Computer Network Lab Assignment 4a:

Topic : Configuration & Simulation using CISCO Packet Tracer

Objective

The objective of this lab assignment is to design and develop a network topology of a **100 Mbps Fast Ethernet LAN** using **two 24-port switches**. Each switch is connected to a disjoint set of **10 nodes (PCs)**, and these nodes are configured with **Class C IP addresses (192.168.4.41 - 60)**. The setup will include a **Packet Data Unit (PDU)** to check the ping and verify connectivity between the PCs. The simulation will be implemented using CISCO Packet Tracer.

Equipment Required

- **CISCO Packet Tracer Software**
- Two (2) **24-Port Ethernet Switches**
- Twenty (20) **PCs**
- Ethernet cables (automatic in Packet Tracer)
- Class C IP address range **192.168.4.41 - 60**

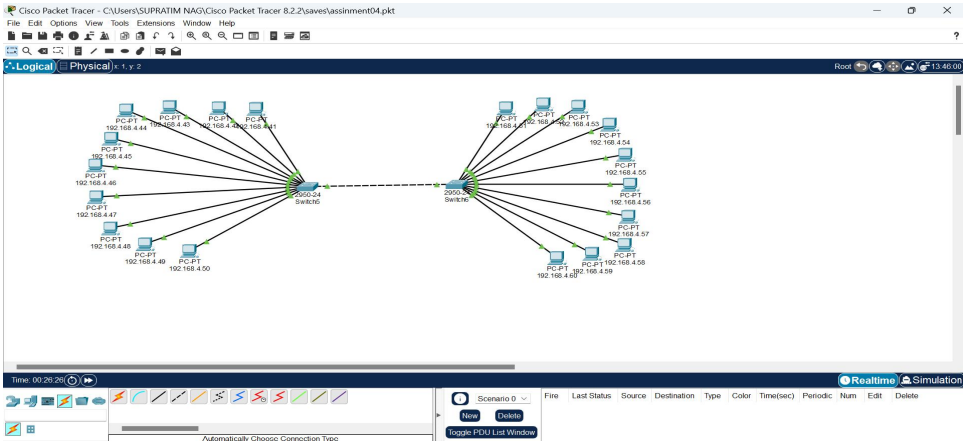
Network Topology Design

1. Setting Up the Network Components

- **Switches:**
  - Use two **24-port Ethernet switches** to handle two groups of 10 PCs each.
  - The switches will be connected to the respective PCs forming two disjoint networks.
- **PCs:**
  - Each group will have **10 PCs** connected to their respective switches, with Class C IP addresses ranging from **192.168.4.41 to 192.168.4.60**.
  - Assign each PC a unique IP address within this range.

2. Network Connectivity

- Ensure that all PCs are connected to their respective switches using **Fast Ethernet cables** in the **Packet Tracer** environment.
- Each switch should be assigned a common subnet mask **255.255.255.0**.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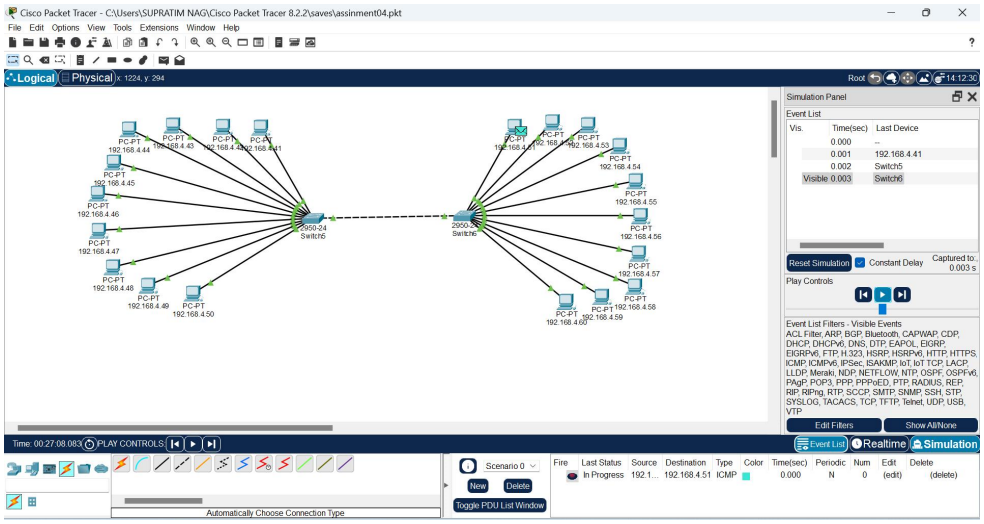
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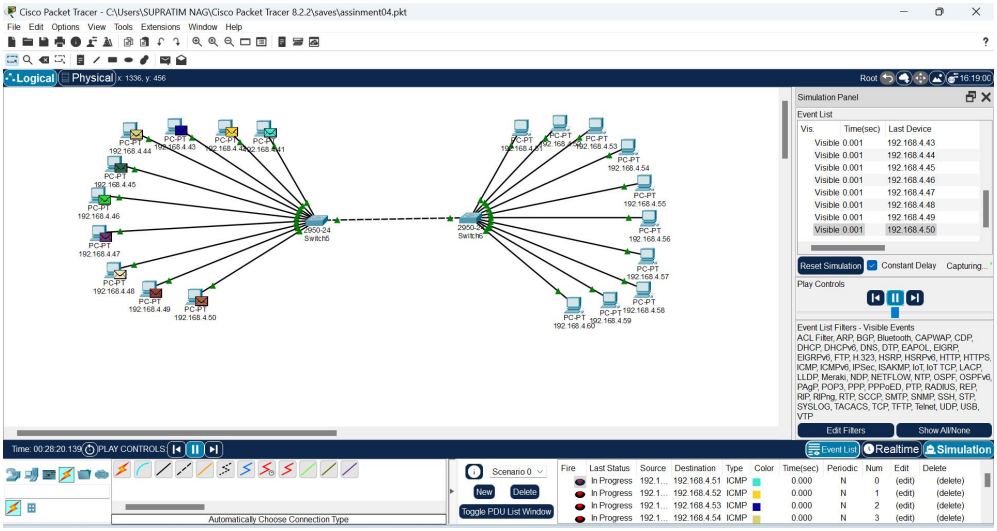
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Steps Involved in Configuration

Step 1: Launch CISCO Packet Tracer

- Open the **CISCO Packet Tracer** application to create and simulate the network topology.

Step 2: Add Devices to Workspace

- **Add Switches:**
  Drag and drop **two 24-port switches** onto the workspace.
- **Add PCs:**
  Add **20 PCs** (10 for each switch) and place them in two groups around each switch.

Step 3: Connect Devices Using Ethernet Cables

- Use the **"Connections" tool** in CISCO Packet Tracer and choose **Fast Ethernet** to connect each PC to its respective switch.
    - **Switch 1:** Connect PCs 1-10.
    - **Switch 2:** Connect PCs 11-20.

Step 4: Assign IP Addresses

- Go to each PC, open the **Desktop** tab, and configure the IP settings.
    - Set IP addresses for PCs 1-10 as **192.168.4.41 to 192.168.4.50**.
    - Set IP addresses for PCs 11-20 as **192.168.4.51 to 192.168.4.60**.
    - Use **255.255.255.0** as the subnet mask for all PCs.

Step 5: Configure and Add PDU for Ping Test

- Use the **Add Simple PDU** tool to check connectivity by initiating a ping from **PC1 to PC11** (or any other PCs across the switches).
- The PDU will simulate a ping request to ensure that the network is functioning correctly.

Step 6: Run the Simulation

- Once everything is configured, start the simulation by switching to the **Simulation Mode** in Packet Tracer.
- Observe the **ping results** between the PCs and ensure proper communication between all devices.

Step 7: Verify the Results

- The **ping test** should return successful results, indicating proper connectivity between the nodes across both switches.

Topics Covered

1. Ethernet LAN and Switches

- **LAN (Local Area Network)** refers to a network that connects devices within a limited area like a building or campus.
- **Switches** operate at Layer 2 (Data Link Layer) and manage communication within the LAN, using MAC addresses to forward packets to the correct destination.

2. Class C IP Addressing

- **Class C IP Address** range is from **192.0.0.0 to 223.255.255.255**.
- A **Class C network** uses a default subnet mask of **255.255.255.0**, which allows up to **254 usable IP addresses** in a given subnet.

3. Ping and Connectivity Testing

- **Ping** is a network utility used to test the reachability of a device on a network by sending **ICMP echo requests**.
- **Packet Data Unit (PDU)** in Packet Tracer helps in visualizing the packet flow during the simulation and testing the connectivity between the devices.

4. Simulation with CISCO Packet Tracer

- **CISCO Packet Tracer** is a simulation tool that allows users to create, configure, and simulate network topologies.
- It enables **real-time** and **simulation mode**, where users can observe network behavior and troubleshoot issues.

Conclusion

In this lab assignment, we successfully designed and developed a network topology of **100 Mbps Fast Ethernet LAN** using two 24-port switches, connected to **20 nodes**. The PCs were configured with **Class C IP addresses**, and the simulation was performed using **CISCO Packet Tracer**. The network was tested for connectivity using **Ping**, and the results showed successful communication between the PCs, confirming the correctness of the network setup.