LAB EXPERIMENT-2 (2023000608)

Aim:

To design and implement a network that connects two different topologies using a router, ensuring seamless communication between all devices in the network.

Objectives:

O To understand the basics of interconnecting two networks using a router.

O To configure the devices for communication.

O To validate connectivity between devices in separate topologies.

O To ensure minimal packet loss and reliable data transfer between devices.

Materials and Software Required:

O Cisco Packet Tracer (simulation software)

O Networking devices:

   o 1 Router (e.g., Cisco 1941) o 2 Switches (e.g., Cisco 2960-24TT)

   o 6 PCs (end devices)

O Ethernet cables (straight-through and cross-over as required)

Network Design Overview:

The network comprises two separate local area networks (LANs) interconnected via a router:

O **LAN 1**: Includes a switch and three PCs (PC0, PC1, PC2).

O **LAN 2**: Includes another switch and three PCs (PC3, PC4, PC5).

O **Router**: Acts as the gateway between the two LANs, routing data between the two networks.

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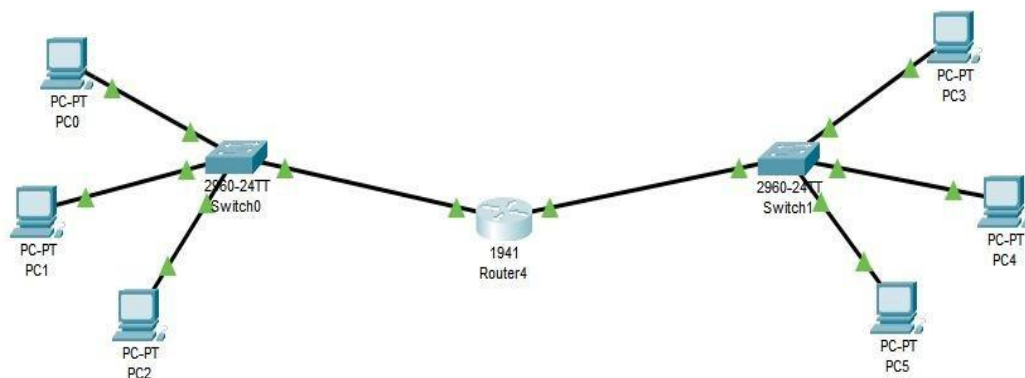
Procedure:

1. Topology Design:

1. Arrange the devices as shown in the network topology:

   - Connect PC0, PC1, and PC2 to Switch0 using straight-through cables.

   - Connect PC3, PC4, and PC5 to Switch1 using straight-through cables.

   - Connect Switch0 to one interface of the router and Switch1 to another interface of the router using cross-over cables.

2. Assigning IP Addresses:

1. Assign IP addresses to all PCs and ensure they belong to different subnets:

   - LAN 1: 192.168.1.0/24

     + PC0: 192.168.1.2

     + PC1: 192.168.1.3

     + PC2: 192.168.1.4

   - LAN 2: 192.168.2.0/24

     + PC3: 192.168.2.2

     + PC4: 192.168.2.3

     + PC5: 192.168.2.4

2. Assign default gateway IP addresses to each PC:

   - LAN 1 Default Gateway: 192.168.1.1 (Router interface connected to Switch0)

   - LAN 2 Default Gateway: 192.168.2.1 (Router interface connected to Switch1)

3. Configuring the Router:

1. Access the router through the CLI or GUI.

2. Assign IP addresses to the router's interfaces:

   - Interface connected to LAN 1: 192.168.1.1/24

   - Interface connected to LAN 2: 192.168.2.1/24 3. Enable the interfaces using the no shutdown command.

4. Testing Connectivity:

1. Use the ping command to test connectivity:

   - From PC0 (LAN 1) to PC3 (LAN 2)

   - From PC4 (LAN 2) to PC1 (LAN 1)

2. Verify successful communication between devices in both LANs through the router.

Observations:

- within the same LAN can communicate directly without using the router.

- Devices Devices in different LANs communicate only through the router.

- Proper subnetting and gateway configuration are essential for communication between networks.

- Packet loss is observed if there is a misconfiguration in IP addresses or gateway settings.

- A router successfully enables communication between devices in different subnets.

- Each LAN operates independently but can exchange data with the other LAN when properly routed.

- Network performance depends on correct configuration of devices.

Conclusion:

The project demonstrates the process of interconnecting two distinct network topologies using a router. It highlights the importance of correct IP addressing, subnetting, and gateway configurations. The experiment validates that routers play a vital role in enabling communication across different networks.