EX.NO:03

Date :

VLAN Configuration

Aim:

To configure Virtual Local Area Networks (VLANs) on switches and wireless access points in order to logically segment a network into smaller broadcast domains. This improves network performance, enhances security, simplifies management, and allows efficient utilization of network resources by grouping devices based on function, department, or application rather than physical location.

Theory: VLAN Configuration:

A Virtual Local Area Network (VLAN) allows logical segmentation of a network into different broadcast domains, regardless of physical location. Devices in the same VLAN can communicate directly, while devices in different VLANs require a Layer 3 device (Router or Layer 3 switch) for communication.

Router-on-a-Stick is a method of inter-VLAN routing in which a single router interface is divided into multiple sub-interfaces, each assigned to a VLAN. This allows communication between VLANs while keeping them logically separated.

Required Equipment:

1. Switch (Managed): To configure and manage VLANs.
2. Router (or Layer 3 Switch): For inter-VLAN routing if communication is needed between VLANs.
3. End Devices: PCs, laptops, servers, etc.
4. Ethernet Cables (Cat5e/Cat6): To connect devices.
5. Packet Tracer (Software): For simulation of VLAN configuration.

Procedure: VLAN Configuration in Cisco Packet Tracer

1. Build the Topology

1. Open Cisco Packet Tracer.
2. Drag and drop devices: PCs, a switch, and (if needed) a router for inter-VLAN routing.

3. Connect PCs to the switch using copper straight-through cables.

2. Create VLANs on the Switch

1. Click on the switch → go to CLI tab.
2. Enter global configuration mode and create VLANs:
3. Switch> enable
4. Switch# configure terminal
5. Switch(config)# vlan 10
6. Switch(config-vlan)# name Sales
7. Switch(config-vlan)# exit
8. Switch(config)# vlan 20
9. Switch(config-vlan)# name HR
10. Switch(config-vlan)# exit

3. Assign Ports to VLANs

1. Assign specific switch ports to VLANs (e.g., FastEthernet 0/1 to VLAN 10, FastEthernet 0/2 to VLAN 20):
2. Switch(config)# interface fastEthernet 0/1
3. Switch(config-if)# switchport mode access
4. Switch(config-if)# switchport access vlan 10
5. Switch(config-if)# exit
6. Switch(config)# interface fastEthernet 0/2
7. Switch(config-if)# switchport mode access
8. Switch(config-if)# switchport access vlan 20
9. Switch(config-if)# exit

4. Configure IP Addresses on PCs

1. Click on PC1 → Desktop → IP Configuration.

- Example for VLAN 10 (Sales):
  - IP: 192.168.10.2
  - Subnet: 255.255.255.0
  - Gateway: 192.168.10.1

2. **On PC2 (VLAN 20 - HR):**
   - IP: 192.168.20.2
   - Subnet: 255.255.255.0
   - Gateway: 192.168.20.1
3. **Repeat for other PCs according to their VLAN.**

5.Configure Router-on-a-Stick (Inter-VLAN Routing)

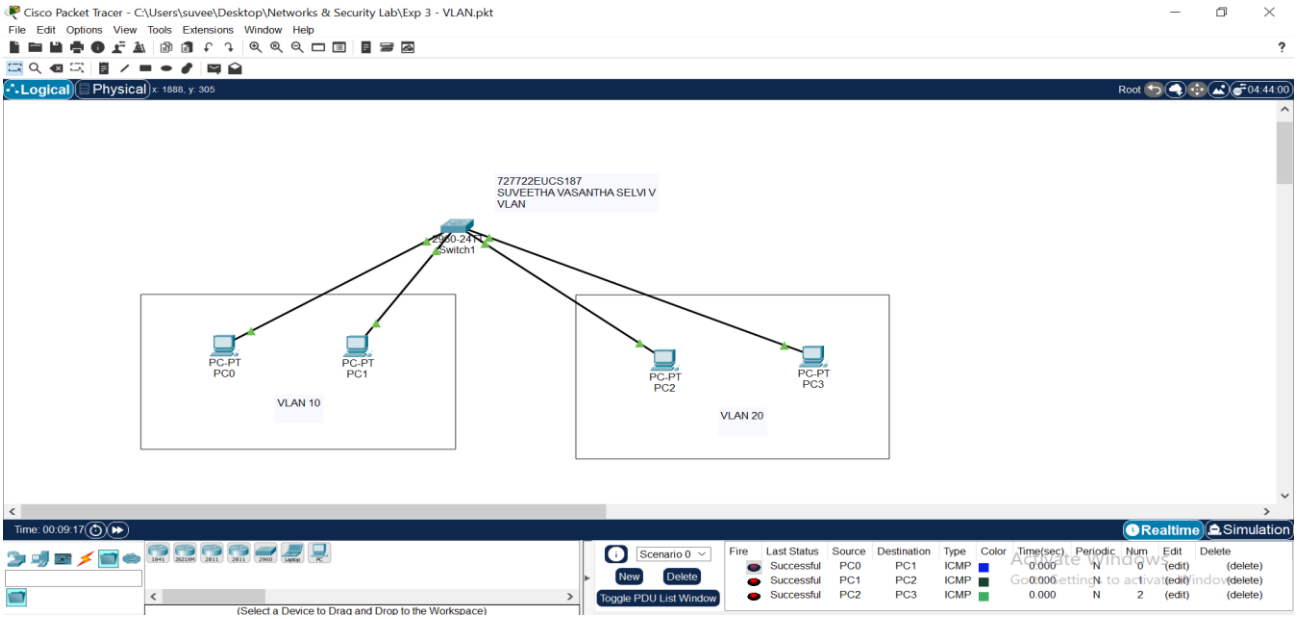
```
1.Router> enable
2.Router# configure terminal
3.Router(config)# interface gigabitEthernet 0/0
4.Router(config-if)# no shutdown
5.Router(config)# interface gigabitEthernet 0/0.10
6.Router(config-subif)# encapsulation dot1Q 10
7.Router(config-subif)# ip address 192.168.10.1 255.255.255.0
8.Router(config-subif)# exit
9.Router(config)# interface gigabitEthernet 0/0.20
10.Router(config-subif)# encapsulation dot1Q 20
11.Router(config-subif)# ip address 192.168.20.1 255.255.255.0
12.Router(config-subif)# exit
```

6.Test Connectivity

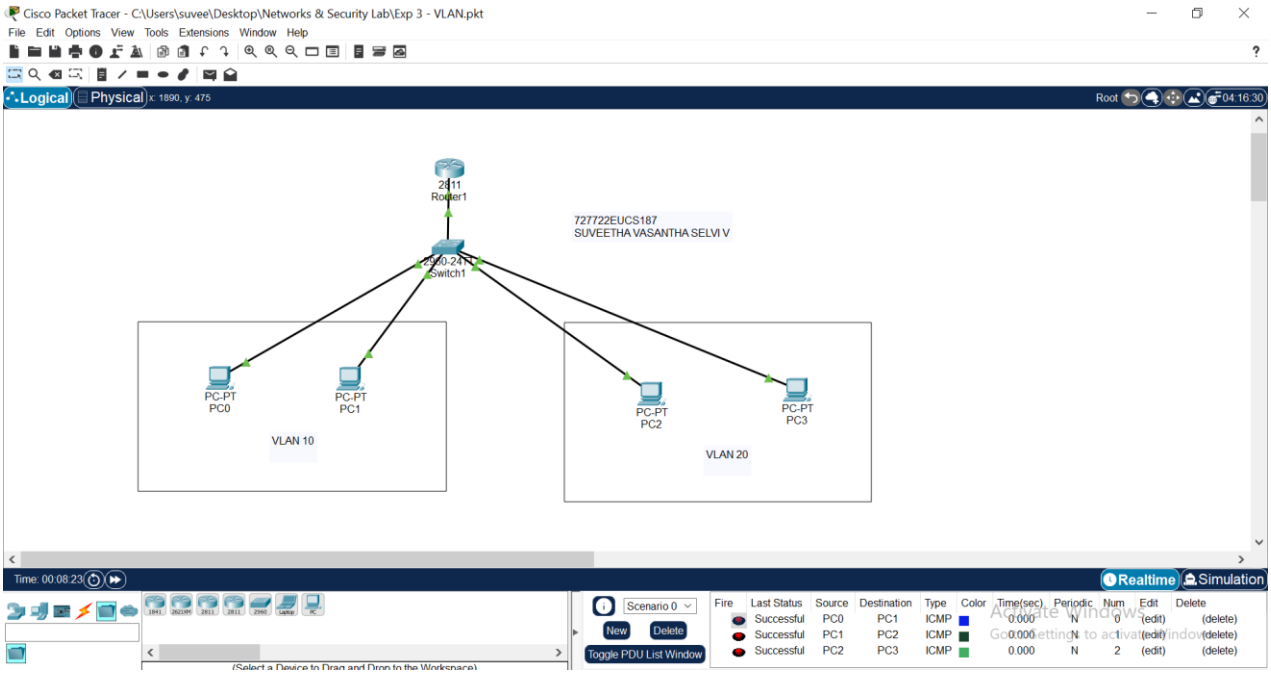
1. **Within the same VLAN:**
   - Open Command Prompt on PC1 and ping another PC in VLAN 10 (e.g., PC3).
   - Ping should succeed.
2. **Between different VLANs:**
   - If no router is configured, ping will fail (VLAN isolation).
   - To allow inter-VLAN communication, configure a Router-on-a-Stick or a Layer 3 switch.

MODEL OUTPUT:

VLAN USING SWITCH ALONE:



VLAN CONGIGURATION USING SWITCH AND ROUTER:



RESULTS:

VLANs were successfully configured, and with the help of the router, devices in different VLANs were able to communicate with each other.