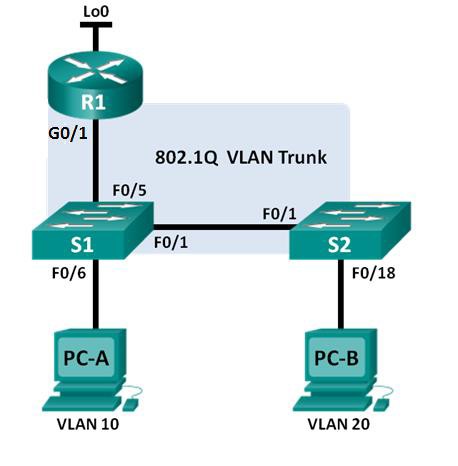


**Lab 2. Configuring 802.1Q Trunk-Based Inter-VLAN Routing**

## Topology



**G0/0/1**

**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.

**Addressing Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Device** | **Interface** | **IP Address** | **Subnet Mask** | **Default Gateway** |
| R1 | G0/0/1.1 | 192.168.1.1 | 255.255.255.0 | N/A |
|  | G0/0/1.10 | 192.168.10.1 | 255.255.255.0 | N/A |
|  | G0/0/1.20 | 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.

S1(config)#

S1(config-if-range)#

S2(config)#

S2(config-if-range)#

**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

* + 1. 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.**

1. 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)#

S1(config-vlan)#

S1(config-vlan)#

S1(config-vlan)#

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)#

S1(config-if)#

S1(config-if)#

S1(config-if)#

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

S1(config)#

S1(config-if)#

S1(config-if)#

### Step 2: Configure VLANs on S2.

* + 1. On **S2**, configure the VLANs and names listed in the Switch Port Assignment Specifications table.
    2. On **S2**, verify that the VLAN names and numbers match those on S1. Write the command you used in the space provided.

**S2# \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

* + 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.

1. 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.

* 1. Configure a subinterface for VLAN 1.
     1. Create a subinterface on **R1 G0/0/1** for VLAN 1 using 1 as the subinterface ID. Write the command you used in the space provided.

**R1(config)#**

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

**R1(config-subif)#**

* + 1. Configure the subinterface with the IP address from the Address Table. Write the command you used in the space provided.

**R1(config-subif)#**

* 1. Configure a subinterface for VLAN 10.
     1. Create a subinterface on **R1 G0/0/1** 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.
  2. Configure a subinterface for VLAN 20.
     1. Create a subinterface on **R1 G0/0/1** 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.
  3. Enable the G0/0/1 interface.

Enable the **G0/0/1** interface. Write the commands you used in the space provided.

**R1(config)#**

**R1(config-if)#**

* 1. Verify connectivity.

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

R1# **show ip route**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

From PC-A, is it possible to ping the default gateway **(192.168.10.1)** for VLAN 10? \_\_\_\_\_

From PC-A, is it possible to ping PC-B **(192.168.20.3)**? \_\_\_\_\_

From PC-A, is it possible to ping Lo0 **(209.165.200.225)** ? \_\_\_\_\_

From PC-A, is it possible to ping S2 **(192.168.1.12)** ? \_\_\_\_\_

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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