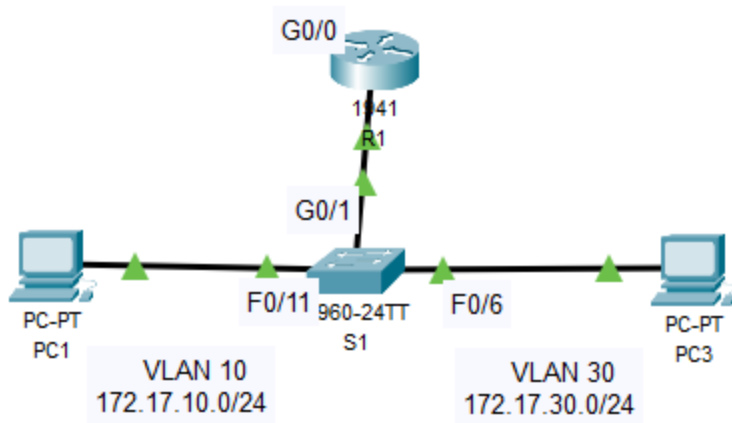# Packet Tracer - Configure Router-on-a-Stick Inter-VLAN Routing

Addressing Table

Device	Interface	IPv4 Address	Subnet Mask	Default Gateway
R1	G0/0.10	172.17.10.1	255.255.255.0	N/A
R1	G0/0.30	172.17.30.1	255.255.255.0	N/A
PC1	NIC	172.17.10.10	255.255.255.0	172.17.10.1
PC2	NIC	172.17.30.10	255.255.255.0	172.17.30.1

Objectives
Part 1: Add VLANs to a Switch
Part 2: Configure Subinterfaces
Part 3: Test Connectivity with Inter-VLAN Routing
Scenario
In this activity, you will configure VLANs and inter-VLAN routing. You will then enable trunk interfaces and verify connectivity between VLANs.

Instructions

Part 1: Add VLANs to a Switch

Step 1: Create VLANs on S1.
Create VLAN 10 and VLAN 30 on S1.
Open configuration window

Step 2: Assign VLANs to ports.
a. Configure interfaces F0/6 and F0/11 as access ports and assign VLANs.
- Assign the port connected to PC1 to VLAN 10.
- Assign the port connected to PC3 to VLAN 30.

b. Issue the show vlan brief command to verify VLAN configuration.

S1#

show vlan brief

Expected Output:

VLAN Name Status Ports

---- -------------------------------- --------- -------------------------------

1 default active Fa0/1, Fa0/2, Fa0/3, Fa0/4
Fa0/5, Fa0/7, Fa0/8, Fa0/9
Fa0/10, Fa0/12, Fa0/13, Fa0/14
Fa0/15, Fa0/16, Fa0/17, Fa0/18
Fa0/19, Fa0/20, Fa0/21, Fa0/22
Fa0/23, Fa0/24, Gig0/1, Gig0/2
10 VLAN0010 active Fa0/11
30 VLAN0030 active Fa0/6
1002 fddi-default active
1003 token-ring-default active
1004 fddinet-default active
1005 trnet-default active

Close configuration window

Step 3: Test connectivity between PC1 and PC3.
From PC1, ping PC3.
Question:
Were the pings successful? Why did you get this result?

Part 2: Configure Subinterfaces

Step 1: Configure subinterfaces on R1 using the 802.1Q encapsulation.
Open configuration window
a. Create the subinterface G0/0.10.

- Set the encapsulation type to 802.1Q and assign VLAN 10 to the subinterface.
- Refer to the Address Table and assign the correct IP address to the subinterface.

R1(config)#

int g0/0.10
R1(config-subif)# encapsulation dot1Q 10
R1(config-subif)# ip address 172.17.10.1 255.255.255.0

b. Repeat for the G0/0.30 subinterface.

Step 2: Verify Configuration.
a. Use the show ip interface brief command to verify subinterface configuration. Both subinterfaces are down. Subinterfaces are virtual interfaces that are associated with a physical interface. Therefore, in order to enable subinterfaces, you must enable the physical interface that they are associated with.
b. Enable the G0/0 interface. Verify that the subinterfaces are now active.

Close configuration window

Part 3: Test Connectivity with Inter-VLAN Routing

Step 1: Ping between PC1 and PC3.
Question:
From PC1, ping PC3. The pings should still fail. Explain.
Step 2: Enable trunking.
Open configuration window
a. On S1, issue the show vlan command.

Question:
What VLAN is G0/1 assigned to?
b. Because the router was configured with multiple subinterfaces assigned to different VLANs, the switch port connecting to the router must be configured as a trunk. Enable trunking on interface G0/1.

Question:
How can you determine that the interface is a trunk port using the show vlan command?

c. Issue the show interface trunk command to verify that the interface is configured as a trunk.
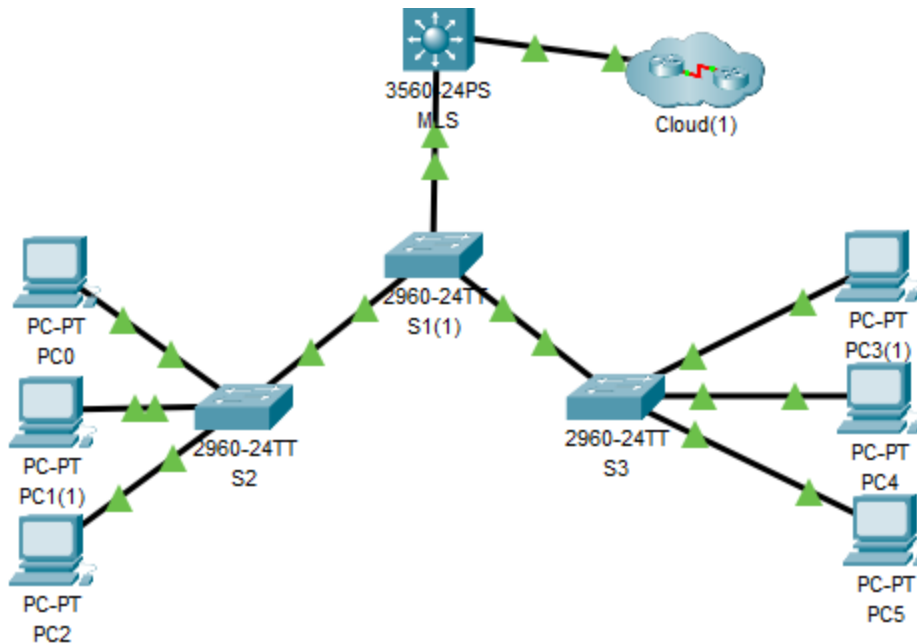
Close configuration window

Step 3: Test Connectivity
If the configurations are correct, PC1 and PC3 should be able to ping their default gateways
and each other.
Question:
What addresses do PC1 and PC3 use as their default gateway addresses?

Packet Tracer - Configure Layer 3 Switching and Inter-VLAN Routing

Addressing Table

Device	Interface	IP Address / Prefix	Gateway
MLS	VLAN 10	192.168.10.254 /24	
MLS	VLAN 20	192.168.20.254 /24	
MLS	VLAN 30	192.168.30.254/24	
MLS	VLAN 99	192.168.99.254/24	

MLS	G0/2	209.165.200.225	
PC0	NIC	192.168.10.1	
PC1	NIC	192.168.20.1	
PC2	NIC	192.168.30.1	
PC3	NIC	192.168.10.2/24	
PC4	NIC	192.168.20.2/24	
PC5	NIC	192.168.30.2	
S1	VLAN 99	192.168.99.1	
S2	VLAN 99	192.168.99.2	
S3	VLAN 99	192.168.99.3	

Objectives

Part 1: Configure Layer 3 Switching

Part 2: Configure Inter-VLAN Routing

Background / Scenario

A multilayer switch (MLS) is capable of both Layer 2 switching and Layer 3 routing. This dual

functionality is a major advantage for network design. A benefit for a small to medium-sized company would be the ability to route traffic between VLANs using multiple Switched Virtual Interfaces (SVIs), as well as the ability to convert a Layer 2 switchport to a Layer 3 interface.

Part 1: Configure Layer 3 Switching

In Part 1, you will configure the GigabitEthernet 0/2 port on switch MLS as a routed port and verify that you can ping another Layer 3 address.

a. On MLS, configure G0/2 as a routed port and assign an IP address according to the Addressing Table.

Open configuration window

```
None


MLS(config)# interface g0/2
MLS(config-if)# no switchport
MLS(config-if)# ip address 209.165.200.225 255.255.255.252
```

b. Verify connectivity to Cloud by pinging 209.165.200.226.

```
None


MLS# ping 209.165.200.226
```

Expected Output:

```
None


Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.226, timeout is 2
seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0
ms
```

Close configuration window

Part 2: Configure Inter-VLAN Routing

Step 1: Add VLANs.

Open configuration window

Add VLANs to MLS according to the table below. Packet Tracer scoring is case-sensitive, so type the names exactly as shown.

VLAN Number	VLAN Name
10	Staff
20	Student
30	Faculty

Step 2: Configure SVI on MLS.

Configure and activate the SVI interfaces for VLANs 10, 20, 30, and 99 according to the Addressing Table. The configuration for VLAN 10 is shown below as an example.

```
None

MLS(config)# interface vlan 10
MLS(config-if)# ip address 192.168.10.254 255.255.255.0
```

Step 3: Configure Trunking on MLS.

Trunk configuration differs slightly on a Layer 3 switch. On the Layer 3 switch, the trunking interface needs to be encapsulated with the dot1q protocol.

a. On MLS, configure interface g0/1.

b. Make the interface a static trunk port.

```
None

MLS(config-if)# switchport mode trunk
```

c. Specify the native VLAN as 99.

```
None

MLS(config-if)# switchport trunk native vlan 99
```

d. Encapsulate the link with the dot1q protocol.

```
None

MLS(config-if)# switchport trunk encapsulation dot1q
```

Note: Packet Tracer may not score the trunk encapsulation.

Step 4: Configure trunking on S1.

a. Configure interface g0/1 of S1 as a static trunk.

b. Configure the native VLAN on the trunk.

Step 5: Enable routing.

Question:

a. Use the show ip route command. Are there any active routes?

Type your answers here.

b. Enter the ip routing command to enable routing in global configuration mode.

```
None

MLS(config)# ip routing
```

c. Use the show ip route command to verify routing is enabled.

```
None

MLS# show ip route
```

Expected Output:

```
None

Codes: C - connected, S - static, I - IGRP, 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

C    192.168.10.0/24 is directly connected, Vlan10
C    192.168.20.0/24 is directly connected, Vlan20
C    192.168.30.0/24 is directly connected, Vlan30
C    192.168.99.0/24 is directly connected, Vlan99
     209.165.200.0/30 is subnetted, 1 subnets
C       209.165.200.224 is directly connected, GigabitEthernet0/2
```

Close configuration window

Step 6: Verify end-to-end connectivity.

a. From PC0, ping PC3 or MLS to verify connectivity within VLAN 10.

b. From PC1, ping PC4 or MLS to verify connectivity within VLAN 20.

c. From PC2, ping PC5 or MLS to verify connectivity within VLAN 30.

d. From S1, ping S2, S3, or MLS to verify connectivity with VLAN 99.

e. To verify inter-VLAN routing, ping devices outside the sender's VLAN.

f. From any device, ping this address inside Cloud, 209.165.200.226.

The Layer 3 switch is now routing between VLANs and providing routed connectivity to the cloud.