**Computer** **Networks**

***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)

**Answer**

### ****VLAN vs Inter-VLAN Routing****

**VLAN** and **Inter-VLAN Routing** are related concepts in networking but serve different purposes. Here's the difference between the two, with examples:

### 1. ****VLAN (Virtual Local Area Network)****

A **VLAN** is a logical grouping of devices within a physical network, used to segment a network into smaller, isolated broadcast domains. Devices within the same VLAN can communicate directly with each other, even if they are on different physical switches, as long as they are configured in the same VLAN.

#### Key Points about VLAN:

* It helps improve network efficiency and security.
* Devices in different VLANs cannot communicate directly unless routing is enabled.
* VLANs are typically used to group devices based on function, department, or purpose (e.g., Sales, HR).

#### Example of VLAN:

* **VLAN 10 (Sales Department)**: The Sales department is assigned to VLAN 10, with the IP address range **192.168.1.0/24**. All devices in this department, such as computers and printers, are placed in this VLAN.
* **VLAN 20 (HR Department)**: The HR department is assigned to VLAN 20, with the IP address range **192.168.2.0/24**. All devices in HR are placed in this VLAN.

**Devices in VLAN 10** can communicate with each other (e.g., computer at 192.168.1.10 with printer at 192.168.1.20), but **devices in VLAN 10 cannot communicate with VLAN 20** (e.g., the computer in Sales cannot directly talk to a computer in HR).

2. **Inter-VLAN Routing**

**Inter-VLAN Routing** allows communication between different VLANs. Since devices in different VLANs are in different broadcast domains, they cannot communicate directly with each other. A router (or a Layer 3 switch) is needed to route the traffic between the VLANs.

#### Key Points about Inter-VLAN Routing:

* It is used to enable communication between devices in different VLANs.
* Requires a **router** or a **Layer 3 switch** to perform the routing between VLANs.
* A router can perform Inter-VLAN Routing by using a feature called **Router-on-a-Stick**, where a single router inter
* face is configured to handle multiple VLANs using subinterfaces.

#### Example of Inter-VLAN Routing:

Continuing from the previous example:

* **VLAN 10 (Sales)** has the IP address range **192.168.1.0/24**.
* **VLAN 20 (HR)** has the IP address range **192.168.2.0/24**.

If a computer in VLAN 10 (e.g., **192.168.1.10**) wants to communicate with a computer in VLAN 20 (e.g., **192.168.2.10**), **Inter-VLAN Routing** must be enabled.

This is typically done by configuring a **router** or **Layer 3 switch**. The router will have interfaces configured with IP addresses in both VLANs:

* One interface with the IP address **192.168.1.1** (for VLAN 10)
* Another interface with the IP address **192.168.2.1** (for VLAN 20)

The computers in VLAN 10 and VLAN 20 will use their respective interfaces as the **default gateway**. When a computer in VLAN 10 wants to communicate with a device in VLAN 20, the traffic will be sent to the router’s interface in VLAN 10. The router will then forward the traffic to the appropriate VLAN 20 interface, allowing the devices in different VLANs to communicate.

#### How Inter-VLAN Routing Works:

* A **router** or **Layer 3 switch** connects the two VLANs.
* Devices in VLAN 10 and VLAN 20 send traffic to their respective default gateways (the router's interfaces), which route the traffic between the VLANs.
* **witch** connects the devices in each VLAN, but the router performs the routing between the two VLANs.

### Key Differences:

| **Feature** | **VLAN** | **Inter-VLAN Routing** |
| --- | --- | --- |
| **Purpose** | Logical segmentation of a network into smaller broadcast domains | Allows communication between devices in different VLANs |
| **Communication** | Devices in the same VLAN can communicate directly | Devices in different VLANs need a router to communicate |
| **Device Required** | Switch (Layer 2) | Router or Layer 3 Switch |
| **Example** | Sales and HR departments in separate VLANs, but no communication between them | Enabling communication between Sales and HR departments |

