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COMPUTER NETWORK AND ITS TYPES:

A computer **network** is the interconnection of two or more computers. These computers are connected via some communication media. These computers are connected to share resources. There are many types of computer **networks. N**etworks can be classified according to the geographical area. They can be classified into three categories:

1. Local Area Network (LAN)
2. Metropolitan Area Network (MAN)
3. Wide Area Network (WAN)

1. Local Area Network:

A **local area network** (**LAN**) is a computer **network.** It interconnects computers within a limited area. This area can be a residence, school, library, or office building. LAN is relatively smaller than MAN and WAN. It is privately owned network. It provides local connectivity. In Offices, LAN is used to share resources. It can also be used to exchange information.

A LAN is made up of many **components**. These components are **Transmission channels** (twisted pair cable, coaxial cable, fiber-optic cable etc.), **Server** Computer, Work Station or **Client** Computers, **Network Interface Card** (NIC), Hub, and shared resources (printers etc.)

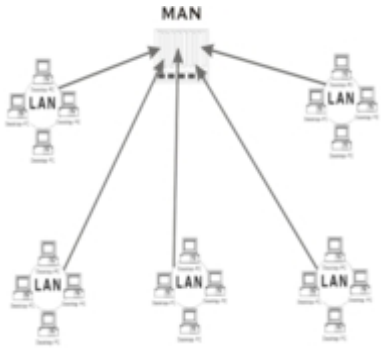
Features of LAN:

Following are some important feature of LAN.

- Local Area Network has a limited geographic area
- Local Area Network has a limited number of Users
- Local Area Networks are reliable and stable. Chances of errors are very few.
- Local Area Networks are Flexible. Different types of computers can be connected to it.
- Local Area Networks are easily expandable. More nodes (computers) can be added easily to it.
- Local Area Networks are secure. They can be supervised by the administrator.

2. Metropolitan Area network (MAN):

A **metropolitan area network** (**MAN**) is a computer network. It is larger than a local area network. It covers a large geographical area as compared to LAN. It can be the area of an entire city. MAN may be a single network like cable TV network. It may be interconnection of many LANs. For example, a company can use MAN to connect it's all office LANs in a city. MAN might be either private or public.



Feature of MAN:

- MAN network can share resources in city.
- MAN is slower than LAN but Faster than WAN.
- MAN has more error rates than LAN.

3. Wide Area networks (WAN):

Wide Area Network is a computer network. It has no limit of geographical distance. This geographical area can be a country, a continent or the whole world. Public networks can be used to connect computers in a wide-area network. For example, telephone network system is used to connect computers to WAN. WANs can also be connected through satellites. Internet is the best example of Wide Area Network. Many components are used in WAN. These components are Bridges, Routers, and Gateways etc. Railway, airlines and banks etc. are the main application areas of WAN.

Feature of WAN:

- It interconnects computer or LANs of distant places.
- It operates world wide web (internet)
- WAN is slower than LAN and MAN.
- WAN has more error rates than LAN and MAN.

Types of WAN:

There are two types of WAN.

I) **Public Networks**: These networks are managed by communication companies. These networks provide their services to their subscribers.

II) **Private networks:** These networks use private or leased lines to connect to other networks.

NETWORK TOPOLOGIES

Network topology is the **arrangement of the various elements** (links, nodes, etc.) of a computer **network**. Computers can be connected in different ways in a network. So there are different types of topologies. Commonly used topologies are discussed below:

Bus Topology:

A bus network is a local area network (LAN). It is the simplest network topology. In this topology, all the nodes (computers as well as servers) are connected to the single cable. This cable is called the Bus. This central cable is the backbone of the network. Every node communicates with the other nodes through this Bus. A terminator is added at ends of bus. It prevents bouncing of signals.

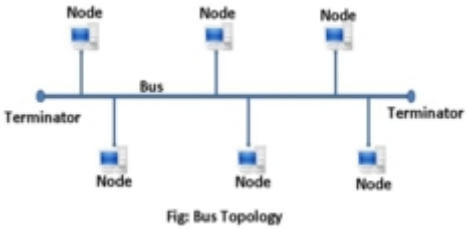


Fig: Bus Topology

Advantages:

- It is a reliable network topology.
- If one node fails, remaining nodes can communicate with each other.
- Bus networks are easy to expand. New nodes can be added easily.
- This network is not costly

Disadvantages:

- The length of the bus is limited.
- If there is some problem in the main cable, whole network breaks down.
- It is not suitable for networks with heavy traffic.

Star Topology

A star network is a local area network (LAN). In this topology, all the components (nodes) of network are connected to the central device. This central device is called **Hub.** The connection between nodes and central device is **point-to-point**. Every node is indirectly connected to every other node by the Hub. All the data passes through the central device. Unshielded Twisted Pair (UTP) Ethernet cable is used to connect workstations to the central node.

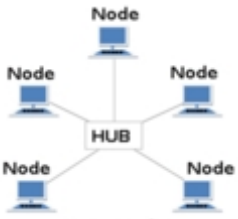


Fig: Star Toology

Advantages of Star Topology:

- It gives far much better performance than the bus topology.
- It is easy to connect new nodes or devices.
- It is easy to remove nodes or devices.
- It has a centralized management.
- If one node fails, other nodes don't affect.

Disadvantages of Star Topology

- If central device fails whole network goes down.
- Total number of nodes depends on the capacity of central device.

Ring Topology

A ring network is a local area network (LAN). In Ring Topology, all the nodes are connected to each-other like a closed loop. Each node is connected to two other nodes on both sides. A node can communicate with its neighboring nodes. In the network, data travels in one direction. Sending and receiving of data takes place with the help of TOKEN. A Token contains the information about the sender and receiver.

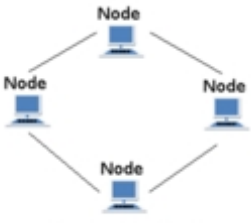


Fig: Ring Topology

Advantages of Ring Topology

- All the traffic flows in only one direction at very high speed.
- Its performance is better than that of Bus topology.
- There is no need for network server to control the nodes.

Disadvantages of Ring Topology

- It is slower than Star topology
- If one node goes down, the entire network gets affected.
- Network is highly dependent on the wire

Mesh Topology

A mesh network is a local area network (LAN). In this topology, all nodes are interconnected with one another. This type of topology is very expensive. It is commonly used in wireless networks. Flooding or routing technique is used in mesh topology.

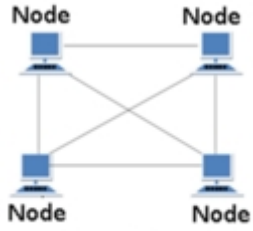


Fig: Mesh Topology

Advantages of Mesh topology:

- Data can be transmitted from many devices simultaneously.
- If any node fails there is always an alternative present.

Disadvantages of Mesh topology:

- Cost of this network is very high
- Set-up and maintenance of this topology is very difficult.
- Administration of the network is tough

Tree Topology

It combines the features of Star and Bus Topology. In Tree Topology, the numbers of Star networks are connected using Bus. This topology is also called **Expanded Star Topology**. Ethernet protocol is commonly used in this type of topology.

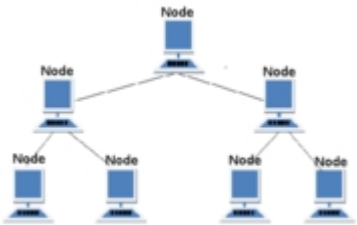


Fig: Tree Topology

Advantages of Tree Topology

- It is an extension of Star and bus Topologies
- It can be extended easily
- If one segment goes down, other segments are not affected.

Disadvantages of Tree Topology

- Its working depends heavily on the main bus cable
- Maintenance becomes difficult when segments exceeds.
- Extension depends on the type of cable used.