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SEM V SEC B

COMPUTER NETWORKS LAB PRACTICAL - 1

Theory

Computer networking is the practice of connecting two or more computing devices together to share resources, data, and services. Networking allows communication between devices either within a local area (LAN) or across wide areas (WAN/Internet).

Network Troubleshooting Commands

1. **ncpa.cpl** – Opens the network configuration window.

2. **ping** – Tests connectivity between devices by sending packets and receiving replies. 3.

tracert – Traces the route taken by packets to reach a destination (maximum 30 hops).

4. **nslookup** – Displays the DNS server information of a remote machine and the local machine.

5. **route print** – Displays the current routing table of the system.

Network Devices

1. **Repeater** – Works at the physical layer, regenerates weak or corrupted signals.

2. **Hub** – A device that connects multiple computers in a network.

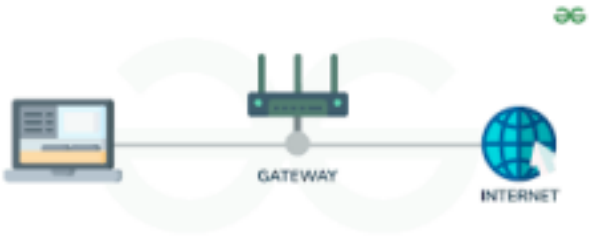
3. **Bridge** – Works at the data link layer, filters traffic using MAC addresses.

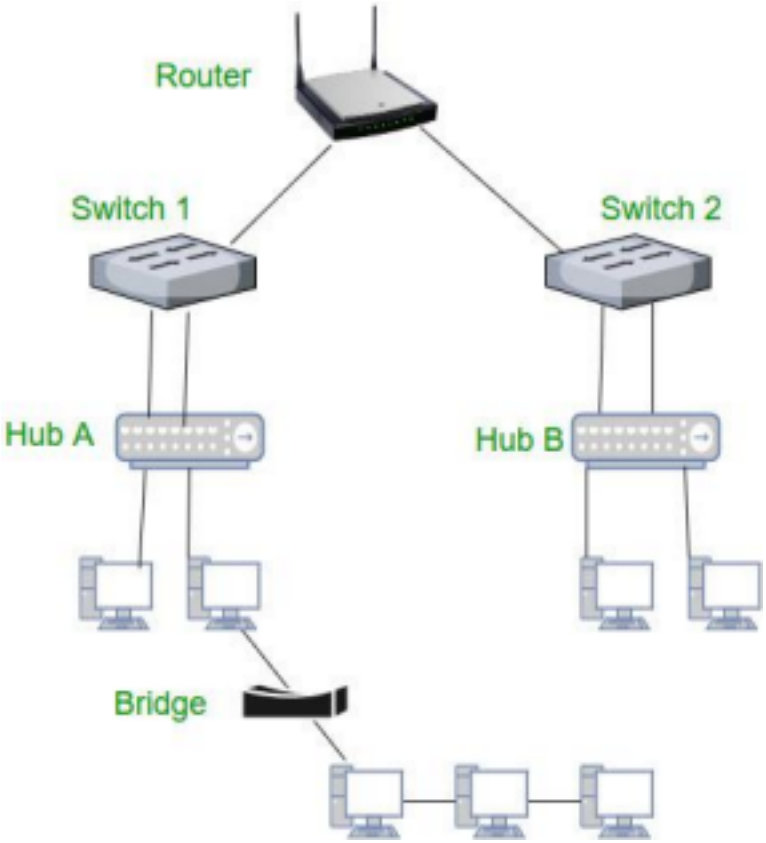
4. **Switch** – An intelligent hub that connects network segments, performs error checking, and forwards data.

5. **Router** – Forwards data packets based on IP addresses, connects different networks.
6. **Gateway** – Connects two different types of networks and enables communication.

7. **Brouter** – A device that can function as both a bridge and a router.

8. **Modem** – Converts digital signals to analog and vice versa (Modulator–Demodulator).





Types of Cables

1. **UTP (Unshielded Twisted Pair)**
    - ○ Commonly used in LAN setups.
    - ○ Uses RJ-45 connectors.
    - ○ Low cost and easy to install.
2. **Coaxial Cable**

○ Used in bus topology.

○ Has a central copper conductor with insulation and shielding.

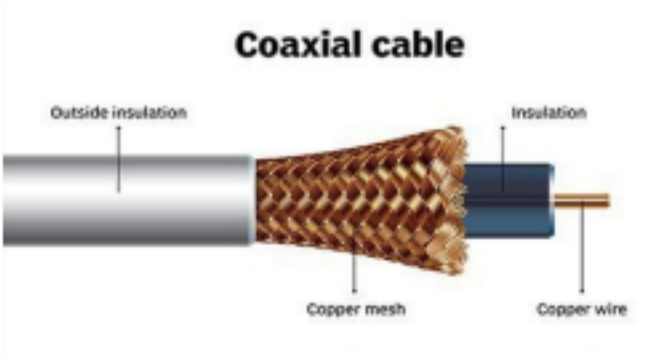
○ Rarely used now.

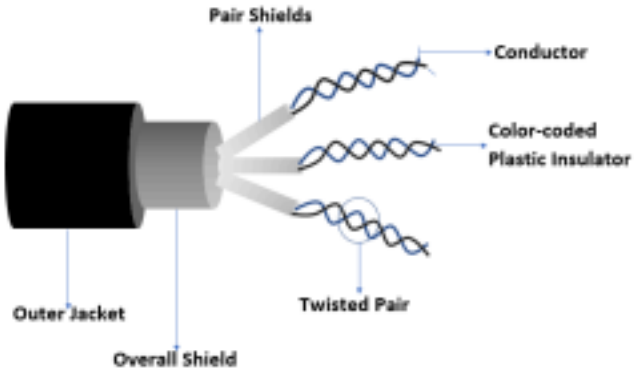
3. **Fibre Optic Cable**

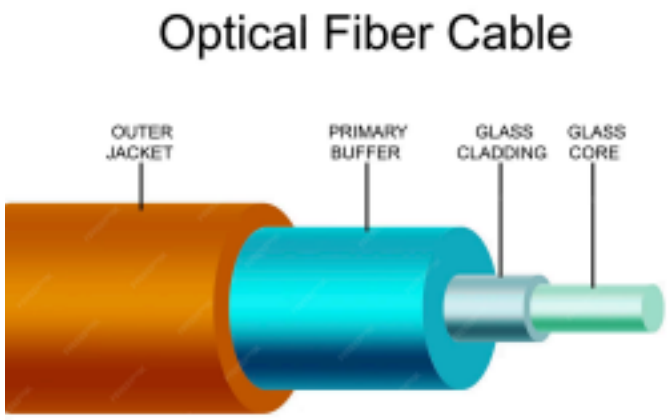
○ High-speed data transmission over long distances.

○ Immune to electromagnetic interference.

○ Common in data centers and high-performance backbones.







Network Topologies

1. **Bus Topology**
    - ○ Single central cable (backbone).
    - ○ Simple and cheap, but failure of main cable disrupts entire network.
2. **Star Topology**
    - ○ All nodes connected to a central hub/switch. ○ Easy

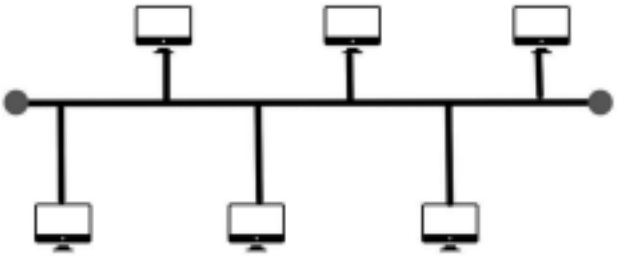
to manage, isolate faults, widely used in LANs. 3. **Ring**

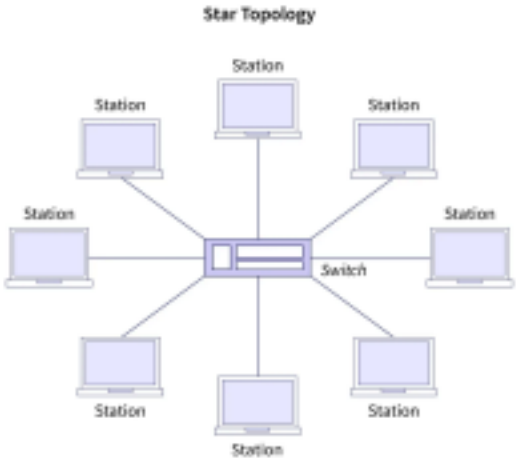
Topology

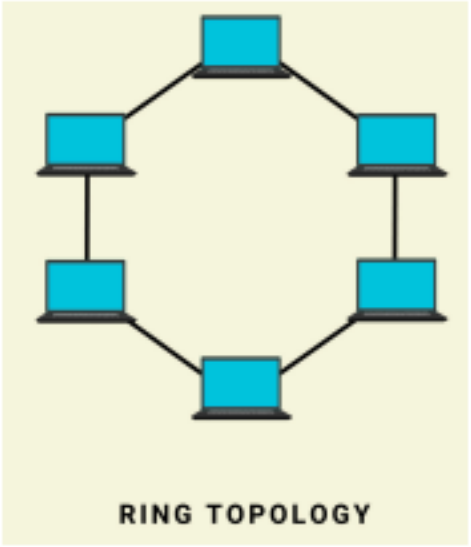
- ○ Each node connected to two others in a ring.
- ○ Data flows in one direction.
- ○ Single failure can disrupt the whole network.

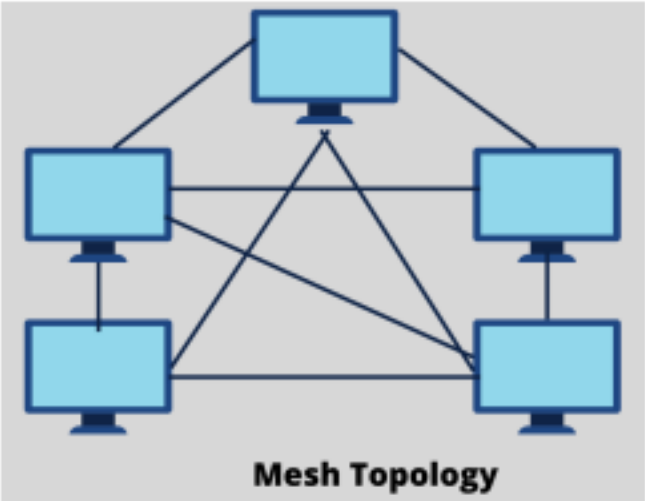
4. **Mesh Topology**
    - ○ Each node connected to every other node.
    - ○ High fault tolerance, but costly and complex.
5. **Hybrid Topology**
    - ○ Combination of two or more topologies.
    - ○ Flexible and scalable.

Bus Topology









Conclusion:

In this practical, the basic concepts of networking devices, cable types, and network topologies were studied. Common troubleshooting commands were also practiced to understand how to monitor and resolve network issues.