CCNA: Switching, Routing, and Wireless Essentials

**Module 4 – 4.1: Inter-VLAN Routing Configuration**

**A.  What is Inter-VLAN Routing?**

VLANs segment Layer 2 networks, but hosts in different VLANs can't communicate without routing. Inter-VLAN routing connects these VLANs. There are three methods:

1. Legacy Inter-VLAN routing: An outdated, non-scalable solution.
2. Router-on-a-Stick: Suitable for small to medium networks.
3. A diagram of a diagram

   AI-generated content may be incorrect.Layer 3 switch (SVIs): The most scalable option for medium to large organizations.

=> PCs on different networks communicate via a default gateway (router). Legacy inter-VLAN routing uses physical router interfaces for each VLAN. This quickly becomes unscalable as the number of VLANs increases, due to the limited number of physical interfaces on a router. Therefore, this method is outdated and no longer used in modern networks.

**B.  Router-on-a-Stick Inter-VLAN Routing**

- Router-on-a-stick routing solves the scalability problem of legacy inter-VLAN routing by using a single physical router interface.

- This interface is configured as an 802.1Q trunk, connected to a trunk port on a switch. The router uses *subinterfaces* (virtual interfaces associated with the single physical interface) to represent each VLAN.

- Each subinterface has its own IP address and VLAN assignment, enabling logical routing. Tagged traffic entering the router is directed to the appropriate subinterface, routed, and then sent out the physical interface with the new VLAN tag if necessary.

A computer diagram of a network

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=> As seen in the animation, PC1 on VLAN 10 is communicating with PC3 on VLAN 30. When R1 accepts the tagged unicast traffic on VLAN 10, it routes that traffic to VLAN 30, using its configured subinterfaces. Switch S2 removes the VLAN tag of the unicast frame and forwards the frame out to PC3 on port F0/23.

**C.  Inter-VLAN Routing on a Layer 3 Switch**

Modern inter-VLAN routing uses Layer 3 switches and Switched Virtual Interfaces (SVIs). An SVI is a virtual interface configured on a Layer 3 switch (also called a multilayer switch).

A diagram of a computer network

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The following are advantages of using Layer 3 switches for inter-VLAN routing:

* They are much faster than router-on-a-stick because everything is hardware switched and routed.
* There is no need for external links from the switch to the router for routing.
* They are not limited to one link because Layer 2 EtherChannels can be used as trunk links between the switches to increase bandwidth.
* Latency is much lower because data does not need to leave the switch in order to be routed to a different network.
* They more commonly deployed in a campus LAN than routers.

The only disadvantage is that Layer 3 switches are more expensive.