**Communications and Information Engineering Program**
**Computer Networks - CIE 447**
**Project 1**
Data Link Layer - VLANs

## PROJECT DESCRIPTION

The goal of this project is to get introduced to the concept and implementation of VLANs (Virtual LANs). This project is divided into five parts in order to ensure a full understanding of the different aspects of the VLAN.

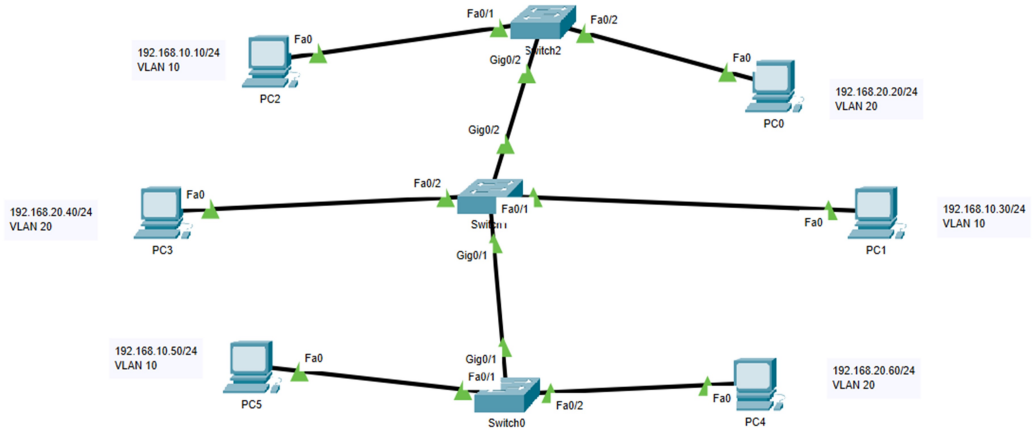
A VLAN is a group of devices on one or more LANs that are configured to communicate as if they were attached to the same switch, when in fact they are located on a number of different LAN segments. Because VLANs are based on logical instead of physical connections, they are extremely flexible.

VLANs define broadcast domains in a Layer 2 network. A broadcast domain is the set of all devices that will receive broadcast frames originating from any device within the set. Broadcast domains are typically bounded by routers because routers do not forward broadcast frames. On the other hand, layer 2 switches can be also used to create broadcast domains based on the configuration of such switches.

In this project, using Cisco Packet tracer, you will build and emulate a network to develop a deeper insight into how VLANs operate.

## PART 1: NETWORK CONFIGURATION

Regarding the following network topology,




1) Create the network topology using Packet Tracer
2) Configure the IP addresses of PCs according to the given table
3) Configure the hostnames of the switches

| Device | Interface | IP Address | Subnet Mask | VLAN |
|---|---|---|---|---|
| PC0 | NIC | 192.168.20.20 | 255.255.255.0 | 20 |
| PC1 | NIC | 192.168.10.30 | 255.255.255.0 | 10 |
| PC2 | NIC | 192.168.10.10 | 255.255.255.0 | 10 |
| PC3 | NIC | 192.168.20.40 | 255.255.255.0 | 20 |
| PC4 | NIC | 192.168.20.60 | 255.255.255.0 | 20 |
| PC5 | NIC | 192.168.10.50 | 255.255.255.0 | 10 |

**In each of the following parts, follow the given steps to answer the questions.**

## PART 2: VIEW THE DEFAULT VLAN CONFIGURATION

***Step 1: Verify connectivity between PCs on the same network***

1) Can PC1 ping PC2?
2) Can PC3 ping PC4?
3) Can PC0 ping PC5?

Verify your answers by taking screen-shots.

- Q1. What benefit will be configuring VLANs provide to the current configuration?

## PART 3: CONFIGURE VLANS

***Step 1: Create and name VLANs on S2***

Create the following VLANs. Names are case-sensitive:

1) VLAN 10: Faculty/Staff
2) VLAN 20: Students
3) VLAN 99: Management

***Step 2: Verify the VLAN configuration***

- Q2. Which command will only display the VLAN name, status, and associated ports on a switch S1?

Verify your answers by taking screen-shots.

***Step 3: Create the VLANs on S0 and S1***

Using the same commands from Step 1, create and name the same VLANs on S0 and S1.

***Step 4: Verify the VLAN configuration***

- Q3. Which command will only display the VLAN name, status, and associated ports on a switches S0 and S1?

Verify your answers by taking screen-shots.

## PART 4: ASSIGN VLANS TO PORTS

***Step 1: Assign VLANs to the active ports on S2***

Assign the VLANs to the following ports:

1) VLAN 10: Fast Ethernet fa0/1
2) VLAN 20: Fast Ethernet fa0/2

***Step 2: Assign VLANs to the active ports on S0 and S1***

Configure S0 and S1 such that to use the same VLAN access port assignments as S2

***Step 3: Verify the loss of connectivity***

Previously, PCs that shared the same network could ping each other successfully. Now, try pinging between PC1 and PC2. Note that the access ports are assigned to the appropriate VLANs.

- Q4. Are the pings successful? Why?
- Q5. What could be done to resolve this issue?

Verify your answers by taking screen-shots.

## PART 5: CONFIGURE TRUNKS

***Step 1: Configure trunking on S1 and use VLAN 99 as the native VLAN***

Configure G0/1 and G0/2 interfaces on S1 for trunking
Configure VLAN 99 as the native VLAN for G0/1 and G0/2 interfaces on S1

- Q6. pings between PCs on the same VLAN are now successful. Why?
- Q7. Verify trunking is enabled on S0 and S2
- Q8. Which active VLANs are allowed to across the trunk?

Verify your answers by taking screen-shots.

***Step 2: Correct the native VLAN mismatch on S0 and S2***

Configure VLAN 99 as the native VLAN for the appropriate interfaces on S0 and S2.

- Q9. Verify configurations on S0 and S2.
- Q10. Use the **show VLAN** command to display information regarding configured VLANs. Why is port G0/1 on S2 no longer assigned to VLAN 1?

Verify your answers by taking screen-shots.

## DELIVERABLES

You are required to submit electronically a single compressed folder including:

1) Packet Tracer file of the configured network
2) Your CLI commands used to complete each step, categorized per part following the project description
3) A complete .pdf report including your procedure, outcomes, screen-shots of the outcomes, and answers of the questions Q1–Q10, numbered properly.

## INSTRUCTIONS

1) This is an **individual** project.
2) Any **copied reports**, either fully or partially, will receive 0 **points**. This applies to both the original and the copy.
3) Any references used should be properly cited.
   Note: **Chapter 6 of CCNA Module 2 is a helpful reference.**
4) **Late submissions** are treated as follows: **15% deduction per day** for a **maximum of 2 days**, after which no submissions are accepted.
5) Grading will depend on:
   - **40%**: Completeness and correctness of deliverables (Packet Tracer + Screen-Shots)
   - **40%**: Clarity of procedure, steps and answers to the questions (as per the .pdf report)
   - **20%**: Report writing and organization