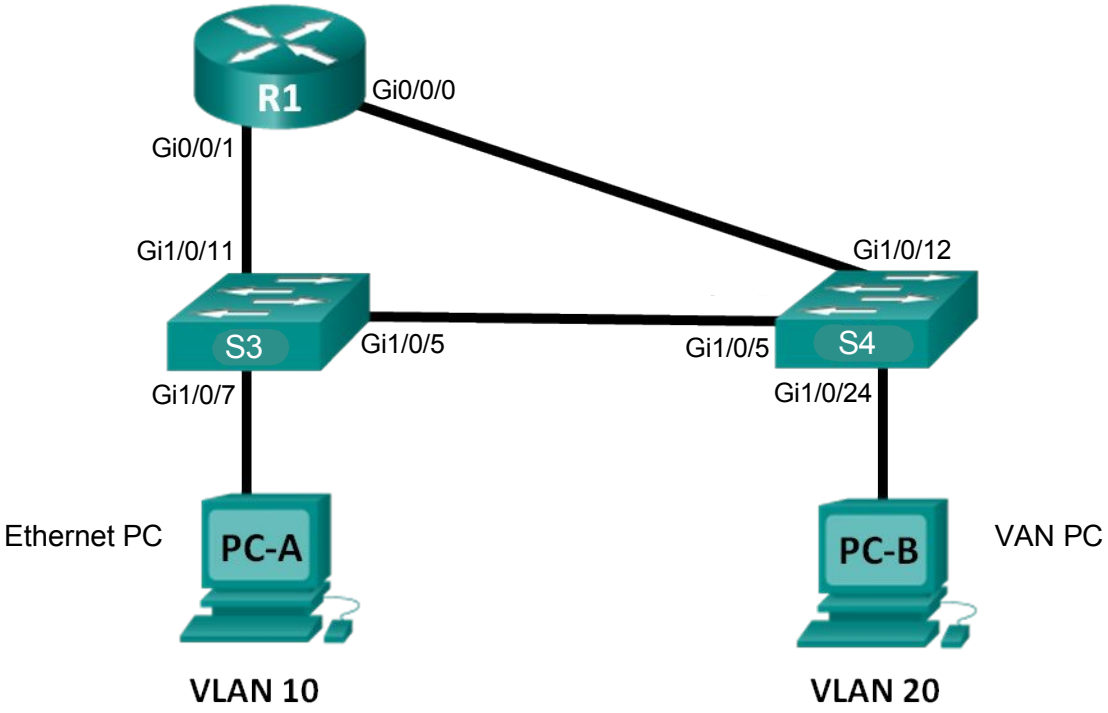
Lab SU-5a – Configuring Per-Interface Inter-VLAN Routing

Topology Diagram



Modifications to Network Drawing

If you are working via remote access, the PCs in the diagram are just for reference and will not be connected to your lab topology. If you are working on-campus, you will set up virtual PCs as PC-A and PC-B.

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Gi0/0/0	192.168.20.1	255.255.255.0	N/A
	Gi0/0/1	192.168.10.1	255.255.255.0	N/A
S3	VLAN 10	192.168.10.11	255.255.255.0	192.168.10.1
S4	VLAN 10	192.168.10.12	255.255.255.0	192.168.10.1
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

Objectives

Part 1: Build the Network and Configure Basic Device Settings

Part 2: Configure Switches with VLANs and Trunking

Part 3: Verify Trunking, VLANs, Routing, and Connectivity

Background / Scenario

Last week, you constructed a switched network using VLANs and VLAN trunking. You should remember that connectivity between VLANs was not possible. The switches ensure that VLANs remain logically separated, creating a number of virtual Switches. Even the management interfaces are segmented into separate VLANs and therefore have no connectivity to other VLANs. In order to enable inter-VLAN connectivity, we need to connect the VLANs together using a router. In this lab we will perform basic configuration on a router to enable communications between VLANs configured on a switched network.

The type of routing we will be configuring is called **Legacy inter-VLAN routing**. This type of routing is seldom used in today's networks; however, it is helpful to configure and understand this type of routing before moving on to **router-on-a-stick** (trunk-based) inter-VLAN routing or configuring Layer-3 switching. Also, you may encounter per-interface inter-VLAN routing in organizations with very small networks. One of the benefits of legacy inter-VLAN routing is ease of configuration.

In this lab, you will set up one router with two switches attached via the router Gigabit Ethernet interfaces. Two separate VLANs will be configured on the switches, and you will set up routing between the VLANs.

Note: This lab provides minimal assistance with the actual commands necessary to configure the router and switches. You should refer to your lab journal and previous lab handouts if you require assistance.

Note: Make sure that the routers and switches have been erased and have no startup configurations. If you are unsure, contact your instructor.

Required Resources

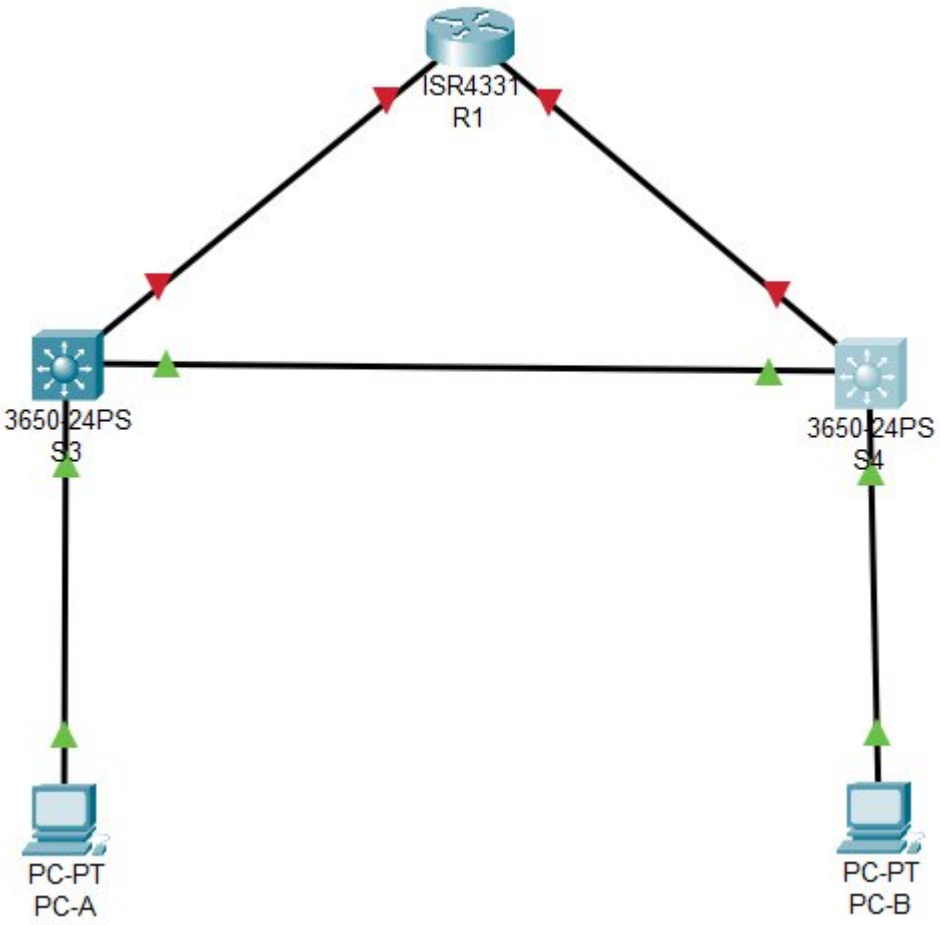
- 1 Router
- 2 Switches
- Ethernet cables as shown in the topology
- 2 PCs (when working on-campus)

Part 1: Build the Network and Configure Basic Switch Settings

In Part 1, you will set up the network topology and clear any configurations, if necessary.

Step 1: Cable the network as shown in the topology.

a. Validate all devices are running with default settings. If not, clean up the devices before continuing.



b. Devices in the lab are already cabled as shown in the Topology Diagram. Once all relevant interfaces are enabled, use the **show ip interface brief** command to verify the interconnections.

```
Router> enable
Router# show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0/0   unassigned      YES unset  administratively down down
GigabitEthernet0/0/1   unassigned      YES unset  administratively down down
GigabitEthernet0/0/2   unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
Router#
```

```
Switch# show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet1/0/1   unassigned      YES unset  down                  down
GigabitEthernet1/0/2   unassigned      YES unset  down                  down
GigabitEthernet1/0/3   unassigned      YES unset  down                  down
GigabitEthernet1/0/4   unassigned      YES unset  down                  down
GigabitEthernet1/0/5   unassigned      YES unset  up                    up
GigabitEthernet1/0/6   unassigned      YES unset  down                  down
GigabitEthernet1/0/7   unassigned      YES unset  up                    up
GigabitEthernet1/0/8   unassigned      YES unset  down                  down
GigabitEthernet1/0/9   unassigned      YES unset  down                  down
GigabitEthernet1/0/10  unassigned      YES unset  down                  down
GigabitEthernet1/0/11  unassigned      YES unset  down                  down
GigabitEthernet1/0/12  unassigned      YES unset  down                  down
GigabitEthernet1/0/13  unassigned      YES unset  down                  down
GigabitEthernet1/0/14  unassigned      YES unset  down                  down
GigabitEthernet1/0/15  unassigned      YES unset  down                  down
GigabitEthernet1/0/16  unassigned      YES unset  down                  down
GigabitEthernet1/0/17  unassigned      YES unset  down                  down
GigabitEthernet1/0/18  unassigned      YES unset  down                  down
GigabitEthernet1/0/19  unassigned      YES unset  down                  down
GigabitEthernet1/0/20  unassigned      YES unset  down                  down
GigabitEthernet1/0/21  unassigned      YES unset  down                  down
GigabitEthernet1/0/22  unassigned      YES unset  down                  down
GigabitEthernet1/0/23  unassigned      YES unset  down                  down
GigabitEthernet1/0/24  unassigned      YES unset  down                  down
GigabitEthernet1/1/1   unassigned      YES unset  down                  down
GigabitEthernet1/1/2   unassigned      YES unset  down                  down
GigabitEthernet1/1/3   unassigned      YES unset  down                  down
GigabitEthernet1/1/4   unassigned      YES unset  down                  down
Vlan1                  unassigned      YES unset  administratively down down
Switch#
```

```
Switch> enable
Switch# show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet1/0/1   unassigned      YES unset  down                  down
GigabitEthernet1/0/2   unassigned      YES unset  down                  down
GigabitEthernet1/0/3   unassigned      YES unset  down                  down
GigabitEthernet1/0/4   unassigned      YES unset  down                  down
GigabitEthernet1/0/5   unassigned      YES unset  up                    up
GigabitEthernet1/0/6   unassigned      YES unset  down                  down
GigabitEthernet1/0/7   unassigned      YES unset  down                  down
GigabitEthernet1/0/8   unassigned      YES unset  down                  down
GigabitEthernet1/0/9   unassigned      YES unset  down                  down
GigabitEthernet1/0/10  unassigned      YES unset  down                  down
GigabitEthernet1/0/11  unassigned      YES unset  down                  down
GigabitEthernet1/0/12  unassigned      YES unset  down                  down
GigabitEthernet1/0/13  unassigned      YES unset  down                  down
GigabitEthernet1/0/14  unassigned      YES unset  down                  down
GigabitEthernet1/0/15  unassigned      YES unset  down                  down
GigabitEthernet1/0/16  unassigned      YES unset  down                  down
GigabitEthernet1/0/17  unassigned      YES unset  down                  down
GigabitEthernet1/0/18  unassigned      YES unset  down                  down
GigabitEthernet1/0/19  unassigned      YES unset  down                  down
GigabitEthernet1/0/20  unassigned      YES unset  down                  down
GigabitEthernet1/0/21  unassigned      YES unset  down                  down
GigabitEthernet1/0/22  unassigned      YES unset  down                  down
GigabitEthernet1/0/23  unassigned      YES unset  down                  down
GigabitEthernet1/0/24  unassigned      YES unset  up                    up
GigabitEthernet1/1/1   unassigned      YES unset  down                  down
GigabitEthernet1/1/2   unassigned      YES unset  down                  down
GigabitEthernet1/1/3   unassigned      YES unset  down                  down
GigabitEthernet1/1/4   unassigned      YES unset  down                  down
Vlan1                  unassigned      YES unset  administratively down down
Switch#
```

c. Disable interface Gi1/0/6 on both switches as we will only be using one switch interconnection in this lab.

```
Switch# config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# interface gi1/0/6
Switch(config-if)# shutdown

%LINK-5-CHANGED: Interface GigabitEthernet1/0/6, changed state to administratively down
Switch(config-if)# end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#
```

```
Switch# config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# interface gi1/0/6
Switch(config-if)# shutdown

%LINK-5-CHANGED: Interface GigabitEthernet1/0/6, changed state to administratively down
Switch(config-if)# end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#
```

Note: Router interfaces are disabled by default, therefore, the links between switches and router will not be up until you manually enable the router interfaces with the **no shutdown** command.

Step 2: Configure basic settings on S3 and S4.

a. Disable DNS lookup.

```
Switch# config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# no ip domain-lookup
Switch(config)#
```

```
Switch# config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# no ip domain-lookup
Switch(config)# end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#
```

b. Assign the device name.

```
Switch# config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# hostname S3
S3(config)# end
S3#
%SYS-5-CONFIG_I: Configured from console by console

S3#
```

```
Switch# config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)# hostname S4
S4(config)# end
S4#
%SYS-5-CONFIG_I: Configured from console by console

S4#
```

Step 3: (On-campus task) Configure basic settings on PC-A and PC-B.

If you are working on-campus, configure PC-A and PC-B with IP addresses and a default gateway address according to the Addressing Table.

Note: Your instructor will demonstrate how to set up the Ethernet PC and VAN PC virtual machines.

Part 2: Configure Switches with VLANs and Trunking

In Part 2, you will configure the switches with VLANs and trunking.

Step 1: Configure VLANs on S3.

a. On S3, create VLAN 10. Assign **Student** as the VLAN name.

```
S3# config t
Enter configuration commands, one per line.  End with CNTL/Z.
S3(config)# vlan 10
S3(config-vlan)# name Student
```

b. Create VLAN 20. Assign **Faculty-Admin** as the VLAN name.

```
S3(config-vlan)# vlan 20
S3(config-vlan)# name Faculty-Admin
S3(config-vlan)# exit
```

c. Configure Gi1/0/5 as a trunk port.

```
S3(config)# interface Gi1/0/5
S3(config-if)# switchport mode trunk

S3(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0/5, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0/5, changed state to up

S3(config-if)# exit
S3(config)#
```

d. Assign Gi1/0/7 and Gi1/0/11 to VLAN 10 and configure both Gi1/0/7 and Gi1/0/11 as access ports.

```
S3(config)# interface Gi1/0/7
S3(config-if)# switchport mode access
S3(config-if)# switchport access vlan 10
S3(config-if)# exit
S3(config)# interface Gi1/0/11
S3(config-if)# switchport mode access
S3(config-if)# switchport access vlan 10
S3(config-if)# exit
S3(config)# exit
S3#
%SYS-5-CONFIG_I: Configured from console by console

S3#
```

e. Assign an IP address to VLAN 10 and enable it. Refer to the Addressing Table.

```
S3# config t
Enter configuration commands, one per line.  End with CNTL/Z.
S3(config)# interface vlan 10
S3(config-if)#
%LINK-5-CHANGED: Interface Vlan10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan10, changed state to up

S3(config-if)# ip address 192.168.10.11 255.255.255.0
S3(config-if)# exit
S3(config)# exit
S3#
%SYS-5-CONFIG_I: Configured from console by console

S3#
```

Step 2: Configure VLANs on S4.

a. On S4, create VLAN 10. Assign **Student** as the VLAN name.

```
S4> enable
S4# config t
Enter configuration commands, one per line.  End with CNTL/Z.
S4(config)# vlan 10
S4(config-vlan)# name Student
S4(config)# exit
S4#
%SYS-5-CONFIG_I: Configured from console by console

S4#
```

b. Create VLAN 20. Assign **Faculty-Admin** as the VLAN name.

c. Configure Gi1/0/5 as a trunk port.

```
S4# config t
Enter configuration commands, one per line.  End with CNTL/Z.
S4(config)# interface Gi1/0/5
S4(config-if)# switchport mode trunk
S4(config-if)# exit
S4(config)# eit
             ^
% Invalid input detected at '^' marker.

S4(config)#exit
```

d. Assign Gi1/0/12 and Gi1/0/24 to VLAN 20 and configure both Gi1/0/12 and Gi1/0/24 as access ports.

```
S4# config t
Enter configuration commands, one per line.  End with CNTL/Z.
S4(config)# interface Gi1/0/12
S4(config-if)# switchport mode access
S4(config-if)# switchport access vlan 20
S4(config-if)# exit
S4(config)# interface Gi1/0/24
S4(config-if)# switchport mode access
S4(config-if)# switchport access vlan 20
S4(config-if)# exit
S4(config)# exit
S4#
%SYS-5-CONFIG_I: Configured from console by console

S4#
```

e. Assign an IP address to VLAN 10 and enable it. Refer to the Addressing Table.

```
S4# config t
Enter configuration commands, one per line.  End with CNTL/Z.
S4(config)# interface vlan 10
S4(config-if)#
%LINK-5-CHANGED: Interface Vlan10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan10, changed state to up

S4(config-if)# ip address 192.168.10.12 255.255.255.0
S4(config-if)# exit
S4(config)# exit
S4#
%SYS-5-CONFIG_I: Configured from console by console

S4#
```

Step 3: Configure Default Gateways on the switches.

a. In order for the switch to deliver packets to devices on VLANs outside the management VLAN, it must send this packet to a **default gateway** router. The configuration tables above nominate the **default gateway** to be configured on each switch. Note that the **default gateway** must be an IP address in the same subnet as the management VLAN IP address as the **default gateway** must be directly reachable.

b. The commands to assign a default gateway on the switch are:
`S3(config)# ip default-gateway a.b.c.d`

Where **`a.b.c.d`** is the address of the gateway router the switch should use.

```
S4# config t
Enter configuration commands, one per line.  End with CNTL/Z.
S4(config)# ip default-gateway 192.168.10.1
S4(config)# exit
S4#
%SYS-5-CONFIG_I: Configured from console by console

S4#
```

c. **Note:** Gateway addresses are assigned for the whole switch (**`config`** mode), not for a particular interface (**`config-if`** mode). This is because the gateway is valid for the whole switch and is used regardless of the source IP addresses if a packet needs to be delivered to a different subnet.

d. Assign the nominated default gateways on both switches

Step 4: Test Switch configurations.

At this point, you have repeated last week's lab.

a. Connectivity scenarios: Use your networking knowledge to answer the below questions

Can S3 ping S4?	Yes
Would S3 ping PC-A?	Yes
Would S3 ping PC-B?	No
Would S4 ping PC-A?	No
Would S4 ping PC-B?	Yes
Would PC-A ping PC-B?	No

If you answer no to any of the above, explain why some pings would work and others don't

- S3 wouldn't ping PC-B because PC-B is in VLAN 20 and Intern-VLAN Routing is not yet configured on the router.
- S4 wouldn't ping PC-A. While both PC-A and S4 is in the VLAN 10 but on a different subnet. And Inter-VLAN routing is not yet configured.
- PC-A wouldn't ping PC-B because both of them are in different VLANs and Inter-VLAN routing is required.

b. On-campus tests: If you are on-campus, run ping tests to answer the below questions

Can S3 ping S4? _____
Can S3 ping PC-A? _____
Can S3 ping PC-B? _____
Can S4 ping PC-A? _____
Can S4 ping PC-B? _____
Can PC-A ping PC-B? _____

Are your results consistent with your answers to the questions in part b.?

_____

Part 3: Basic Router Configuration

Step 1: Configure basic settings for R1.

a. Router CLI configuration is very similar to switch configuration. The CLI user interface is almost exactly the same

b. Explore the similarities on the router by issuing a number of simple commands to examine the running configuration and to move between user, administrator, and configuration modes.

Step 2: Configure basic settings for R1.

a. Disable DNS lookup.

```
Router> ena
Router# config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# no ip domain-lookup
Router(config)#
```

b. Assign the router name.

```
Router(config)# hostname R1
R1(config)#
```

c. Assign a MOTD on the router

```
R1(config)# banner motd +*********************
Enter TEXT message.  End with the character '+'.
*********************
**Unauthorized access is prohibited!**
**********************+

R1(config)#
```

Step 3: Configure Ethernet Interface settings for R1.

a. Configuring an interface on the router is similar to configuring an interface on a switch. Unlike the switch, IP addresses are configured on the actual interfaces rather than the virtual interfaces. The other primary difference to the switch is that the router interfaces are always **shutdown** by default and have to be enabled.

b. Configure **Gi0/0/0** on the Router.

```
R1(config)# int g0/0/0
R1(config-if)# description Connection to Switch4 – VLAN 20
R1(config-if)# ip address 192.168.20.1 255.255.255.0
```

```
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)# exit
R1#
```

```
R1(config)# int g0/0/0
R1(config-if)# description Connection to Switch4 - VLAN 20
R1(config-if)# ip address 198.168.20.1 255.255.255.0
R1(config-if)# no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up

R1(config-if)# exit
R1(config)# exit
R1#
%SYS-5-CONFIG_I: Configured from console by console
```

c. Configure addressing on **Gi0/0/1** and enable that interface.

```
R1# config t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)# int g0/0/1
R1(config-if)# description Connection 198.168.10.1 255.255.255.0
R1(config-if)# no shutdown

R1(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up

R1(config-if)# exit
R1(config)# exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#
```

Step 4: Routing.

a. In a switched network such as this one, all VLANs/subnets are only one hop away. This means that all PCs/devices that need to communicate to another VLAN will send the packet to their gateway (the router), and the router will forward the packet directly to the destination. In order to deliver a packet to a destination, a router needs to know how to reach a network (using network address and subnet mask)

b. The act of configuring and enabling an interface on a router means that the router learns about the directly connected network/subnet. The router does not need to be taught how to reach any network that it is directly connected to.

c. As all our VLANs/subnets are only one hop away, the router will be able to route traffic to all subnets with no further routing configuration. Further configuration is only required in a more complex routing-based network with multiple routers. This is beyond the scope of this Unit and will be covered in TNE20002.

Step 5: Useful Commands.

a. The **show ip route** command displays the current routing table. As we will not configure any advanced routing in this Unit, it will only display summary information about the directly connected networks

```
R1# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     198.168.20.0/24 is variably subnetted, 2 subnets, 2 masks
C       198.168.20.0/24 is directly connected, GigabitEthernet0/0/0
L       198.168.20.1/32 is directly connected, GigabitEthernet0/0/0

R1#
```

b. The **show ip interface brief** command displays a summary of all interfaces configured on the router. The output and meaning is similar to the same command on the switch.

```
R1# show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0/0   198.168.20.1    YES manual up                    up
GigabitEthernet0/0/1   unassigned      YES unset  up                    up
GigabitEthernet0/0/2   unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
R1#
```

Part 4: Verify Trunking, VLANs, Routing, and Connectivity

Step 1: Verify the R1 routing table.

a. On R1, issue the **show ip route** command. The **show ip route** command displays the routers current routing table. As we have not configured any advanced routing, it will only display summary information about the directly connected networks. What happens to the output of **show ip route** when you disconnect one of the switches from the router?

=> show ip route: The routing table will show directly connected networks (192.168.10.0/24 and 192.168.20.0/24). Disconnecting a switch will remove the corresponding directly connected network from the routing table.

b. On both S3 and S4, issue the **show interface trunk** command. Is the Gi1/0/5 port on both switches set to trunk?

=> **show interface trunk:** Verify Gi1/0/5 is configured as a trunk on both switches.

c. Issue a **show vlan brief** command on both S3 and S4. Verify that VLANs 10 and 20 are active and that the proper ports on the switches are in the correct VLANs. Why is Gi1/0/5 not in any of the active VLANs?

=> **show vlan brief:** Verify VLANs and port assignments. Gi1/0/5 is not in any active VLANs because it's a trunk port, not an access port. Trunk ports carry traffic for multiple VLANs.

d. Connectivity scenarios:

Would PC-A be able to ping PC-B? Explain your answer:

- Yes. Now that the router interfaces are configured, inter-VLAN routing is enabled. PC-A sends traffic to R1 (its default gateway), and R1 forwards it to PC-B's VLAN.

Should ping between all devices work at this point? Explain your answer:

- Yes, connectivity should now be established between all devices in VLAN 10 and VLAN 20.

e. Connectivity tests from R1:

On R1, you can use the extended options of the ping command to test connectivity between the different VLANs connected to the router.

For example, you can test inter-vlan routing between VLAN 10 and VLAN 20, by pinging S3 in VLAN 10 sourcing the ping from the router interface connected to VLAN 20. To do this you use the command:

```
R1# ping 192.168.10.11 source g0/0/0
```

If the above ping is successful, this indicates that devices in VLAN 10 can communicate with devices in VLAN 20.

You should also be able to ping S4 from the router interface connected to VLAN 20:

```
R1# ping 192.168.10.12 source g0/0/0
```


f. On-campus tests:

from PC-A in VLAN 10 to PC-B in VLAN 20. Is the ping successful?

Note: If Inter-VLAN routing is functioning correctly, the pings between the 192.168.10.0 network and the 192.168.20.0 should be successful.

Verify connectivity between devices by pinging from every device to every other device. Are all ping tests successful?

Note: You should be able to ping between all devices. Troubleshoot if you are not successful.

Part 5: Further Router Configuration

Step 1: Configure the router for SSH access.

a. Enable SSH connections and create a user in the local database of the router.

```
R1# configure terminal
R1(config)# ip domain-name ccna.lab
R1(config)# username admin privilege 15 secret adminpass
R1(config)# line vty 0 4
R1(config-line)# transport input ssh
R1(config-line)# login local
R1(config-line)# exit
R1(config)# crypto key generate rsa general-keys modulus 1024
R1(config)# exit
```

```
R1# config t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)# ip domain-name ccna.lab
R1(config)# username admin privilege 15 secrest adminpass
                                              ^
% Invalid input detected at '^' marker.

R1(config)# username admin privilege 15 secret adminpass
R1(config)# line vty 0 14
R1(config-line)# transport input ssh
R1(config-line)# login local
R1(config-line)# exit
R1(config)# crypto key generate rsa general-keys modulus 1024
The name for the keys will be: R1.ccna.lab

% The key modulus size is 1024 bits
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]
*Mar 1 0:38:50.791: %SSH-5-ENABLED: SSH 1.99 has been enabled
R1(config)#
```

b. Test SSH connectivity to the router from either of the two switches using the following command:

```
S3#ssh -l admin 192.168.10.1
```

```
S3# ssh -l admin 192.168.10.1
          ^
% Invalid input detected at '^' marker.

S3# ssh -l admin 192.168.10.1

% Connection timed out; remote host not responding
S3#
```

c. On-campus test:

Test SSH connectivity to the router using PuTTY from either of your virtual PCs. Try connecting from each virtual PC to each of the routers two allocated IP addresses.

Note: Routers only have 5 virtual terminal lines (line vty 0 - 4), whereas switches have 16 (line vty 0 -15).

Part 6: Save Configuration Files and Clean up

Step 1: Device Configurations.

Note: DO NOT reset configurations or power off Switch 3 and Switch 4 until you have saved the running configuration of each device in a text file. You will need to use the switches' configuration files in Lab SU-5b.

a. Save S3 and S4 running configuration files following the steps below on each switch:

- In enable mode, use the **terminal length 0** command.

```
S3> ena
S3# terminal length 0
               ^
% Invalid input detected at '^' marker.

S3#
```

```
S4> ena
S4# terminal length 0
               ^
% Invalid input detected at '^' marker.

S4#
```

- Then use the **show run** command to display the running-configuration file.

```
S3# show run
Building configuration...

Current configuration : 1581 bytes
!
version 16.3.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname S3
!
!
!
!
!
!
!
no ip cef
no ipv6 cef
!
!
!
!
!
!
!
!
!
!
!
!
no ip domain-lookup
!
!
spanning-tree mode pvst
!
!
```

```
S4# show running
Building configuration...

Current configuration : 1613 bytes
!
version 16.3.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname S4
!
!
!
!
!
!
!
no ip cef
no ipv6 cef
!
!
```

- Select the **running-configuration** output and press **Enter** to copy.

```
S3# running-configuration
Translating "running-configuration"
% Unknown command or computer name, or unable to find computer address
```

```
S4#
S4# running-configuration
Translating "running-configuration"
% Unknown command or computer name, or unable to find computer address
```

- Open a new **text file** and paste the running-configuration in *plain* text.
- Name and save the text file (suggested names: S3.txt and S4.txt respectively).

b. After saving the running configuration files of the switches, you can proceed to Clean up your devices:
   - Clear the VLAN database using the **delete vlan.dat** command on both your switches.
   - If you saved the startup-config, use the **write erase** command to delete it from all devices.
   - Turn off all devices.