

Lab 12

Configure VLAN & Inter-VLAN Routing

Web-Link:

<https://computernetworking747640215.wordpress.com/2018/07/05/vlan-configuration-on-a-cisco-switch-in-packet-tracer/>

Lab 12 - Task

Task 1;

What is difference between “VLAN & Inter-VLAN Routing”, explain with Example (draw structure in cisco)

VLAN (Virtual Local Area Network)

A VLAN is a logical subdivision of a network, created on a switch to divide it into multiple isolated broadcast domains. This isolation helps reduce broadcast traffic, enhance security, and manage devices more effectively.

Working of VLANs:

1. Switch Ports and VLAN Membership:

- Each switch port is assigned to a VLAN.
- Devices connected to the same VLAN can communicate directly without involving a router.

2. Broadcast Domains:

- VLANs limit the scope of broadcast traffic to within the VLAN.
- A broadcast sent by a device in VLAN 10 will only reach other devices in VLAN 10, not VLAN 20.

3. Tagging (802.1Q Standard):

- VLANs use tagging to identify VLAN membership for traffic traveling over trunk links (links between switches).
- Untagged traffic is considered part of the **native VLAN**.

4. Communication within a VLAN:

- Traffic within a VLAN is switched at Layer 2.
- The switch uses the MAC address table to forward packets to the appropriate port.

Benefits of VLANs:

- **Segmentation:** Logical grouping of devices, regardless of physical location.
- **Enhanced Security:** Devices in different VLANs cannot communicate without routing.
- **Improved Performance:** Reduces unnecessary broadcast traffic.

Inter-VLAN Routing

Inter-VLAN Routing enables devices in different VLANs to communicate. Since VLANs are isolated at Layer 2, routing is required at Layer 3 to forward traffic between VLANs.

Working of Inter-VLAN Routing:

1. Traditional Method (Router-on-a-Stick):

- A single router interface is configured as a **trunk port** and allows traffic from multiple VLANs.
- Subinterfaces are created on the router for each VLAN, each with its own IP address (gateway for that VLAN).
- Traffic is tagged with VLAN IDs and forwarded between VLANs using the router.

2. Modern Method (Layer 3 Switch):

- A Layer 3 switch combines the functionality of a switch and a router.
- VLANs are configured on the switch, and **SVIs (Switched Virtual Interfaces)** act as gateways for VLANs.
- The switch routes traffic internally between VLANs, improving performance and reducing latency.

Steps in Inter-VLAN Communication:

1. Device Sends Traffic to Another VLAN:

- The device sends traffic to its VLAN's default gateway (router or SVI).

2. Routing:

- The router or Layer 3 switch receives the traffic, inspects the destination IP, and forwards it to the appropriate VLAN.

3. Forwarding:

- The traffic is forwarded to the destination device within the target VLAN.

Example Scenario:

- **VLAN 10 (192.168.1.0/24):** PCs in an HR department.
- **VLAN 20 (192.168.2.0/24):** PCs in an IT department.

To allow a PC in VLAN 10 to communicate with a PC in VLAN 20:

1. Traffic from VLAN 10 is tagged and sent to the router or Layer 3 switch.
2. The router checks the routing table, identifies VLAN 20, and forwards the traffic accordingly.
3. The receiving device in VLAN 20 gets the traffic.