EXPERIMENT -1

Study of Network Devices in Detail and Connecting Computers in a Local Area Network (LAN)

1. Introduction to Network Devices

Network devices are essential components that enable communication between computers and other devices in a network. In a **Local Area Network (LAN)**, various devices work together to ensure data transmission and connectivity. Below are some commonly used network devices and their functions:

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2. Essential Network Devices

a) Router:

- Function: Connects multiple networks and directs data packets to their destination.
- Features: Dynamic routing, Network Address Translation (NAT), and firewall capabilities.
- Use Case: Connecting a LAN to the internet.

b) Switch:

- Function: Connects multiple devices within a LAN and forwards data only to the intended recipient.
- Features: VLAN support, MAC address learning, and high-speed data transfer.
- Use Case: Interconnecting computers, printers, and servers within a network.

c) Hub:

- Function: Broadcasts data to all connected devices without filtering.
- Features: Simple, inexpensive, and basic connectivity.
- Use Case: Small or less complex networks.

d) Modem (Modulator-Demodulator):

- Function: Converts digital signals to analog for transmission over phone lines and vice versa.
- Features: DSL, Cable, and Fiber modems.
- Use Case: Connecting a LAN to the internet through an ISP.

e) Access Point (AP):

- Function: Extends wireless coverage by connecting Wi-Fi devices to a wired LAN.

- Features: Dual-band support, security protocols (WPA3).
- Use Case: Creating wireless networks within a LAN.

f) Network Interface Card (NIC):

- Function: Connects a computer to a network using wired (Ethernet) or wireless (Wi-Fi) methods.
- Features: Unique MAC address and Ethernet port.
- Use Case: Physical network connection on desktops and laptops.

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3. Connecting Computers in a Local Area Network (LAN)

Step 1: Gather Required Devices and Cables

- Router or Switch
- Ethernet cables (Cat5e or Cat6)
- Network Interface Cards (NIC)
- Wireless Access Point (optional)

Step 2: Physical Connection

- Connect the switch to the router using an Ethernet cable.
- Connect each computer to the switch using Ethernet cables.
- Optionally, connect a wireless access point to the switch.

Step 3: Configure IP Addresses

- Use **Dynamic Host Configuration Protocol (DHCP)** on the router to assign IP addresses automatically.
- Alternatively, assign **Static IP Addresses** manually within the same subnet.

Step 4: Network Configuration

- Ensure that all computers are set to the same **IP subnet** (e.g., 192.168.1.x).
- Configure the **Gateway and DNS Server** as the router's IP address.

Step 5: Enable File and Printer Sharing

- On Windows:
  - Go to **Network and Sharing Center**.
  - Enable **Network Discovery** and **File and Printer Sharing**.
- On Linux:

- Use **Samba** to share files across the network.

Step 6: Testing the Network

- Use the **ping** command to check connectivity:
- ping 192.168.1.2
- Test file sharing and printing between connected devices.