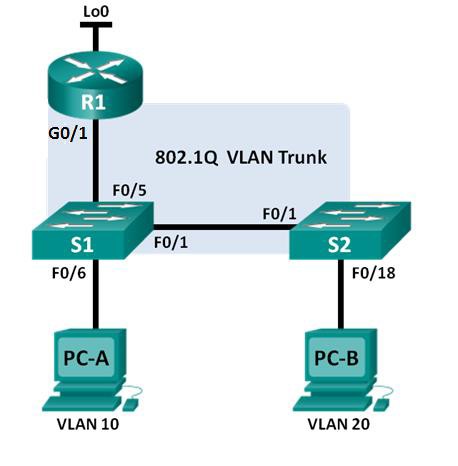
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**Lab 6.3.3.7 – Configuring 802.1Q Trunk-Based Inter-VLAN Routing**

## Topology



**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 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.

## Required Resources

* 1 Router (Cisco 1941 with Cisco IOS, release 15.2(4)M3 universal image or comparable)
* 2 Switches (Cisco 2960 with Cisco IOS, release 15.0(2) lanbasek9 image or comparable)
* 2 PCs

**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 |

**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: Configure basic settings for each switch.**

1. Console into the switch and enter global configuration mode.
2. 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 cisco login

logging synchronous line vty 0 15 password cisco login

exit

1. Configure the device name as shown in the topology.
2. Configure the IP address listed in the Addressing Table for VLAN 1 on the switch.
3. Configure the default gateway on the switch.
4. Administratively deactivate (shutdown) all unused ports on the switch.

**Step 4: Configure basic settings for the router.**

1. Console into the router and enter global configuration mode.
2. 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 cisco login

logging synchronous line vty 0 4 password cisco

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.**

# 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.

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

**S1(config)# vlan 10**

**S1(config-vlan)# name Students**

**S1(config-vlan)# vlan 20**

**S1(config-vlan)# name Faculty**

**S1(config-vlan)# exit**

1. 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.

**S1(config)# interface f0/5**

**S1(config-if)# switchport mode trunk**

**S1(config-if)# interface f0/1**

**S1(config-if)# switchport mode trunk**

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

**S1(config)# interface f0/6**

**S1(config-if)# switchport mode access**

**S1(config-if)# switchport access vlan 10**

### 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**

1. On S2, assign the access port for PC-B to VLAN 20.
2. 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 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.

1. Create a subinterface on R1 G0/1 for VLAN 10 using 10 as the subinterface ID.
2. Configure the subinterface to operate on VLAN 10.
3. Configure the subinterface with the address from the Address Table.

**Step 3: Configure a subinterface for VLAN 20.**

1. Create a subinterface on R1 G0/1 for VLAN 20 using 20 as the subinterface ID.
2. Configure the subinterface to operate on VLAN 20.
3. 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**

**192.168.1.0, 192.168.10.0, 192.168.20.0, and 209.165.200.224**

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?

**Router-on-a-stick inter-VLAN routing allows for one interface to route to multiple VLANs**

**El ruteo VLAN de Router-on-a-stick permite que rutear por una interface multiples VLANs**

**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 G0/1.1**

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

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

R1(config-subif)# **interface G0/1.10**

R1(config-subif)# **encapsulation dot1Q 10**

R1(config-subif)# **ip address 192.168.10.1 255.255.255.0**

R1(config-subif)# **interface G0/1.20**

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 G0/1** R1(config-if)# **no shutdown**