



CSE 320 - Computer Networks

LAB Session 4

27.03.2024

Packet Tracer:

<https://www.packettracernetwork.com/download/download-packet-tracer.html>

<https://skillsforall.com/resources/lab-downloads?courseLang=en-US>

Packet Tracer Everywhere: <https://github.com/PTAnywhere/ptAnywhere-installation>

1. To understand and implement VLAN configurations within a switched network. Students will learn how to segment a network using VLANs, assign IP addresses, and configure switches to facilitate communication between PCs in different VLANs.

a. Step 1: Lab Setup

Physical Network Design:

- Arrange three switches (Switch 1, Switch 2, Switch 3, 2960), with each connecting to 3 PCs. These switches represent different network segments or departments within an organization.
- Connect these switches to a fourth switch (Switch 4), the central unit linking all segments.

Logical Network Design:

- Define three VLANs on the network: VLAN 10 (Switch 1), VLAN 20 (Switch 2), and VLAN 30 (Switch 3).

b. Step 2: Switch Configuration

VLAN Configuration on Switches 1, 2, and 3:

Access Switch CLI:

- Log into each switch using the console connection.

Create VLANs:

```
enable
```

```
configure terminal
vlan 10
name Marketing
exit
vlan 20
name HR
exit
vlan 30
name IT
exit
```

- Repeat the above steps on Switches 1, 2, and 3, respectively, to create VLANs corresponding to their connected PCs.

Assign Ports to VLANs:

```
configure terminal
interface range fa0/1 - 3
switchport mode access
switchport access vlan 10 // Use VLAN 20 for Switch 2, VLAN 30
for Switch 3
exit
```

- Ensure you are assigning the correct VLAN IDs based on the switch. For instance, ports on Switch 1 will be assigned to VLAN 10.

Configure Trunk Port on Switches 1-3 to Connect to Switch 4:

```
interface fa0/24 // Assuming fa0/24 is the port connected to
Switch 4
switchport mode trunk
switchport trunk allowed vlan add 10,20,30
exit
```

- Adjust the port number if your setup uses a different port for the uplink.

Enable Port Fast (optional):

- To reduce the time it takes for the ports to come up, you can enable port fast on the access ports.

```
interface range fa0/1 - 3
spanning-tree portfast
exit
```

- **IP Setup**

IP Address Assignment for PCs:

Assign IP addresses to PCs connected to each VLAN with the following scheme:

VLAN 10 (Switch 1 PCs):

PC1: IP 192.168.10.2, Subnet Mask 255.255.255.0, Default Gateway 192.168.10.1
PC2: IP 192.168.10.3, Subnet Mask 255.255.255.0, Default Gateway 192.168.10.1
PC3: IP 192.168.10.4, Subnet Mask 255.255.255.0, Default Gateway 192.168.10.1
VLAN 20 (Switch 2 PCs):

PC1: IP 192.168.20.2, Subnet Mask 255.255.255.0, Default Gateway 192.168.20.1
PC2: IP 192.168.20.3, Subnet Mask 255.255.255.0, Default Gateway 192.168.20.1
PC3: IP 192.168.20.4, Subnet Mask 255.255.255.0, Default Gateway 192.168.20.1
VLAN 30 (Switch 3 PCs):

PC1: IP 192.168.30.2, Subnet Mask 255.255.255.0, Default Gateway 192.168.30.1
PC2: IP 192.168.30.3, Subnet Mask 255.255.255.0, Default Gateway 192.168.30.1
PC3: IP 192.168.30.4, Subnet Mask 255.255.255.0, Default Gateway 192.168.30.1

c. **Step 6: Test Connectivity**

Ping across the switches

d. **Step 7: Check Switch Table**

```
Switch> enable
Switch# show mac address-table
```

2. Router:

The goal of this lab is to demonstrate the setup and configuration of a network topology where three routers are connected to a central router, with each router having three PCs connected. This will facilitate the understanding of inter-router communication, subnetting, and routing of traffic between multiple subnets.

Required Equipment:

- 4 Routers (e.g., Cisco 2911)
- 12 PCs for testing connectivity.
- Connecting cables

Network Topology

- Router Connections: Connect Router1, Router2, and Router3 each to a distinct interface on Router0 using Ethernet cables.
- Connect three PCs to each of Router1, Router2, and Router3, respectively.

Ensure the network diagram is clearly labeled with router names, interface identifiers, and the PCs connected to each router.

Configuration

Perform these steps on Router0 (the central router), then repeat appropriately for Router1, Router2, and Router3.

Basic Setup for Each Router:

1. Set the Hostname:

```
enable
configure terminal
hostname RouterX # Replace X with the router number
exit
```

2. Configure Interfaces:

Assign IP addresses to the interfaces on each router. Router0's interfaces should be configured to connect to Router1, Router2, and Router3. Each interface on Router1, Router2, and Router3 that connects to Router0 should also be configured.

- **Example for Router0 connecting to Router1:**

```
plaintext
Copy code
configure terminal
interface GigabitEthernet0/0
ip address 192.168.1.1 255.255.255.252
no shutdown
exit
Note: Use a unique subnet for each router connection to Router0, and
within each router's local network for the PCs.
```

- **Enable Routing:**

Ensure routing is enabled to allow communication between the connected subnets

```
configure terminal
ip routing
exit
```

PC Configuration:

Assign IP addresses to each PC connected to the routers. Ensure each PC's IP address is within the subnet of its connected router. Set the default gateway of each PC to the router's interface IP address it's connected to.

- **Inter-Router Routing:**

On Router0, configure routes to the networks behind Router1, Router2, and Router3. Repeat similarly for the other routers, ensuring they have routes to the networks behind each other.

Example static route on Router0 to reach a network behind Router1:

plaintext

Copy code

```
ip route 192.168.2.0 255.255.255.0 192.168.1.2
```

Testing Connectivity:

1. **Ping Test Between PCs:** Perform a ping test from a PC connected to Router1 to a PC connected to Router2 and Router3. This verifies the routing setup and inter-connectivity.
2. **Troubleshooting:** If pings fail, check the IP configurations, default gateway settings on PCs, and the static routes on routers.

TAKE HOME

Submit your final work on router setup. Deadline: 03/04/2024 23:59