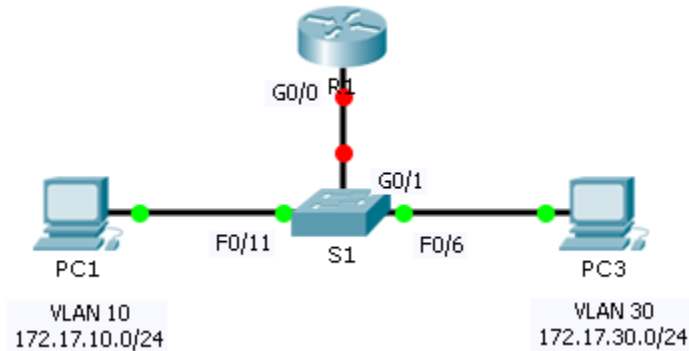# Packet Tracer – Configuring Router-on-a-Stick Inter-VLAN Routing (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Topology

Addressing Table

Device	Interface	IPv4 Address	Subnet Mask	Default Gateway
R1	G0/0.10	172.17.10.1	255.255.255.0	N/A
	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: Test Connectivity without Inter-VLAN Routing

Part 2: Add VLANs to a Switch

Part 3: Configure Subinterfaces

Part 4: Test Connectivity with Inter-VLAN Routing

Scenario

In this activity, you will check for connectivity prior to implementing inter-VLAN routing. You will then configure VLANs and inter-VLAN routing. Finally, you will enable trunking and verify connectivity between VLANs.

Part 1: Test Connectivity Without Inter-VLAN Routing

Step 1: Ping between PC1 and PC3.

Wait for switch convergence or click **Fast Forward Time** a few times. When the link lights are green for **PC1** and **PC3**, ping between **PC1** and **PC3**. Because the two PCs are on separate networks and **R1** is not configured, the ping fails.

Step 2: Switch to Simulation mode to monitor pings.

a. Switch to Simulation mode by clicking the **Simulation** tab or pressing **Shift+S**.

b. Click **Capture/Forward** to see the steps the ping takes between **PC1** and **PC3**. Notice how the ping never leaves **PC1**. What process failed and why? The ARP process failed because the ARP request was dropped by PC3. PC1 and PC3 are not on the same network, so PC1 never gets the MAC address for PC3. Without a MAC address, PC1 cannot create an ICMP echo request.

Part 2: Add VLANs to a Switch

Step 1: Create VLANs on S1.

Return to **Realtime** mode and create VLAN 10 and VLAN 30 on **S1**.

```
S1(config)# vlan 10
S1(config-vlan)# vlan 30
```

Step 2: Assign VLANs to ports.

a. Configure interface F0/6 and F0/11 as access ports and assign VLANs.

- Assign **PC1** to VLAN 10.
- Assign **PC3** to VLAN 30.

```
S1(config-vlan)# int fa0/11
S1(config-if)# switchport mode access
S1(config-if)# switchport access vlan 10
S1(config-if)# int fa0/6
S1(config-if)# switchport mode access
S1(config-if)# switchport access vlan 30
```

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

```
S1# show vlan brief

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
```

Step 3: Test connectivity between PC1 and PC3.

From **PC1**, ping **PC3**. The pings should still fail. Why were the pings unsuccessful? Each VLAN is a separate network and requires a router or a layer 3 switch to provide communication between them.

Part 3: Configure Subinterfaces

Step 1: Configure subinterfaces on R1 using the 802.1Q encapsulation.

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.

b. Repeat for the G0/0.30 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
R1(config-subif)# int g0/0.30
R1(config-subif)# encapsulation dot1Q 30
R1(config-subif)# ip address 172.17.30.1 255.255.255.0
```

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.

Part 4: Test Connectivity with Inter-VLAN Routing

Step 1: Ping between PC1 and PC3.

From **PC1**, ping **PC3**. The pings should still fail.

Step 2: Enable trunking.

a. On **S1**, issue the **show vlan** command. What VLAN is G0/1 assigned to? VLAN 1

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.

```
S1(config-if)# int g0/1
S1(config-if)# switchport mode trunk
```

c. How can you determine that the interface is a trunk port using the **show vlan** command? The interface is no longer listed under VLAN 1.

d. Issue the **show interface trunk** command to verify the interface is configured as a trunk.

Step 3: Switch to Simulation mode to monitor pings.

a. Switch to **Simulation** mode by clicking the **Simulation** tab or pressing **Shift+S**.

b. Click **Capture/Forward** to see the steps the ping takes between **PC1** and **PC3**.

c. You should see ARP requests and replies between **S1** and **R1**. Then ARP requests and replies between **R1** and **S3**. Then **PC1** can encapsulate an ICMP echo request with the proper data-link layer information and R1 will route the request to **PC3**.

> **Note:** After the ARP process finishes, you may need to click Reset Simulation to see the ICMP process complete.

Suggested Scoring Rubric

Packet Tracer scores 60 points. The four questions are worth 10 points each.