Practical 9: To implement and simulate VLAN (Virtual LAN) in Packet Tracer for network segmentation and verify inter-VLAN communication using a router.

Objectives

1. To understand the concept of VLANs and how they help in network segmentation within a switched network.
2. To create and configure multiple VLANs on a managed switch and assign ports to specific VLANs.
3. To configure inter-VLAN communication using a router (Router-on-a-Stick configuration).
4. To verify VLAN functionality and inter-VLAN communication using network testing commands.

Lab Task

1. Build the Network Topology as shown below

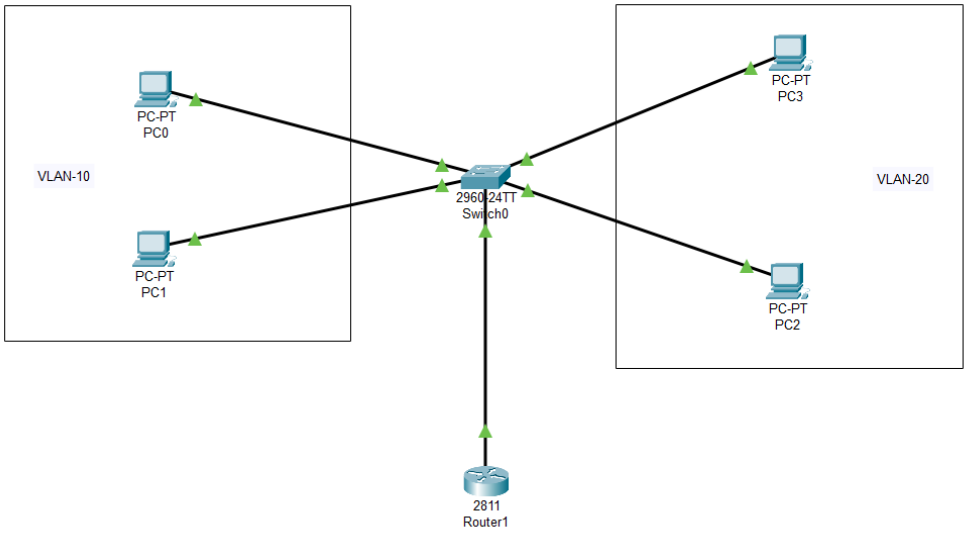

Figure 1: Network Topology for VLAN and Inter-VLAN Communication

2. Configure All Devices

- **PC Configuration:**
  - Assign a static IP address, subnet mask, and default gateway to each PC.
  - PCs belonging to the same VLAN should be in the same subnet.
- **Switch Configuration:**
  - Create VLANs (e.g., VLAN 10 for LAB-1, VLAN 20 for LAB-2).

- Assign specific switch ports to respective VLANs.
- Configure the port connected to the router as a trunk port.

- **Router Configuration (Router-on-a-Stick):**
  - Configure subinterfaces on the router's FastEthernet interface.
  - Assign each subinterface an IP address corresponding to the VLAN subnet.
  - Enable encapsulation (dot1Q) for each subinterface.

3. Verify and Test Connectivity

- **VLAN Verification:** Use the `show vlan brief` command on the switch to confirm VLAN creation and port assignments.
- **Trunk Verification:** Use `show interfaces trunk` to confirm that trunking is active.
- **Ping Test:** Verify that devices within the same VLAN can communicate directly and that devices in different VLANs can communicate via the router.

Report Submission Requirements

1. IP Address and VLAN Number Generation

- VLAN IP Generator website: https://chetankamani.github.io/vlan-helper/
- Provide a screenshot showing the generated IP addresses and VLAN numbers.

2. Network Topology Diagram

- Provide a clear screenshot of the VLAN network topology created in Packet Tracer.

3. Configuration of All Devices

- **PC Configurations:** Provide screenshots of the IP Configuration window for all PCs showing assigned IPs and gateways.
- **Switch Configuration:** Include screenshots of VLAN creation and port assignment commands.
- **Router Configuration:** Copy and paste the full CLI configuration output of the subinterfaces.

4. VLAN Verification

- Provide screenshots of `show vlan brief` and `show interfaces trunk` outputs.

5. Connectivity Testing

- **Ping Results:** Include screenshots of successful ping tests between devices of the same VLAN and between different VLANs (to confirm inter-VLAN routing).