CCNA - VLANs and Inter-VLAN Routing

This document provides a detailed explanation of VLANs and Inter-VLAN Routing, which are important topics in the Cisco Certified Network Associate (CCNA) certification.

1. VLANs (Virtual Local Area Networks)

A VLAN is a logical subgroup within a Local Area Network (LAN) that combines a group of devices from different physical LAN segments. VLANs allow network administrators to partition a network into separate, isolated segments to improve performance and security.

Key Characteristics of VLANs:

- - VLANs reduce broadcast domains.
- - They enhance network security.
- - VLANs simplify network management.
- - Devices in different VLANs cannot communicate without a Layer 3 device.

2. Types of VLANs

- - Default VLAN: VLAN 1 is the default VLAN on Cisco switches.
- - Data VLAN: Used to carry user-generated traffic.
- - Voice VLAN: Supports voice traffic from IP phones.
- - Management VLAN: Used for switch management traffic.
- - Native VLAN: Carries untagged traffic on trunk ports.

3. Inter-VLAN Routing

Inter-VLAN routing allows communication between different VLANs. Since VLANs are isolated at Layer 2, a Layer 3 device (such as a router or Layer 3 switch) is required to route traffic between them.

4. Methods of Inter-VLAN Routing

There are two primary methods of Inter-VLAN Routing:

1. 1. **Router-on-a-Stick**: Uses a single physical interface on the router to route traffic between VLANs using subinterfaces.
2. 2. **Layer 3 Switch Routing**: Uses switched virtual interfaces (SVIs) to perform routing on a Layer 3 switch.

5. Configuration Example: Router-on-a-Stick

Example configuration on a router:

```
interface GigabitEthernet0/0.10
 encapsulation dot1Q 10
 ip address 192.168.10.1 255.255.255.0

interface GigabitEthernet0/0.20
 encapsulation dot1Q 20
 ip address 192.168.20.1 255.255.255.0
```

6. Benefits of VLANs and Inter-VLAN Routing

- - Enhanced security by isolating sensitive data.
- - Improved performance through reduced broadcast domains.
- - Easier network management and scalability.