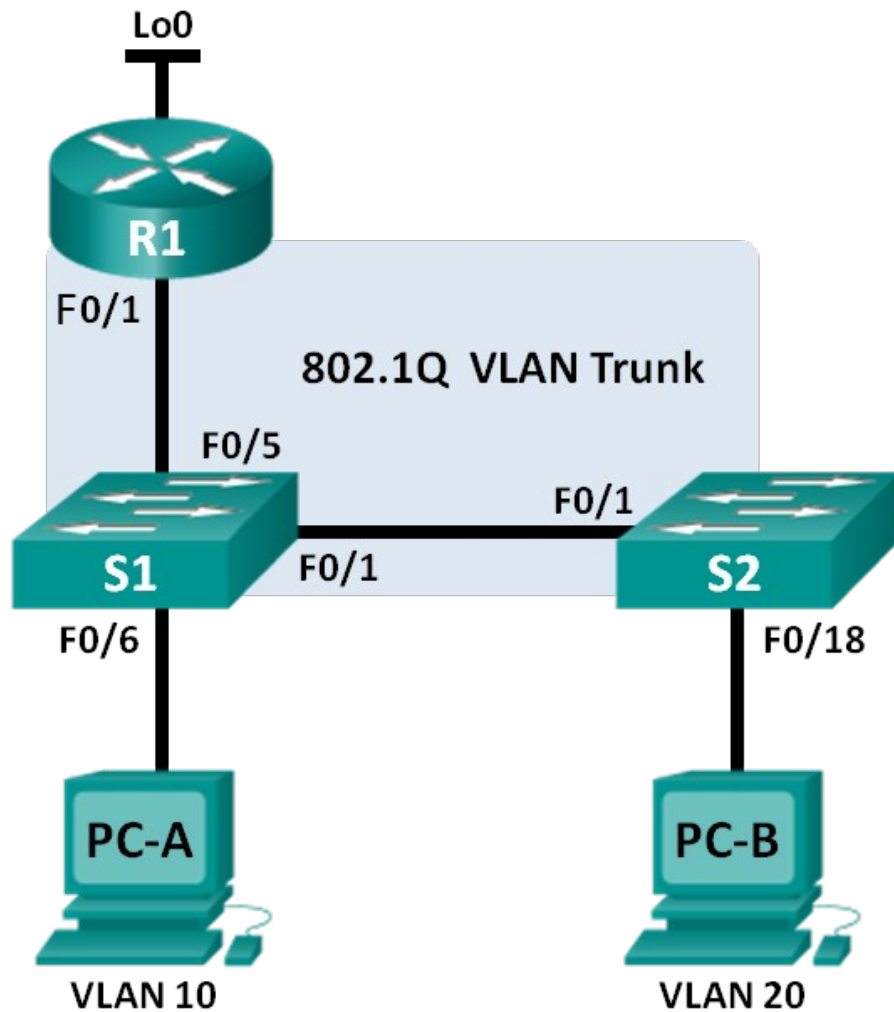# Lab – Configuring 802.1Q Trunk-Based Inter-VLAN Routing

Topology

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	F0/1.1	192.168.1.1	255.255.255.0	N/A
	F0/1.10	192.168.10.1	255.255.255.0	N/A
	F0/1.20	192.168.20.1	255.255.255.0	N/A
	Lo0	209.165.200.225	255.255.255.224	N/A
S1	VLAN 1	192.168.1.11	255.255.255.0	192.168.1.1
S2	VLAN 1	192.168.1.12	255.255.255.0	192.168.1.1
PC-A	NIC	192.168.10.3	255.255.255.0	192.168.10.1
PC-B	NIC	192.168.20.3	255.255.255.0	192.168.20.1

Switch Port Assignment Specifications

Ports	Assignment	Network
S1 F0/1	802.1Q Trunk	N/A
S2 F0/1	802.1Q Trunk	N/A
S1 F0/5	802.1Q Trunk	N/A
S1 F0/6	VLAN 10 – Students	192.168.10.0/24
S2 F0/18	VLAN 20 – Faculty	192.168.20.0/24

Objectives

Part 1: Build the Network and Configure Basic Device Settings

Part 2: Configure Switches with VLANs and Trunking

Part 3: Configure Trunk-Based Inter-VLAN Routing

Background / Scenario

A method of providing routing and connectivity for multiple VLANs is through the use of an 802.1Q trunk between one or more switches and a single router interface. This method is also known as router-on-a-stick inter-VLAN routing. In this method, the physical router interface is divided into multiple subinterfaces that provide logical pathways to all VLANs connected.

In this lab, you will configure trunk-based inter-VLAN routing and verify connectivity to hosts on different VLANs as well as with a loopback on the router.

Note: This lab provides minimal assistance with the actual commands necessary to configure trunk-based inter-VLAN routing. However, the required configuration commands are provided in Appendix A of this lab. Test your knowledge by trying to configure the devices without referring to the appendix.

Note: Make sure that the routers and switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

Required Resources

- 1 Router (Cisco 2811)
- 2 Switches (Cisco 2960)
- 2 PCs (Windows with terminal emulation program)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet cables as shown in the topology

Part 1: Build the Network and Configure Basic Device Settings

In Part 1, you will set up the network topology and configure basic settings on the PC hosts, switches, and router.

Step 1:   Cable the network as shown in the topology.

Step 2:   Configure PC hosts.

Step 3:   Initialize and reload the router and switches as necessary.

Step 4:   Configure basic settings for each switch.

a.   Console into the switch and enter global configuration mode.

b.   Copy the following basic configuration and paste it to the running-configuration on the switch.

```
no ip domain-lookup
service password-encryption
enable secret class
banner motd #
Unauthorized access is strictly prohibited. #
line con 0
password nis
login
logging synchronous
line vty 0 15
password nis
login
exit
```

c.   Configure the device name as shown in the topology.

d.   Configure the IP address listed in the Addressing Table for VLAN 1 on the switch.

e.   Configure the default gateway on the switch.

f.   Administratively deactivate all unused ports on the switch.

g.   Copy the running configuration to the startup configuration.

Step 5:   Configure basic settings for the router.

a.   Console into the router and enter global configuration mode.

b.   Copy the following basic configuration and paste it to the running-configuration on the router.

```
no ip domain-lookup
hostname R1
service password-encryption
enable secret class
banner motd #
Unauthorized access is strictly prohibited. #
Line con 0
password nis
login
logging synchronous
line vty 0 4
password nis
login
```

c. Configure the Lo0 IP address as shown in the Address Table. Do not configure sub-interfaces at this time. They will be configured in Part 3.

d. Copy the running configuration to the startup configuration.

Part 2: Configure Switches with VLANs and Trunking

In Part 2, you will configure the switches with VLANs and trunking.

Note: The required commands for Part 2 are provided in Appendix A. Test your knowledge by trying to configure S1 and S2 without referring to the appendix.

Step 1: Configure VLANs on S1.

a. On S1, configure the VLANs and names listed in the Switch Port Assignment Specifications table. Write the commands you used in the space provided.

_____

_____

_____

_____

b. On S1, configure the interface connected to R1 as a trunk. Also configure the interface connected to S2 as a trunk. Write the commands you used in the space provided.

_____

_____

c. On S1, assign the access port for PC-A to VLAN 10. Write the commands you used in the space provided.

_____

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Step 2: Configure VLANs on Switch 2.

a. On S2, configure the VLANs and names listed in the Switch Port Assignment Specifications table.

b. On S2, verify that the VLAN names and numbers match those on S1. Write the command you used in the space provided.

_____

c. On S2, assign the access port for PC-B to VLAN 20.

d. On S2, configure the interface connected to S1 as a trunk.

Part 3: Configure Trunk-Based Inter-VLAN Routing

In Part 3, you will configure R1 to route to multiple VLANs by creating subinterfaces for each VLAN. This method of inter-VLAN routing is called router-on-a-stick.

Note: The required commands for Part 3 are provided in Appendix A. Test your knowledge by trying to configure trunk-based or router-on-a-stick inter-VLAN routing without referring to the appendix.

Step 1: Configure a subinterface for VLAN 1.

a. Create a subinterface on R1 F0/1 for VLAN 1 using 1 as the subinterface ID. Write the command you used in the space provided.

_____

b. Configure the subinterface to operate on VLAN 1. Write the command you used in the space provided.

_____

c. Configure the subinterface with the IP address from the Address Table. Write the command you used in the space provided.

_____

Step 2: Configure a subinterface for VLAN 10.

a. Create a subinterface on R1 F0/1 for VLAN 10 using 10 as the subinterface ID.

b. Configure the subinterface to operate on VLAN 10.

c. Configure the subinterface with the address from the Address Table.

Step 3: Configure a subinterface for VLAN 20.

a. Create a subinterface on R1 F0/1 for VLAN 20 using 20 as the subinterface ID.

b. Configure the subinterface to operate on VLAN 20.

c. Configure the subinterface with the address from the Address Table.

Step 4: Enable the F0/1 interface.

Enable the F0/1 interface. Write the commands you used in the space provided.

_____

Step 5: Verify connectivity.

Enter the command to view the routing table on R1. What networks are listed?

_____

From PC-A, is it possible to ping the default gateway for VLAN 10? _____

From PC-A, is it possible to ping PC-B? _____

From PC-A, is it possible to ping Lo0? _____

From PC-A, is it possible to ping S2? _____

If the answer is **no** to any of these questions, troubleshoot the configurations and correct any errors.

Reflection

What are the advantages of trunk-based or router-on-a-stick inter-VLAN routing?

_____

_____

Appendix A – Configuration Commands

Switch S1

```
S1(config)# vlan 10
S1(config-vlan)# name Students
S1(config-vlan)# vlan 20
S1(config-vlan)# name Faculty
S1(config-vlan)# exit
S1(config)# interface f0/1
S1(config-if)# switchport mode trunk
S1(config-if)# interface f0/5
S1(config-if)# switchport mode trunk
S1(config-if)# interface f0/6
S1(config-if)# switchport mode access
S1(config-if)# switchport access vlan 10
```

Switch S2

```
S2(config)# vlan 10
S2(config-vlan)# name Students
S2(config-vlan)# vlan 20
S2(config-vlan)# name Faculty
S2(config)# interface f0/1
S2(config-if)# switchport mode trunk
S2(config-if)# interface f0/18
S2(config-if)# switchport mode access
S2(config-if)# switchport access vlan 20
```

Router R1

```
R1(config)# interface f0/1.1
R1(config-subif)# encapsulation dot1Q 1
R1(config-subif)# ip address 192.168.1.1 255.255.255.0
R1(config-subif)# interface f0/1.10
R1(config-subif)# encapsulation dot1Q 10
R1(config-subif)# ip address 192.168.10.1 255.255.255.0
R1(config-subif)# interface f0/1.20
R1(config-subif)# encapsulation dot1Q 20
```

```
R1(config-subif)# ip address 192.168.20.1 255.255.255.0
R1(config-subif)# exit
R1(config)# interface f0/1
R1(config-if)# no shutdown
```

Note: This Experiment is a modified version of a similar one from the CCNA Course provided by Cisco Networking Academy.