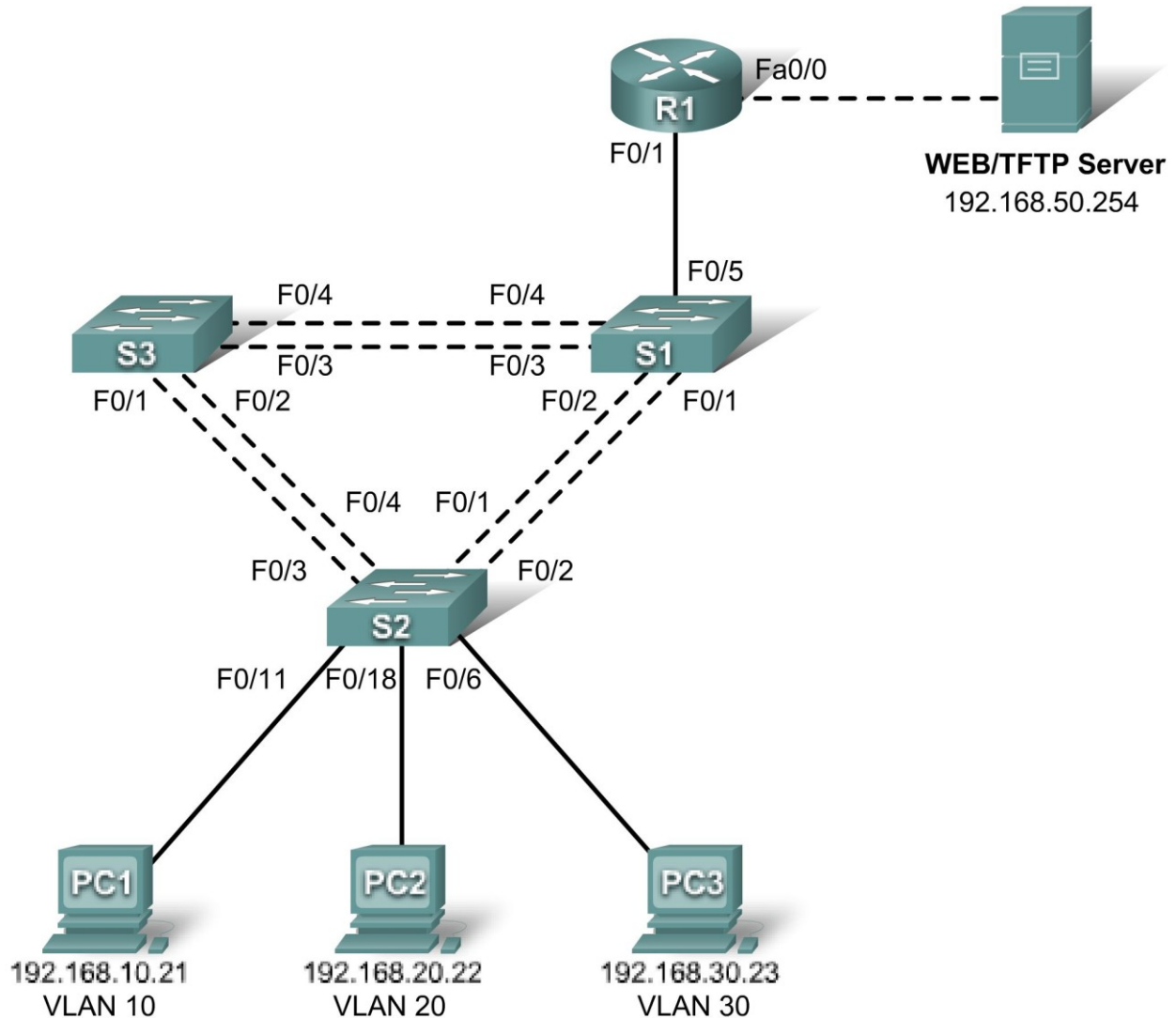# Lab 6.4.2: Challenge Inter-VLAN Routing

Topology Diagram

Addressing Table

Device (Hostname)	Interface	IP Address	Subnet Mask	Default Gateway
S1	VLAN 99	192.168.99.11	255.255.255.0	192.168.99.1
S2	VLAN 99	192.168.99.12	255.255.255.0	192.168.99.1
S3	VLAN 99	192.168.99.13	255.255.255.0	192.168.99.1
R1	Fa 0/0	192.168.50.1	255.255.255.0	N/A

R1	Fa 0/1	See Subinterface Configuration Table		N/A
PC1	NIC	192.168.10.21	255.255.255.0	192.168.10.1
PC2	NIC	192.168.20.22	255.255.255.0	192.168.20.1
PC3	NIC	192.168.30.23	255.255.255.0	192.168.30.1
Server	NIC	192.168.50.254	255.255.255.0	192.168.50.1

Port Assignments – Switch 2

Ports	Assignment	Network
Fa0/1 – 0/5	802.1q Trunks (Native VLAN 99)	192.168.99.0 /24
Fa0/6 – 0/10	VLAN 30 – Sales	192.168.30.0 /24
Fa0/11 – 0/17	VLAN 10 – R&D	192.168.10.0 /24
Fa0/18 – 0/24	VLAN 20 – Engineering	192.168.20.0 /24

Subinterface Configuration Table – Router 1

Router Interface	Assignment	IP Address
Fa0/1.1	VLAN1	192.168.1.1
Fa0/1.10	VLAN 10	192.168.10.1
Fa0/1.20	VLAN 20	192.168.20.1
Fa0/1.30	VLAN 30	192.168.30.1
Fa0/1.99	VLAN 99	192.168.99.1

Learning Objectives

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

- Cable a network according to the topology diagram
- Clear configurations and reload a switch and a router to the default state
- Perform basic configuration tasks on a switched LAN and a router
- Configure VLANs and VLAN Trunking Protocol (VTP) on all switches
- Configure a router to support 802.1q trunking on a Fast Ethernet interface
- Configure a router with subinterfaces corresponding to the configured VLANs
- Demonstrate inter-VLAN routing

Task 1: Prepare the Network

Step 1: Cable a network that is similar to the one in the topology diagram.

The output shown in this lab is based on 2960 switches and an 1841 router. You can use any current switches or routers in your lab as long as they have the required interfaces shown in the topology diagram. Other device types may produce different output. Note that Ethernet (10Mb) LAN interfaces on routers do not support trunking, and Cisco IOS software earlier than version 12.3 may not support trunking on Fast Ethernet router interfaces.

Set up console connections to all three switches and to the router.

Step 2: Clear any existing configurations on the switches.

Clear NVRAM, delete the vlan.dat file and reload the switches. Refer to Lab 2.2.1 if necessary for the procedure. After the reload is complete, use the **show vlan** command to confirm that only default VLANs exist and that all ports are assigned to VLAN 1.

Step 3: Disable all ports using the shutdown command.

Ensure that the initial switch port states are inactive by disabling all ports. Use the **interface-range** command to simplify this task. Remember to repeat the process on each switch in the topology.

Task 2: Perform Basic Switch Configurations

Step 1: Configure the S1, S2, and S3 switches.

Use the addressing table and the following guidelines:

- Configure the switch hostname.
- Disable DNS lookup.
- Configure an EXEC mode password of **class**.
- Configure a password of **cisco** for console connections.
- Configure a password of **cisco** for vty connections.
- Configure the default gateway on each switch.

Step 2: Re-enable the active user ports on S2 in access mode.

Enable ports Fa0/6, Fa0/11, and Fa0/18 on S2 using the **no shutdown** command, and configure them as access ports.

Task 3: Configure the Ethernet Interfaces on the Server and Host PCs

Configure the Ethernet interfaces of PC1, PC2, PC3 and the remote TFTP/Web Server with the IP addresses from the addressing table. Connect these devices using the correct cables and interfaces.

Task 4: Configure VTP on the Switches

Step 1: Configure VTP on the three switches.

Use the following table to configure the switches. Remember that VTP domain names and passwords are case-sensitive.

Switch Name	VTP Operating Mode	VTP Domain	VTP Password
S1	Server	Lab6	cisco
S2	Client	Lab6	cisco
S3	Client	Lab6	cisco

Step 2: Configure trunking ports and designate the native VLAN for the trunks.

Configure Fa0/1 through Fa0/5 as trunking ports, and designate VLAN 99 as the native VLAN for these trunks. Use the **interface range** command in global configuration mode to simplify this task.

Step 3: Configure VLANs on the VTP server.

Configure the following VLANS on the VTP server.

VLAN	VLAN Name
VLAN 99	Management
VLAN 10	R&D
VLAN 20	Engineering
VLAN 30	Sales

Verify that the VLANs have been created on S1 with the **show vlan brief** command.

Step 4: Verify that the VLANs created on S1 have been distributed to S2 and S3.

Use the **show vlan brief** command on S2 and S3 to verify that the four VLANs have been distributed to the client switches.

Step 5: Configure the Management interface address on all three switches.

Refer to the addressing table at the beginning of the lab to assign the management IP address on all three switches.

Verify that the switches are correctly configured by pinging between them. From S1, ping the Management interface on S2 and S3. From S2, ping the Management interface on S3.

Were the pings successful? _____

If not, troubleshoot the switch configurations and resolve.

Step 6: Assign switch ports to VLANs on S2.

Refer to the port assignment table at the beginning of the lab to assign ports to VLANs on S2.

Step 7: Check connectivity between VLANs.

Open command windows on the three hosts connected to S2. Ping from PC1 (192.168.10.21) to PC2 (192.168.20.22). Ping from PC2 to PC3 (192.168.30.23).

Are the pings successful? _____

If not, why do these pings fail?_____

_____

Task 5: Configure the Router

Step 1: Clear the configuration on the router and reload.

Step 2: Create a basic configuration on the router.

- Configure the router with hostname R1.
- Disable DNS lookup.
- Configure an EXEC mode password of **class**.
- Configure a password of **cisco** for console connections.
- Configure a password of **cisco** for vty connections.

Step 3: Configure the trunking interface on R1.

Configure the Fa0/1 interface on R1 with five subinterfaces, one for each VLAN identified in the Subinterface Configuration Table at the beginning of the lab. Configure these subinterfaces with dot1q encapsulation, and use the first address in each VLAN subnet on the router subinterface. Specify VLAN 99 as the native VLAN on its subinterface. Do not assign an IP address to the physical interface, but be sure to enable it. Document your subinterfaces and their respective IP addresses in the subinterface table.

Step 4: Configure the server LAN interface on R1.

Refer to the addressing table and configure Fa0/0 with the correct IP address and mask.

Step 5: Verify the routing configuration.

At this point, there should be six networks configured on R1. Verify that you can route packets to all six by checking the routing table on R1.

If your routing table does not show all six networks, troubleshoot your configuration and resolve the problem before proceeding.

Step 6: Verify inter-VLAN routing

From PC1, verify that you can ping the remote server (192.168.50.254) and the other two hosts (192.168.20.22 and 192.168.30.23). It may take a couple of pings before the end-to-end path is established.

Are the pings successful? _____

If not, troubleshoot your configuration. Check to make sure the default gateways have been set on all PCs and all switches. If any of the hosts have gone into hibernation, the connected interface may go down.

At this point, you should be able to ping any node on any of the six networks configured on your LAN, including the switch management interfaces.

Task 6: Clean Up

Erase the configurations and reload the switches. Disconnect and store the cabling. For PC hosts that are normally connected to other networks (such as the school LAN or to the Internet), reconnect the appropriate cabling and restore the TCP/IP settings.