	SHRI SANT GAJANAN MAHARAJ COLLEGE ENGG. SHEGAON		LABORATORY MANUAL
	PRACTICAL EXPERIMENT INSTRUCTION SHEET		
	EXPERIMENT TITLE: **LAN Implementation**		
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Date:

LAN IMPLEMENTATION

01. AIM :

Design & implement a Local Area Network (LAN) that connects multiple computers and shares files between connected computers.

02. FACILITIES :

Computers/Workstations: Multiple computers running Windows OS.

Switches/Routers: Used to connect the devices within the LAN.

Network Cables: Ethernet cables for wired connections.

Windows OS: For setting up file sharing using File Explorer.

IP Configuration: Static or dynamic IP addressing for device identification.

03. SCOPE :

Connecting Devices: The experiment connects multiple computers using switches to form a LAN.

File Sharing: Focuses on configuring file sharing through **File Explorer** on Windows OS.

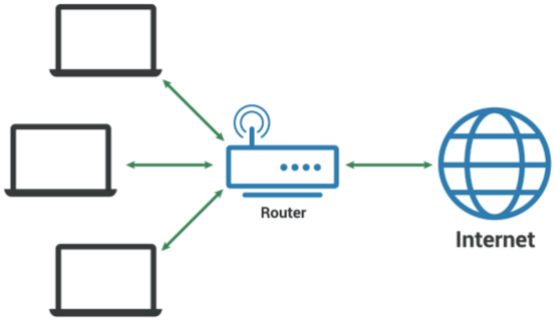
Security: Basic file access control via Windows' built-in permissions.

Network Troubleshooting: Simple testing of network connectivity and shared folders.

04 THEORY:

Local Area Network (LAN):

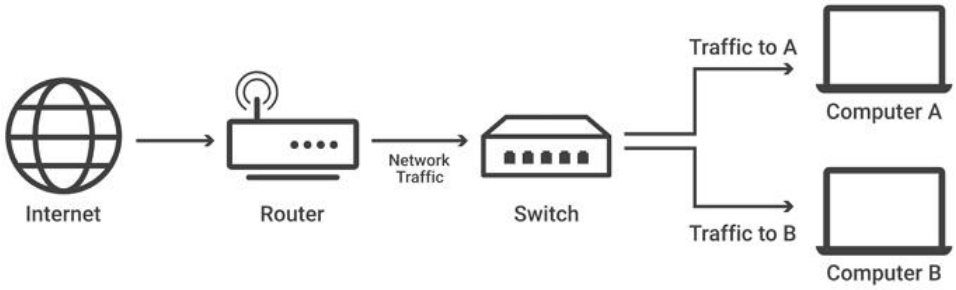
A **Local Area Network (LAN)** is a network that connects multiple devices within a small geographical area, such as a home, office, or building. The devices in a LAN communicate through networking hardware like switches and routers, and use network protocols to exchange data and resources like files, printers, or internet access.



The key elements that define a LAN include:

1. Devices and Connectivity:
In a LAN, computers, printers, and other devices are interconnected. These devices communicate with one another using Ethernet cables or wireless connections (Wi-Fi), although for this experiment, we are focusing on a wired network using **Ethernet cables** connected to a **switch**. The switch acts as the central hub, forwarding data packets between devices.

2. Switches:
A **network switch** is a device that connects multiple devices within a LAN. Unlike a hub, which broadcasts data to all devices, a switch directs data to the specific device it is meant for. This reduces network collisions, optimizes performance, and ensures data is transferred to the correct device on the network. Switches also allow for scalable network setups as more devices can be added easily by connecting them to the switch.



3. IP Addressing:
For devices in a LAN to communicate, they need unique IP addresses. These can be assigned **statically** (manually) or **dynamically** (automatically through a **DHCP server**). In most cases, static IP addressing is used for fixed devices, while dynamic IP addressing works well for devices that may join and leave the network frequently.

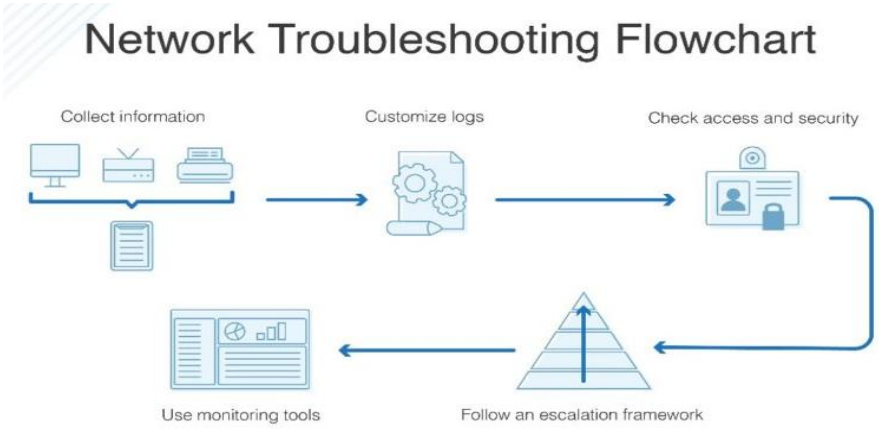
4. File Sharing Protocols:
File sharing is one of the main purposes of a LAN. In Windows OS, file sharing is typically done using the **SMB (Server Message Block)** protocol. This protocol allows one computer to share folders and files with other devices on the network.

File Explorer in Windows OS provides a simple interface to share files, either by selecting specific folders or setting up shared drives.

5. Permissions and Access Control:
Shared files or folders can be restricted based on user permissions. In Windows, users can assign different levels of access to shared resources, such as read-only, read-write, or full control. This ensures that sensitive data is protected and only authorized users can access or modify shared content.

6. Network Security:
Security is essential in a LAN to prevent unauthorized access to shared resources. Windows OS has built-in tools for securing file shares, such as setting passwords for shared folders, configuring **Windows Firewall** to restrict access, and enabling encryption for sensitive data. Ensuring that only authorized devices and users can access specific shared folders helps protect the integrity of the LAN.

7. LAN Troubleshooting:
Troubleshooting is an important aspect of maintaining a LAN. Common issues that may arise include devices not connecting, incorrect IP addresses, file-sharing permissions issues, or network cable problems. Tools such as **ping** (to check connectivity) and the **Network Troubleshooter** in Windows can help diagnose and resolve problems.



Implementation of LAN and File Sharing:

1. Network Planning and Setup:

a) **Design the network**: Identify the devices that need to be connected (computers, printers, etc.). Plan whether they will be connected through wired Ethernet or Wi-Fi (for this experiment, we are using wired Ethernet).

b) **Set up the switch**: Position the network switch in a central location, where all the devices can be connected. Each device will be plugged into the switch using Ethernet cables.

c) **Power up the devices**: Turn on the computers and ensure they are all connected to the switch via network cables.

2. Assigning IP Addresses:

a) **Static IP addressing**: Decide if you want to assign static IP addresses to each device or use DHCP for automatic assignment. If static IPs are used, assign an IP range (e.g., 192.168.1.2, 192.168.1.3, etc.).

b) **Configure IP addresses**: Go to the **Network and Sharing Center** on each Windows PC and assign the appropriate static IP addresses or configure DHCP to automatically assign them.

Control Panel →

Network and Internet →

Network and Sharing Center →

Change Adapter Settings →

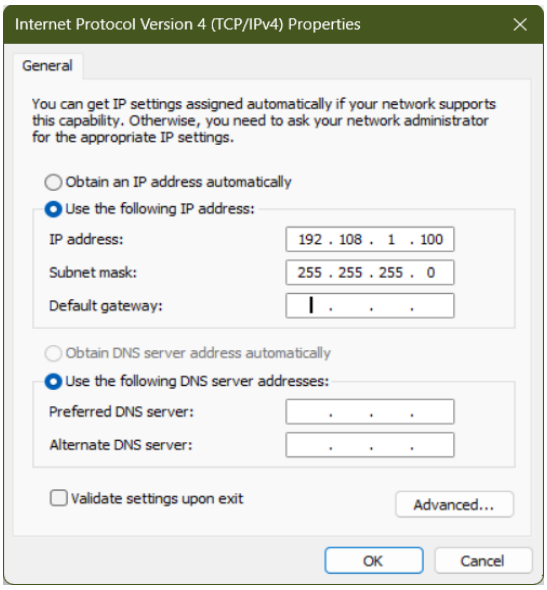
Select Network →

Properties →

Search 'Internet Protocol v4 (TCP/IPv4)' in the list →

Properties →

Assign IP, Subnet mask is autogenerated



3. Enabling File Sharing on Windows OS:

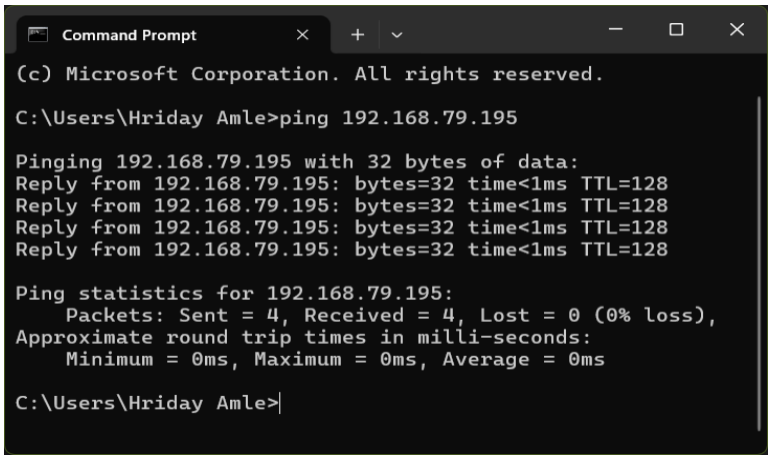
a) **Open File Explorer**: On each Windows computer, open **File Explorer** and navigate to the folder you want to share.

b) **Share a Folder**: Right-click on the folder, select **Properties**, then go to the **Sharing** tab. Click **Share**, and select the users or groups you want to share with.

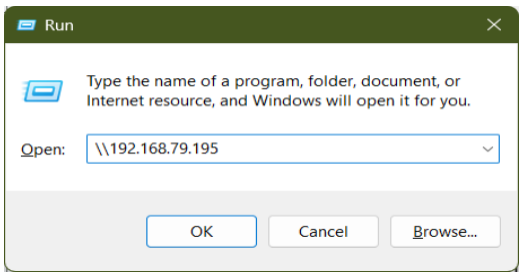
c) **Set Permissions**: You can choose whether the shared folder is **read-only** or if users can **read and write** to the folder. Configure access permissions based on your needs.

4. Testing the LAN Connection:

a) **Ping Test**: From the **Command Prompt**, use the **ping** command to check if each computer can communicate with others. Type `ping <IP address>` and ensure there is a response. This confirms the devices are on the same network.



b) **Access Shared Folders**: On one computer, open **File Explorer** and type `\\<IP address>` of another computer to access the shared folder. Ensure that the shared files are visible and accessible.



5. Secure the LAN:

a) **Set Network Security**: Configure firewalls on each computer to allow only specific devices or users to access shared folders. Set up passwords or use **Windows credentials** to control access to the files.

b) **Encrypt Sensitive Data**: For sensitive files, consider enabling **BitLocker** encryption on Windows to secure data stored on shared drives.

6. Troubleshooting:

a) **Check Connectivity**: If a computer cannot ping another, verify the network cables, IP configuration, and switch connectivity.

b) **File Sharing Issues**: If shared folders are not accessible, check if file-sharing is enabled, permissions are correctly set, and that the firewall is not blocking file-sharing protocols.

08 CONCLUSION:

This experiment set up a **Local Area Network (LAN)** using switches and Windows OS for file sharing. It emphasized configuring file sharing through **File Explorer**, assigning static IPs, setting file permissions, ensuring security, and troubleshooting, demonstrating how a LAN enhances collaboration, resource sharing, and network management efficiently.

09 VIVA QUESTIONS:

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