Experiment No. 8

Configuring 802.1Q Trunk-Based Inter-VLAN Routing

LEARNING OBJECTIVE:

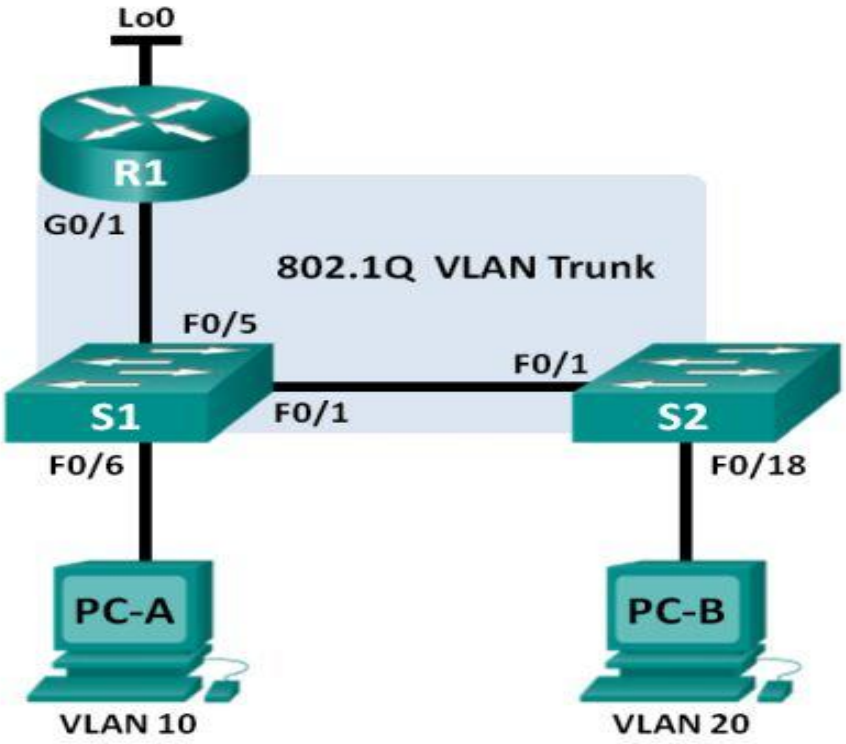
Upon completion of this lab, you will be able to:

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

TOPOLOGY



ADDRESSING TABLE:

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/1.1	192.168.1.1	255.255.255.0	N/A
	G0/1.10	192.168.10.1	255.255.255.0	N/A
	G0/1.20	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

Background Scenario:

A second 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.

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. Disable DNS lookup.
b. Configure device names as shown in the topology.
c. Assign class as the privileged EXEC password.
d. Assign cisco as the console and vty passwords.
e. Configure logging synchronous for the console line.
f. Configure the IP address listed in the Addressing Table for VLAN 1 on both switches.
g. Configure the default gateway on both switches.
h. Administratively deactivate all unused ports on the switch.
i. Copy the running configuration to the startup configuration.

Step 5: Configure basic settings for the router.

a. Disable DNS lookup.
b. Configure device names as shown in the topology.
c. Configure the Lo0 IP address as shown in the Address Table. Do not configure subinterfaces at this time as they will be configured in Part 3.
d. Assign cisco as the console and vty passwords.
e. Assign class as the privileged EXEC password.
f. Configure logging synchronous to prevent console messages from interrupting command entry.
g. 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.

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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.

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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.

S2# show vlan brief

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.

Step 1: Configure a subinterface for VLAN 1.

a. Create a subinterface on R1 G0/1 for VLAN 1 using 1 as the subinterface ID. Write the command you used in the space provided.

```
R1(config)# interface g0/1.1
```

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

```
R1(config-subif)# encapsulation dot1Q 1
```

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

```
R1(config-subif)# ip address 192.168.1.1 255.255.255.0
```

Step 2: Configure a subinterface for VLAN 10

a. Create a subinterface on R1 G0/1 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 G0/1 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 G0/1 interface.

Enable the G0/1 interface. Write the commands you used in the space provided.

```
R1(config)# interface g0/1
R1(config-if)# no shutdown
```

Step 5: Verify connectivity.

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

```
R1# show ip route
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From PC-A, is it possible to ping the default gateway for VLAN 10? _____ Yes
From PC-A, is it possible to ping PC-B? _____ Yes
From PC-A, is it possible to ping Lo0? _____ Yes
From PC-A, is it possible to ping S2? _____ Yes

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?

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CONCLUSION & COMMENTS: