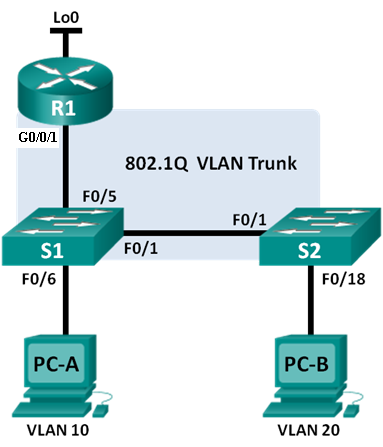
Lab 3.3 - 6.3.3.7 Configuring 802.1Q Trunk-Based Inter-VLAN Routing – PT (Sem B 2020/2021)

1. Topology



1. Addressing Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Device | Interface | IP Address | Subnet Mask | Default Gateway |
| R1 | G0/0/1.1 | 172.16.1.1 | 255.255.255.0 | N/A |
|  | G0/0/1.10 | 172.16.10.1 | 255.255.255.0 | N/A |
|  | G0/0/1.20 | 172.16.20.1 | 255.255.255.0 | N/A |
|  | Lo0 | 209.165.200.225 | 255.255.255.224 | N/A |
| S1 | VLAN 1 | 172.16.1.11 | 255.255.255.0 | 172.16.1.1 |
| S2 | VLAN 1 | 172.16.1.12 | 255.255.255.0 | 172.16.1.1 |
| PC-A | NIC | 172.16.10.3 | 255.255.255.0 | 172.16.10.1 |
| PC-B | NIC | 172.16.20.3 | 255.255.255.0 | 172.16.20.1 |

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 | 172.16.10.0/24 |
| S2 F0/18 | VLAN 20 – Faculty | 172.16.20.0/24 |

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

1. 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.

**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.

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.

* 1. Open the template file and cable the network as shown in the topology.
  2. Configure PC hosts.
  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 (optional).

service password-encryption

line con 0

password conpass

login

logging synchronous

line vty 0 15

password vtypass

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.

(command is: ip default-gateway 172.16.1.1)

* + 1. Administratively deactivate all unused ports on the switch (command is: shutdown).
    2. Copy the running configuration to the startup configuration.

\*\* Repeat the above steps in S2.

* 1. 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(optional).

hostname R1

service password-encryption

Line con 0

Password conpass

login

logging synchronous

line vty 0 4

password vtypass

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.
    2. Copy the running configuration to the startup configuration.

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.

* 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.

\_\_\_\_vlan 10\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_name Students\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_vlan 20\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_name Faculty\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* + 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.

\_\_\_\_int f0/1 (and also int f0/5)\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_switchport mode \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

\_\_\_\_\_\_int f0/6\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_switchport mode access\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_switchport access vlan 10\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Configure VLANs on Switch 2.
     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.

\_\_\_\_sh 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.

1. Configure Trunk-Based Inter-VLAN Routing

In Part 3, you will configure R1 to route to multiple VLANs by creating sub-interfaces 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 sub-interface for VLAN 1.
     1. Create a sub-interface on R1 G0/0/1 for VLAN 1 using 1 as the sub-interface ID. Write the command you used in the space provided.

\_\_\_int g0/0/1.1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

\_\_\_\_\_encapsulation dot1q 1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

\_\_\_\_\_\_ip address 172.16.1.1 255.255.255.0\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Configure a sub-interface for VLAN 10.
     1. Create a sub-interface on R1 G0/0/1 for VLAN 10 using 10 as the sub-interface ID.
     2. Configure the sub-interface to operate on VLAN 10.
     3. Configure the sub-interface with the address from the Address Table.
  2. Configure a sub-interface for VLAN 20.
     1. Create a sub-interface on R1 G0/0/1 for VLAN 20 using 20 as the sub-interface ID.
     2. Configure the sub-interface to operate on VLAN 20.
     3. Configure the sub-interface 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.

\_\_\_\_int g0/0/1, no shut\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Verify connectivity.

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

\_\_172.16.1.1, 172.16.10.1, 172.16.20.1\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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.

1. ☞ Save your Packet Tracer file (.pkt) and upload to Canvas.

Appendix A – Configuration Commands

1. 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)# **no shutdown**

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

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

S1(config-if)# **no shutdown**

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

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

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

S1(config-if)# **no shutdown**

1. 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)# **no shutdown**

S2(config-if)# **interface f0/18**

S2(config-if)# **switchport mode access**

S2(config-if)# **switchport access vlan 20**

S1(config-if)# **no shutdown**

1. Router R1

R1(config)# **interface g0/0/1.1**

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

R1(config-subif)# **ip address 172.16.1.1 255.255.255.0**

R1(config-subif)# **interface g0/0/1.10**

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

R1(config-subif)# **ip address 172.16.10.1 255.255.255.0**

R1(config-subif)# **interface g0/0/1.20**

R1(config-subif)# **encapsulation dot1Q 20**

R1(config-subif)# **ip address 172.16.20.1 255.255.255.0**

R1(config-subif)# **exit**

R1(config)# **interface g0/0/1**

R1(config-if)# **no shutdown**