual Local Area Network (VLAN)

8. For VLAN configuration write down the following CLI commands in each switch.

CLI Commands for Switch 1:

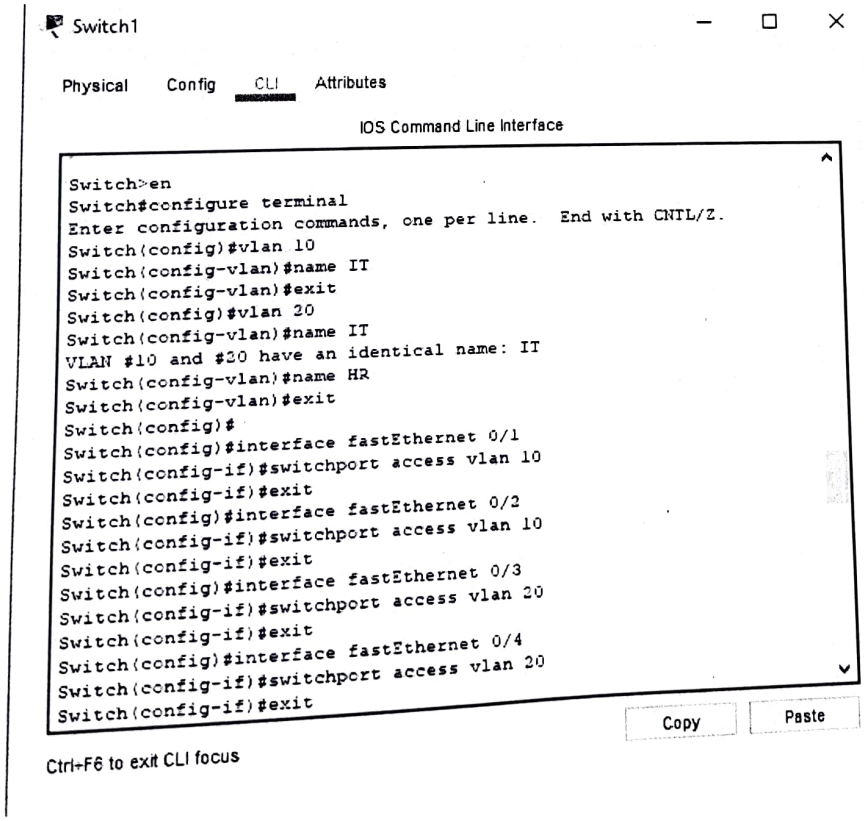


Figure 02: CLI commands for switch configuration.

```
Switch>en
Switch#configure terminal
Switch(config)#vlan 10
Switch(config-vlan)#name IT
Switch(config-vlan)#exit
Switch(config)#vlan 20
Switch(config-vlan)#name HR
Switch(config-vlan)#exit
Switch(config)#interface fastEthernet 0/1
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/2
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/3
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
Switch(config)#interface fastEthernet 0/4
Switch(config-if)#switchport access vlan 20
Switch(config-if)#exit
```

Similarly configure the other switch.

9. For switch configuration write down the following commands in CLI.

   CLI Commands for Switch 1:

```
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface fastEthernet 0/5
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#interface range fastEthernet 0/1-4
Switch(config-if-range)#switchport mode access
```

Figure 03: CLI commands for switch configuration.

```
Switch#configure terminal
Switch(config)#interface fastEthernet 0/5
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#interface range fastEthernet 0/1-4
Switch(config-if-range)#switchport mode access
```

10. To know which port is assigned for which VLAN use the following command.

    Switch#show vlan brief

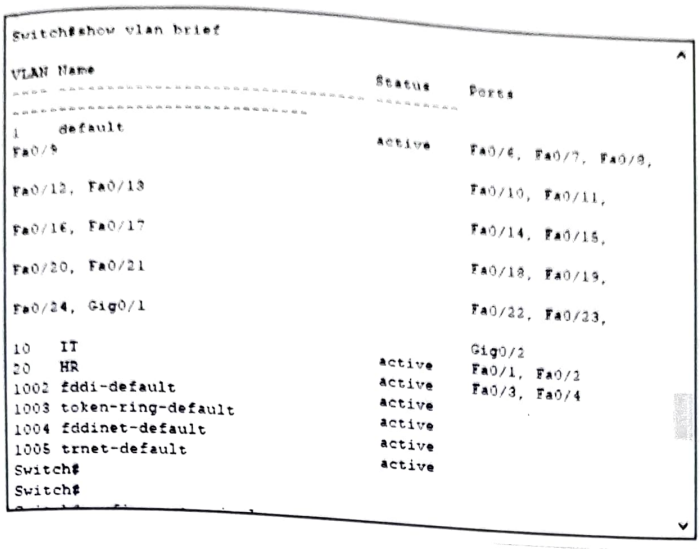


Figure 04: VLAN brief.

11. Now for the host configuration click on each PC to configure with different IP addresses.

For Switch 0:

PC 0	ip address: 198.168.1.1	[under vlan 10 (IT department)]
PC 1	ip address: 198.168.1.2	[under vlan 10 (IT department)]
PC 2	ip address: 198.168.1.11	[under vlan 20 (HR department)]
PC 3	ip address: 198.168.1.12	[under vlan 20 (HR department)]

For Switch 1:

PC 4	ip address: 198.168.1.3	[under vlan 10 (IT department)]
PC 5	ip address: 198.168.1.4	[under vlan 10 (IT department)]
PC 6	ip address: 198.168.1.13	[under vlan 20 (HR department)]
PC 7	ip address: 198.168.1.14	[under vlan 20 (HR department)]

Simulation Procedure:

In a network, data must be sent and received successfully. We have to follow the following steps for a successful communication. There are two methods for sending data to desired receiver.

Method 1:

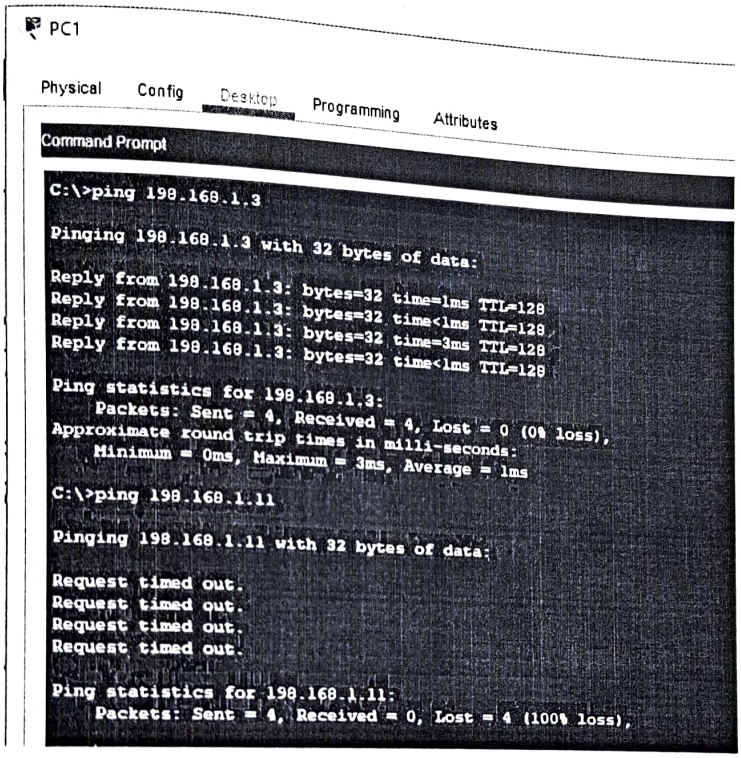
1. Select the packet sign (a simple PDU) from secondary toolbar.
2. Select the sender PC.
3. Select receiver PC.
4. Now click the simulation mode from bottom right corner of the screen, or press Shift+S.
5. Click auto play or play button to see the simulations.

Method 2:

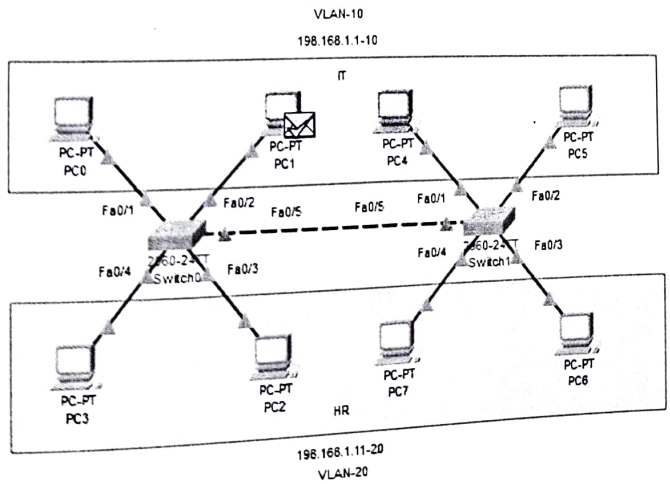
1. Click the sender PC.
2. Select command prompt from 'Desktop' option.
3. Write the following statement to send packet from the selected PC/laptop.

ping "receiver PC/laptop's IP address"

For example in this experiment we have sent packet from user PC 1 to user PC 4 which belong to same department. So we have written down the IP address of PC 4. But packets cannot be sent to a [PC i.e. PC 2] which belong to different department. (See the following figure 05).



(i)



(ii)

Figure 05: Successful simulation