

Assignment: Configuration of Multiple VLANs with Inter-VLAN Routing

Course: Computer Networks

Topic: VLAN, Trunking, and Inter-VLAN Routing

Tool: Cisco Packet Tracer

Problem Statement

Design and configure a network consisting of multiple VLANs with multiple PCs using a Layer-2 switch and a router. Implement Inter-VLAN Routing so that PCs in different VLANs can communicate with each other.

Network Requirements

VLAN Details

VLAN ID	VLAN Name	Subnet
10	STUDENT	192.168.10.0 /24
20	FACULTY	192.168.20.0 /24
30	ADMIN	192.168.30.0 /24

PC Allocation

PC	VLAN	IP Address	Default Gateway
PC1	VLAN 10	192.168.10.2	192.168.10.1
PC2	VLAN 10	192.168.10.3	192.168.10.1
PC3	VLAN 20	192.168.20.2	192.168.20.1
PC4	VLAN 20	192.168.20.3	192.168.20.1
PC5	VLAN 30	192.168.30.2	192.168.30.1

Tasks to be Performed

Task 1: Switch Configuration

1. Create VLANs 10, 20, and 30 on the switch.
2. Assign appropriate switch ports to each VLAN in **access mode**.

3. Configure the switch port connected to the router in **trunk mode** using **IEEE 802.1Q** encapsulation.

Task 2: Router Configuration (Router-on-a-Stick)

1. Configure sub-interfaces on the router for VLAN 10, VLAN 20, and VLAN 30.
2. Assign appropriate IP addresses to each sub-interface.
3. Enable 802.1Q encapsulation on each sub-interface.
4. Ensure the physical interface is enabled.

Task 3: PC Configuration

1. Manually configure IP address, subnet mask, and default gateway on each PC.
2. Verify connectivity by:
 - Pinging default gateway
 - Pinging PCs in other VLANs

Verification Tasks

Students must demonstrate:

1. Successful ping between PCs **within the same VLAN**
2. Successful ping between PCs **across different VLANs**
3. Proper VLAN assignment using in switch.
4. Proper trunk configuration using:

All command outputs must be copied and pasted in the submission.

Submission Guidelines

The assignment submission must include:

1. Switch CLI configuration (copy-paste)
2. Type `show running-config` in the Switch (copy-paste), may need to `en` the switch.
3. Type `show show vlan brief` in the Switch cli (copy-paste).
4. Type `show interfaces trunk` in the Switch cli (copy-paste).
5. Type `show mac address-table` in the Switch cli (copy-paste) after all inter vlan and intra vlan packet sending.
6. Type `show running-config` in the router cli (copy-paste), may need to `en` the router.
7. Go to the command prompt of all Pcs, type `ipconfig/ifconfig` (copy-paste)