Inter-VLAN Routing using Layer 3 Switch in Cisco Packet Tracer

# 1. Introduction

This report presents the configuration and implementation of VLANs and Inter-VLAN Routing using a Layer 3 switch in Cisco Packet Tracer. Virtual Local Area Networks (VLANs) help in logically segmenting a network into different broadcast domains. A Layer 3 switch combines the functionality of both Layer 2 switching and Layer 3 routing, allowing direct communication between VLANs without requiring an external router.

# 2. Objectives

The objectives of this assignment are:

* To create and configure VLANs on a Layer 3 switch.
* To assign switch ports to respective VLANs.
* To configure Switched Virtual Interfaces (SVIs) for each VLAN.
* To enable Inter-VLAN Routing on a Layer 3 switch.
* To verify communication between hosts in different VLANs.

# 3. Theory

Layer 3 switches, also called multilayer switches, provide both Layer 2 switching and Layer 3 routing functionalities. Unlike traditional Layer 2 switches, they can perform IP routing between VLANs by using Switched Virtual Interfaces (SVIs). This eliminates the need for an external router in small to medium networks.

Virtual Local Area Networks (VLANs) allow network administrators to logically separate networks at the data link layer. However, by default, devices in separate VLANs cannot communicate. Inter-VLAN routing is the process of allowing communication between different VLANs using either a router-on-a-stick method or a Layer 3 switch with SVIs.

# 4. Implementation Steps

The following steps were carried out in Cisco Packet Tracer:

1. Drag and drop a Layer 3 switch (Cisco 3560) and two PCs onto the workspace.
2. Create VLANs 10 (Sales) and 20 (HR).
3. Assign ports Fa0/1 and Fa0/2 to VLAN 10 and VLAN 20 respectively.
4. Enable Layer 3 routing using the 'ip routing' command.
5. Configure SVIs with IP addresses for VLAN 10 and VLAN 20.
6. Assign IP addresses and gateways to PCs according to the VLAN they belong to.
7. Verify connectivity by pinging between PCs across VLANs.

# 5. IP Addressing Table

|  |  |  |  |
| --- | --- | --- | --- |
| Device | Interface | IP Address | VLAN |
| Layer 3 Switch | VLAN 10 (SVI) | 192.168.10.1 | 10 |
| Layer 3 Switch | VLAN 20 (SVI) | 192.168.20.1 | 20 |
| PC1 | NIC | 192.168.10.10 | 10 |
| PC2 | NIC | 192.168.20.10 | 20 |

# 6. Network Topology Diagram

The topology consists of a Layer 3 switch with two PCs connected. PC1 is connected to Fa0/1 (VLAN 10), and PC2 is connected to Fa0/2 (VLAN 20). The Layer 3 switch performs Inter-VLAN Routing through its SVIs. (In the actual Packet Tracer file, this can be visually represented using the workspace diagram).

# 7. Verification of Connectivity

To verify the configuration, the following tests were performed:

* Ping from PC1 to its gateway (192.168.10.1).
* Ping from PC2 to its gateway (192.168.20.1).
* Ping from PC1 (192.168.10.10) to PC2 (192.168.20.10).

Successful ping replies confirm that Inter-VLAN Routing is working correctly through the Layer 3 switch.

# 8. Conclusion

In this assignment, VLANs were configured and Inter-VLAN Routing was implemented on a Layer 3 switch. The configuration allowed communication between devices in different VLANs without using an external router. This demonstrates how Layer 3 switches can simplify network design and improve performance by integrating routing and switching capabilities.