# Practical 1 – Networking Devices, Cables, Topologies & Commands

🎯 Aim

To study networking devices, transmission media (cables), network topologies, and basic network troubleshooting commands.

1️⃣ **Networking Devices**

- **Hub**: Basic device, broadcasts data to all ports.

- **Switch**: Smarter device, forwards data to specific destination using MAC address.

- **Router**: Connects different networks (LAN to WAN), forwards packets using IP addresses.

- **Modem**: Converts digital signals to analog (and vice versa) for Internet.

- **Access Point**: Provides wireless connectivity.

- **Gateway**: Connects networks with different protocols.

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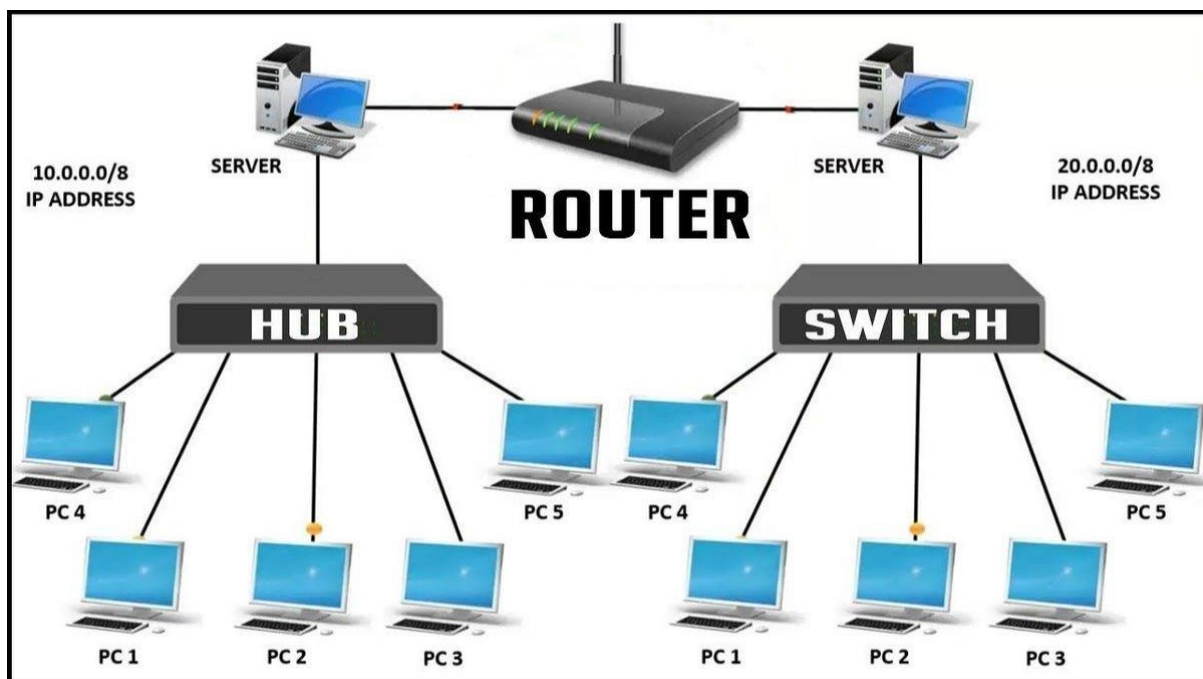
2 **Transmission Media (Cables)**

- **Coaxial Cable**

  - Single copper conductor with shielding.

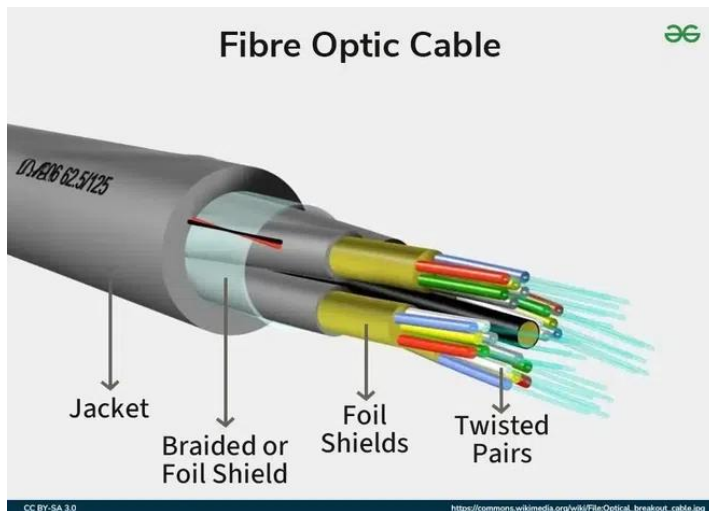 - Example: TV cable, older Ethernet.

- **Twisted Pair Cables**

  - **Cat5**: Up to 100 Mbps, older LANs.

  - **Cat5e**: Enhanced, up to 1 Gbps.

  - **Cat6**: Supports 10 Gbps over short distances, better shielding.

  - **Cat7**: Supports 10–40 Gbps, shielded twisted pairs, high performance.

  - Used in Ethernet LANs.
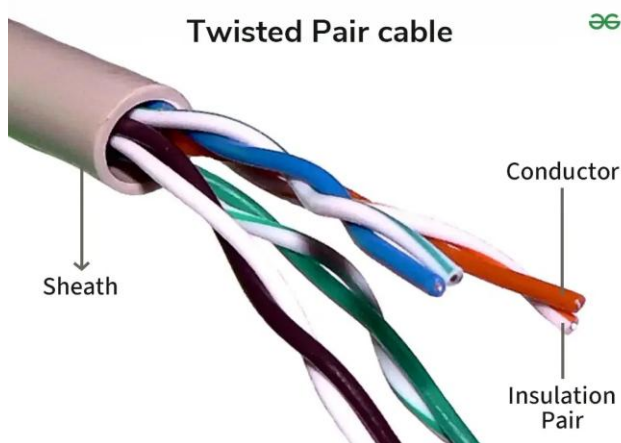
- **Fiber Optic Cable**

  - Uses light signals for data transmission.

  - Very high bandwidth, long distance, immune to EMI.

  - Types: Single Mode (long distance), Multi Mode (short distance).

Fibre Optic Cable

Jacket — Braided or Foil Shield — Foil Shields — Twisted Pairs

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3 **Network Topologies**

1. **Bus Topology**

   - Single backbone cable, all devices connected.

   - Simple, but failure in main cable disrupts network.

2. **Star Topology**

   - All devices connect to a central switch/hub.

   - Easy to manage, failure of one device doesn't affect others.
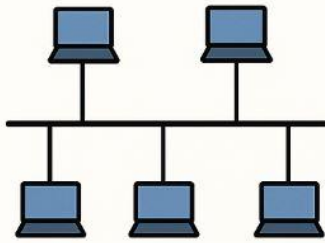
3. **Ring Topology**

   - Devices connected in a circular path.

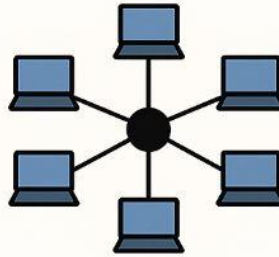   - Data travels in one direction, failure in one device may affect all.

4. **Mesh Topology**

   - Every device connected to every other device.
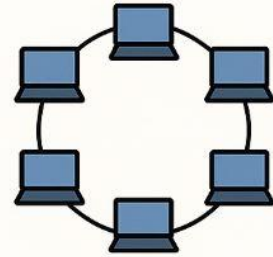
   - Very reliable but costly.
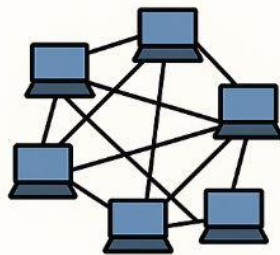
MOST COMMON TYPES OF NETWORK TOPOLOGY
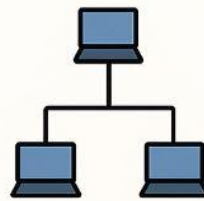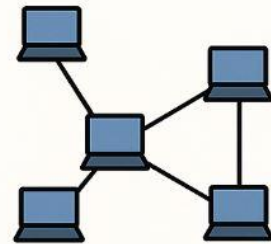
Bus Topology

Star Topology

Ring Topology

Mesh Topology

Tree Topology

Hybrid Topology

4️⃣ **Network Troubleshooting Commands**

- **ipconfig**

  - Displays IP configuration.

  - Example: `ipconfig /all`

- **ping**

  - Tests connectivity with a host.

  - Example: `ping google.com`

- **tracert**

  - Shows path taken by packets to destination.

  - Example: `tracert google.com`

- **nslookup**

  - Queries DNS to resolve domain names.

  - Example: `nslookup google.com`

- **getmac**

  - Displays MAC address of system.

  - Example: `getmac`

- **route print**

  - Shows routing table.

  - Example: `route print`

✅ Conclusion

In this practical, we studied basic networking devices, types of cables, common network topologies, and used troubleshooting commands like `ping`, `ipconfig`, `tracert`, `nslookup`, `getmac`, and `route print` to analyze and solve network-related issues.