Network and Topologies

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Network

Computer network

A network is two or more computers, or other electronic devices connected together so that they can share resources (Printer, scanner, data storage, file, software etc.).Connections between computing devices can be physical using wires or cables or wireless using radio waves or infrared signals

Some advantages of a network are:

- Sharing: Resources (Hardware and Software) can be shared.
- Easy Communication: Allows more effective communication between users e.g. via e-mail.
- Reduced Cost: Networks are cheaper than "stand-alone PCs."
- Security: Information held on the network can be accessed by all users with authorised access.
- Speed: Sharing and transferring files within networks is very rapid, depending on the type of network

Some disadvantages of a network are:

- The set-up and maintenance costs can be expensive.
- A fault with the network server can cause difficulties with the organisation.
- Networks need security measures to restrict access to users.
- WANs are vulnerable to hackers and viruses.

Local area network (LAN)

- A network that connects a relatively small number of machines in a relatively close geographical area. Example: With in Institution, Hospital, Company etc.

Metropolitan area network(MAN)

- A *Metropolitan Area Network* (MAN) is a network that is utilized across multiple buildings
- Commonly used in school campuses or large companies with multiple buildings
- Is larger than a LAN, but smaller than a WAN
- Is also used to mean the interconnection of several LANs by bridging them together. This sort of network is also referred to as a *campus network*

Wide area network(WAN)

- *A Wide Area Network* is a network spanning a large geographical area of around several hundred miles to across the globe
- WANs are networks that are found where computers in **different areas** or **countries** need to communicate.
- Can be connected through cable, fiber or satellite
- Services include internet, frame relay, ATM (Asynchronous Transfer Mode)

Topology

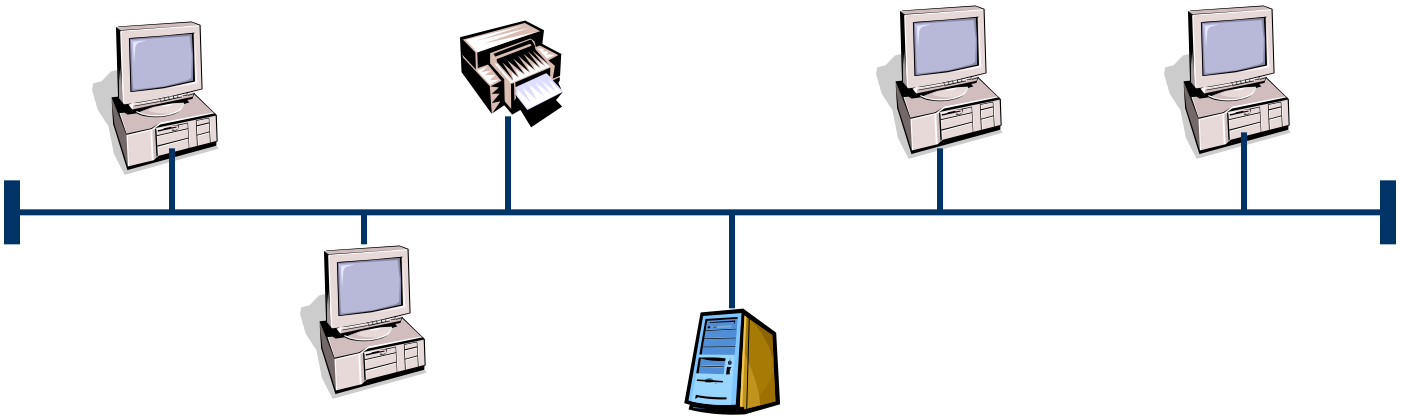
- The physical topology of a network refers to the configuration of cables, computers and other peripherals.
- There are five basic configurations used to connect computers they are :
  - Linear Bus
  - Star
  - Ring
  - Tree or Hybrid
  - Mesh

Disadvantages of a Bus LAN

- Sharing of a single data bus
  - When the traffic increases the performance deteriorates
- Waiting period may reach unacceptable lengths of time under heavy data traffic
- Cable fault results in the entire LAN becoming inoperative

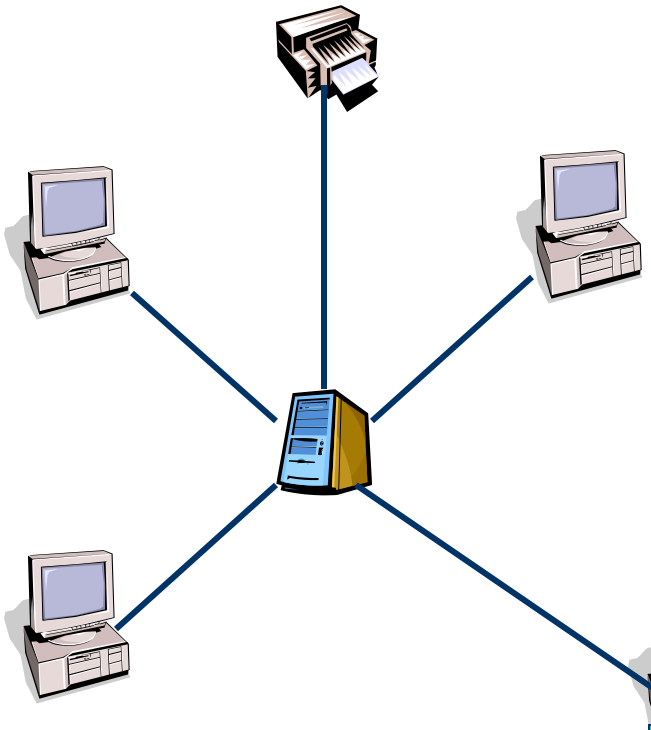
Linear Bus topology

- All nodes are connected to a single communication line that carries messages in both directions



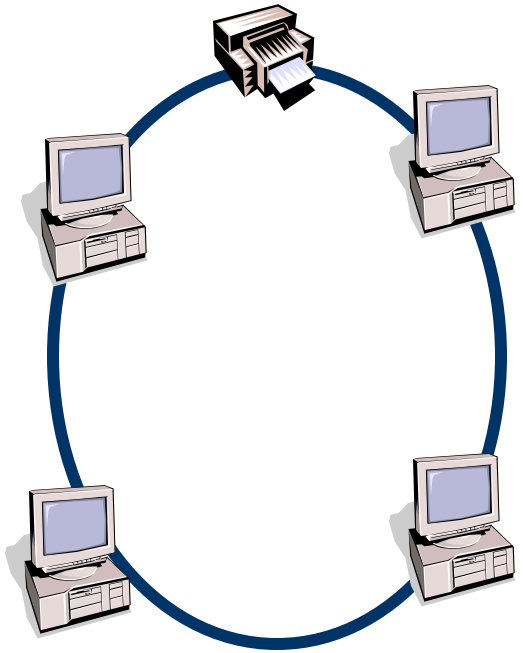
Star topology

- A configuration that centers around one node to which all others are connected and through which all messages are sent



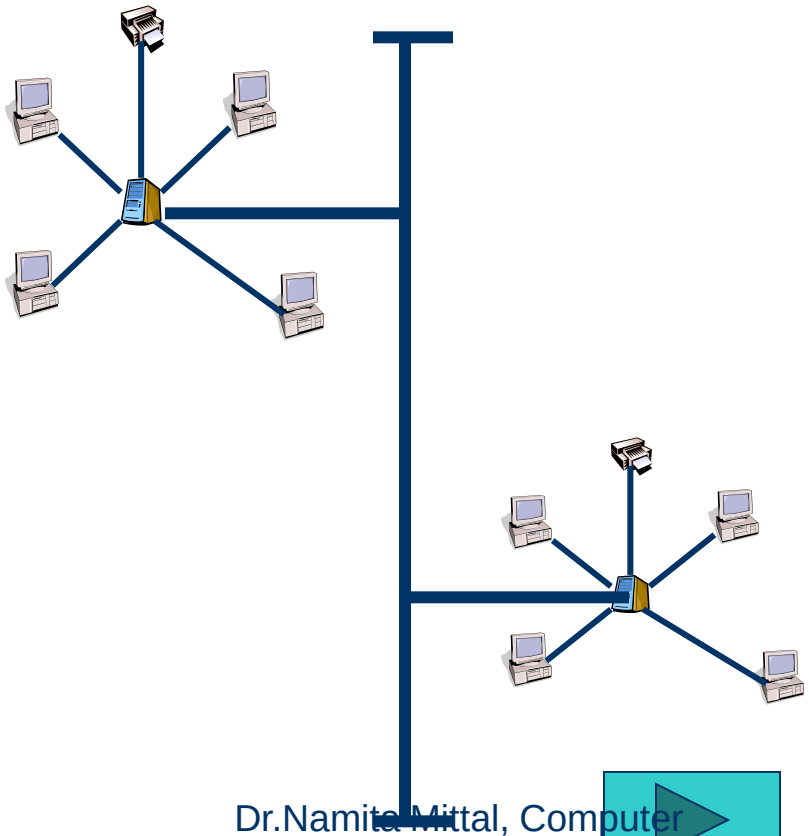
Ring topology

- A ring network is one where all workstations and other devices are connected in a continuous loop. There is no central server



Tree or hybrid topology

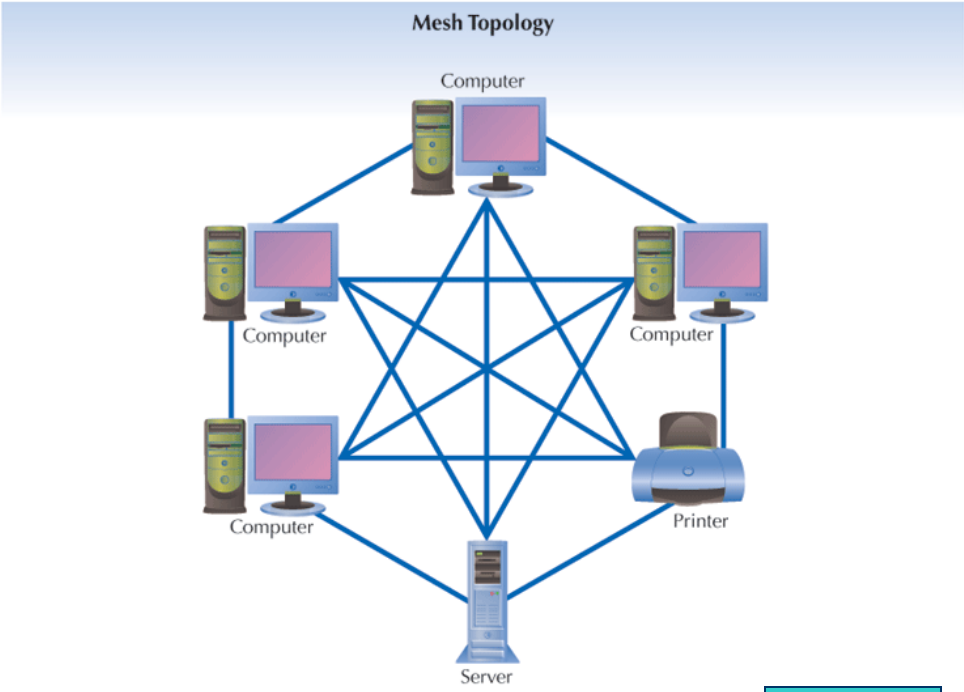
- A tree or hybrid topology combines characteristics of linear bus and star and/or ring topologies.
- It consists of groups of star-configured workstations connected to a linear bus backbone cable



Mesh topology

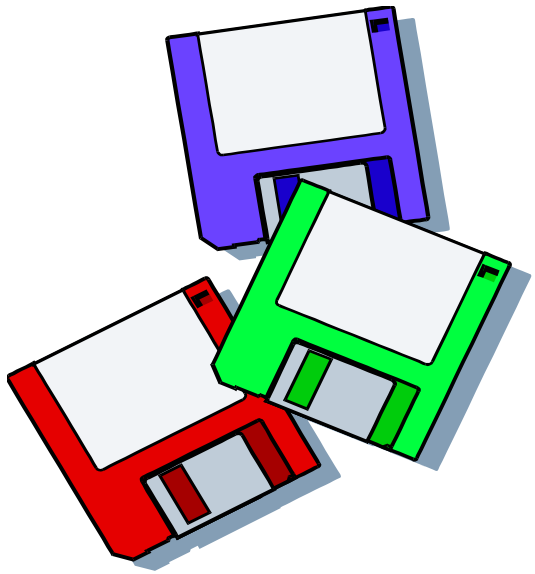
The term ‘mesh networks' describes wireless networks in which each node can communicate directly with one or more peer nodes. The term 'mesh' originally used to suggest that all nodes were connected to all other nodes.

Figure 5.5d Network Topologies



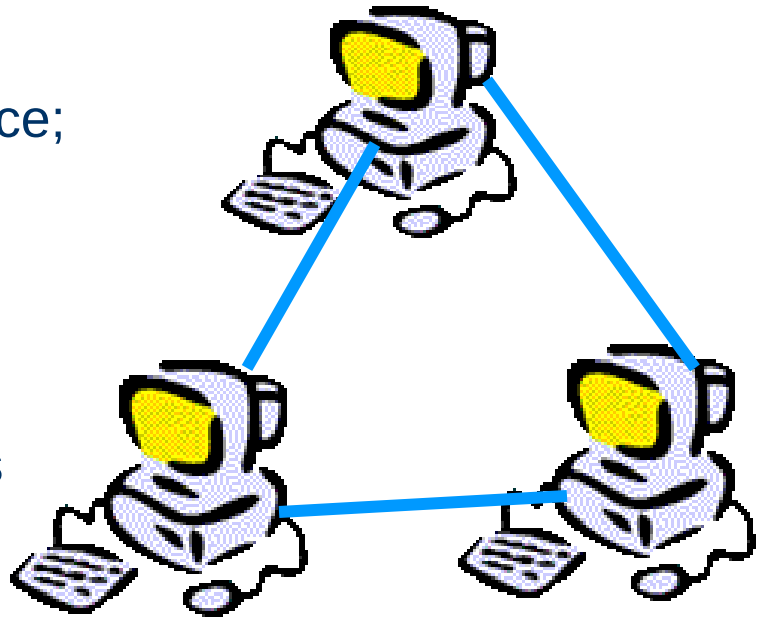
Network Operating Software

- Network operating systems co-ordinate the activities of multiple computers across a network
- The two major types of network OS are:
  - Peer-to-peer
  - Client/server



Peer to peer network OS

- In peer to peer network OS, there is no file server or central management source; all computers are considered equal
- Peer to peer networks are design primarily for small to medium LANS
- AppleShare and Windows for Workgroups are examples of programs that can function as peer to peer



Client/Server network OS

- Client/server network OS centralize functions and applications in one or more dedicated file servers.
- The file server provides access to resources and provides security
- Novel Netware and Windows NT Server are examples of client/server network operating systems