Network Technology & Administration

CH:1

Basics Of Network , Network Models & LAN Sharing

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- LAN,MAN,WAN
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- Network Access Method

Definition

- Network : A Network of computer is a group of interconnected system sharing resources interacting using a shared communication link.
- A computer network is defined as two computer that are linked together through either a physical cable or a wireless device.

Advantages of Network

- Speed : network is provide is very high speed for sharing and transferring the file.
- Security
- Resource sharing : resources such as printers, fax machines and modems can be shared

Cont....

- Email : The presence of a network provide the h/w necessary to install an e-mail system
- workgroup computing : workgroup s/w allow many user to work on a document or project concurrently

Disadvantages of network

- server faults stop application being available
- Network faults can causes loss of data
- User work dependent upon network
- System open to hackers
- Network management can become difficult

2. Network services

1. File services
2. Printing services
3. Application services
4. Database services
5. messaging/ communication services
   Email, voice mail, fax
6. Security services

1.File services

- File services : file services include all network functions dealing with the storage, retrieval, or movement of data files. File services enable users to read, write, and manage files and data.

A : file transfer services: = file transfer is possible with a network using communication software. file sharing is also regulated by network operating system.

Cont...

- B : file storage : = centralized storage have online storage hard disk. in online storage data is stored on hard disk that is accessible on demand.

2.Printing services :

- Printing services :
- Many users can share the same printers.
- Printers can be located anywhere, not just next to user’s pc.

3.Application services :

- Application services :
- Application services enable applications to leverage the computing power and specialized capabilities of other computers on a network.
- Some of the more common application servers are database servers, messaging communication servers, groupware servers, and directory servers.

4.Database services :

- Database services :
- Database servers are the most common type of application servers.
- Database services relieve clients of most of the responsibilities for managing data.

5.Messaging/ Communication services

- Messaging/ Communication services :
- Messaging/communication services generally transfer information from one place to another.

- Just like =Email =Voice mail = Fax service

6.Security services :

- Security services :

- Another main service which is provided by network is the security service.

- Security is one of the most important elements involved in finalizing network.

Cont...

- The elements of network security are

1 authentication

2 access permission

3 protection with password

➢Types of Network

- LAN (Local area network)
- MAN (Metropolitan area network)
- WAN (Wide area network)

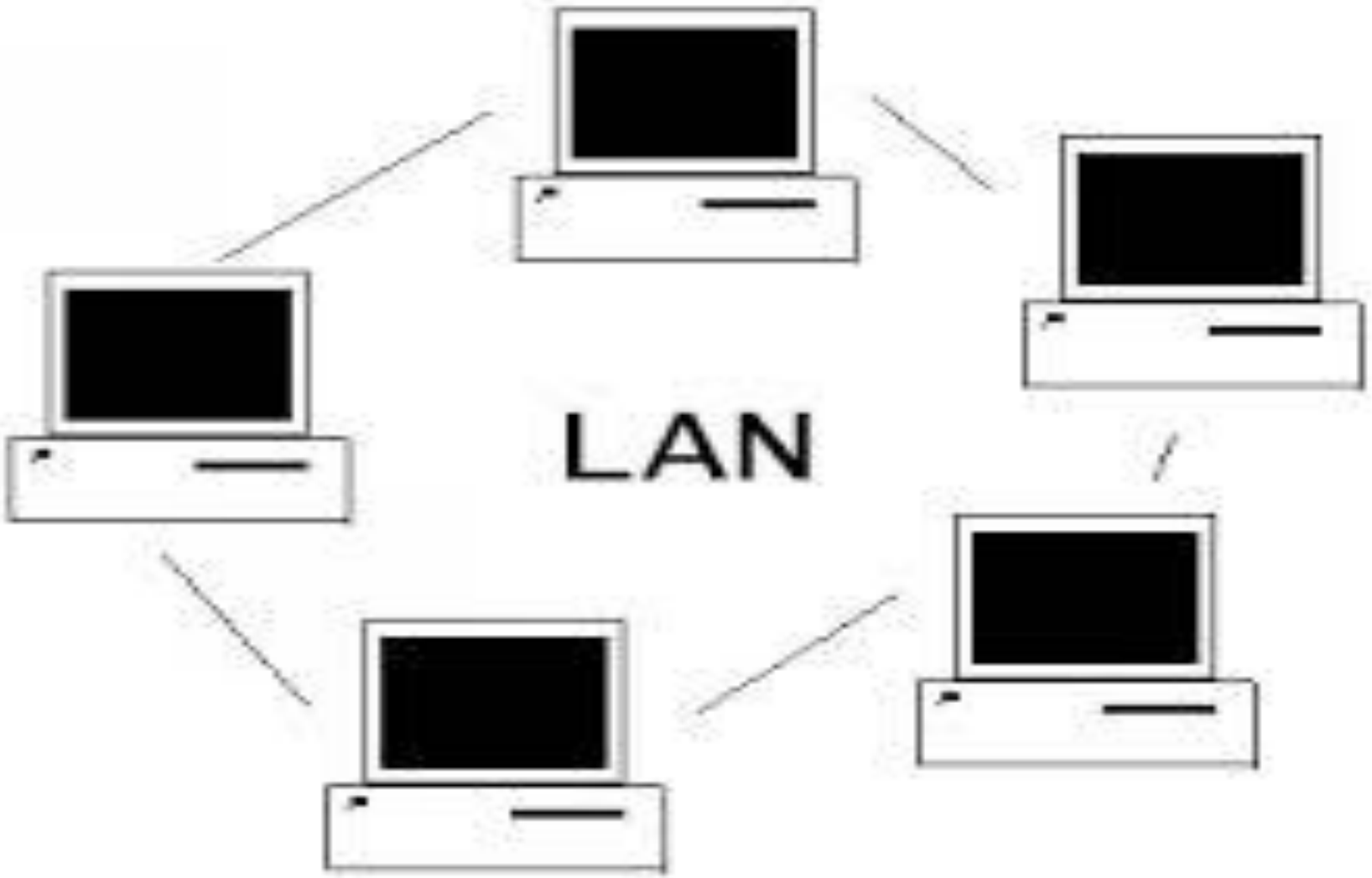
1 LAN

- LAN is highly speed low error data and relatively small geographical area so LAN there is network within 10 k.m To 200 K.m. It can be LAN

- Network can be small or be depending upon need and necessary or a particular organization.

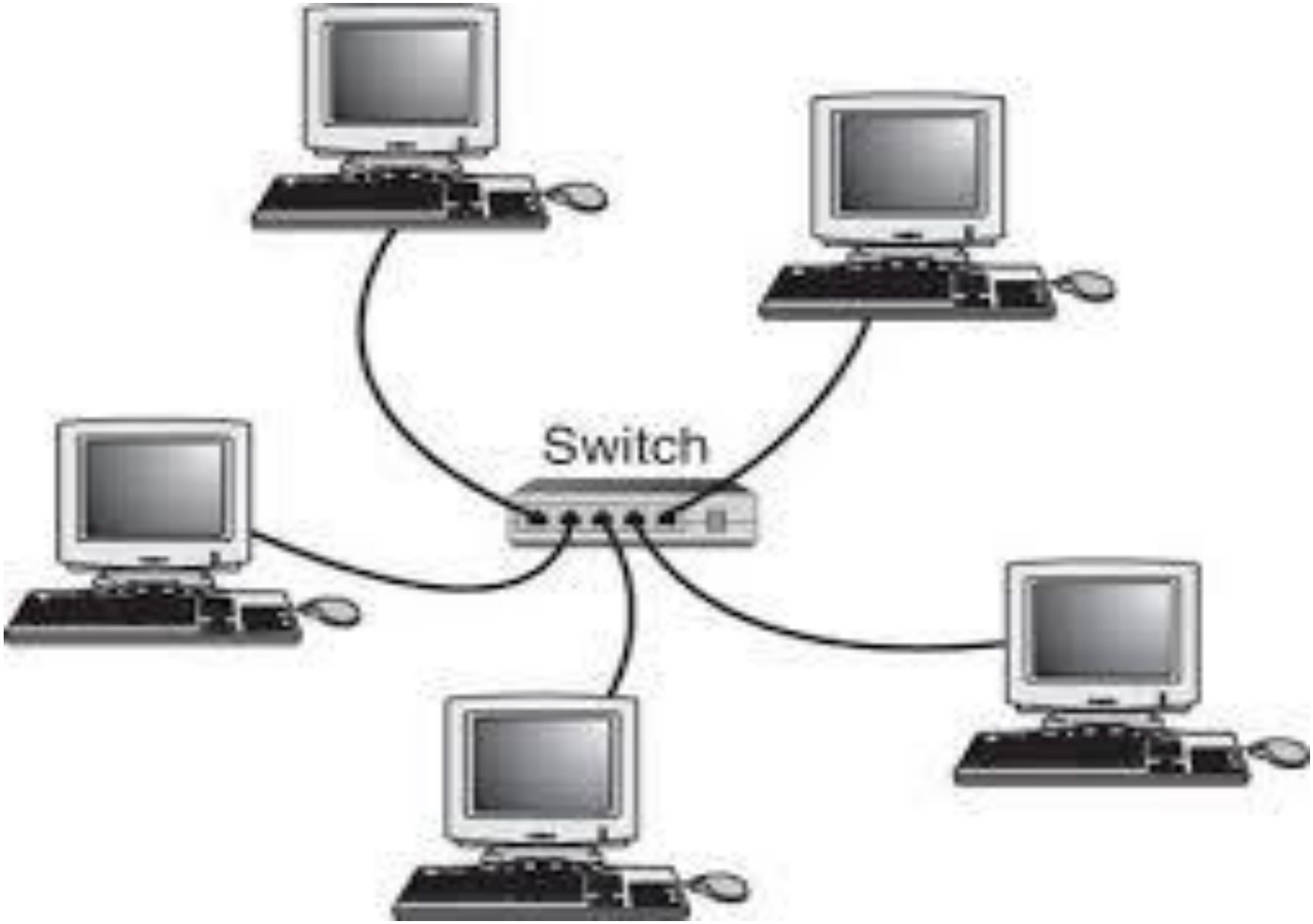
❖ Characteristic

- There transfer data an high speed
- There exits at difficult limited geographical area


LAN

2 MAN

- Generally a MAN span a large geographical area compare to LAN
- Computer are located in the city are connected using modem or telephone line so they can easily connected with each other
- A MAN is made from switch or router connected to one to another with high side cable.

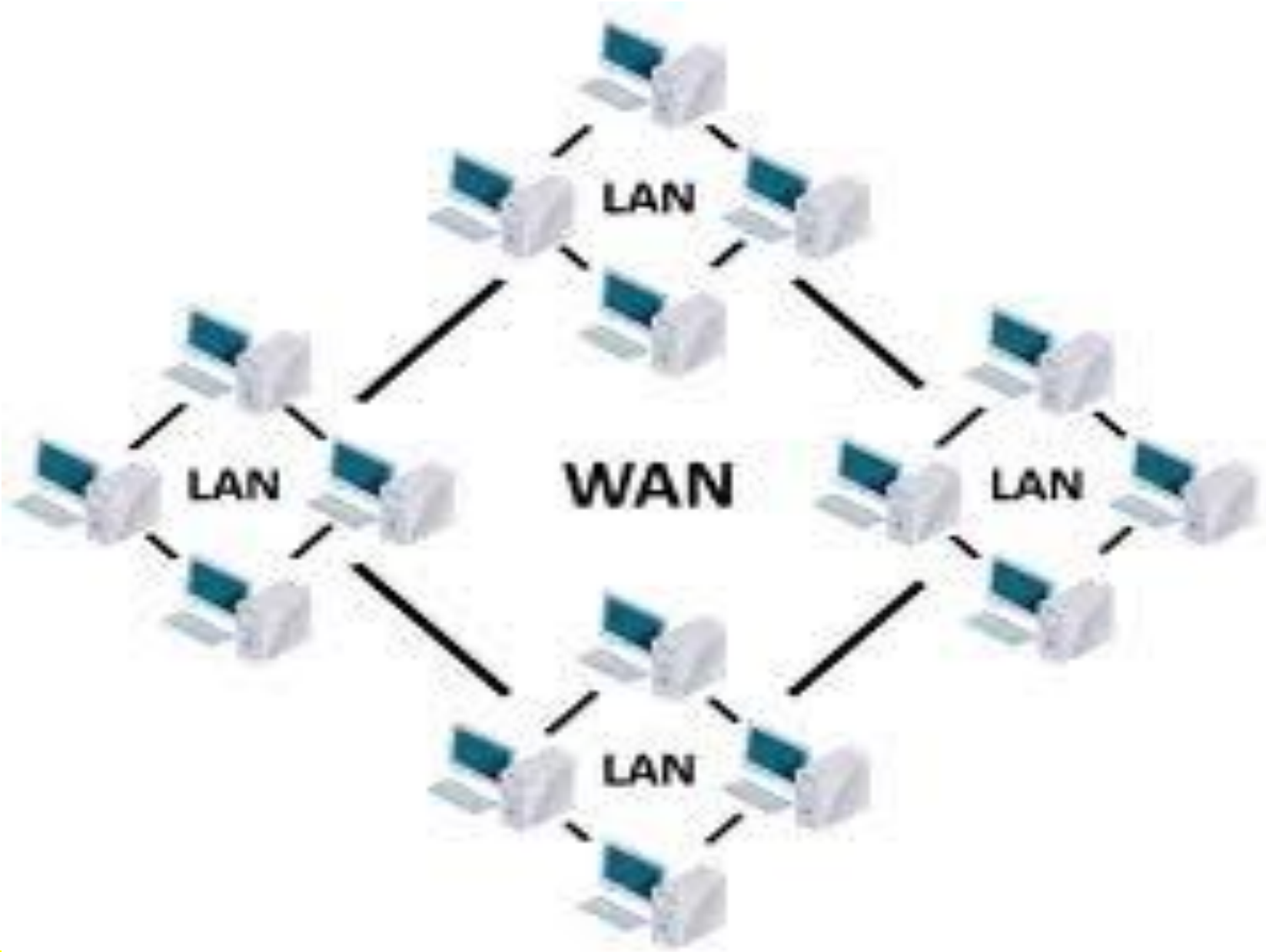

Switch

3 WAN

- WAN use by operator at slower speed then LAN

❖ Characteristics :

- There exit unlimited geographical area
- There use by interconnect multiple LAN
- There often transfardata at lower speed

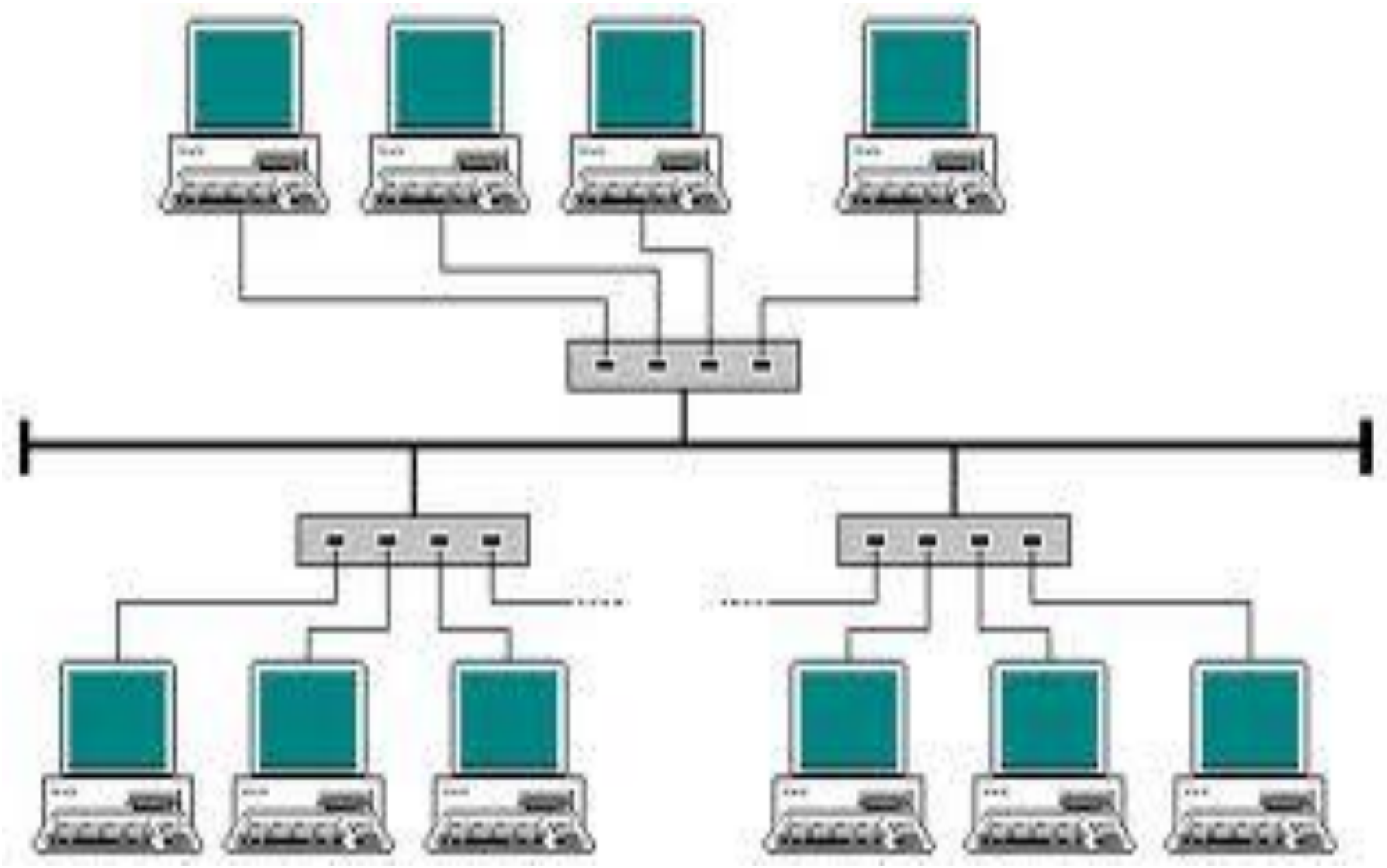

LAN
LAN
WAN
LAN
LAN

➢ Topology

- Network topologies is how computer printer and other device connected over network it describe layout of wire devices.
- There are five types of network topology available
- 1 Bus 2 Star 3 Ring 4 Mesh 5 Tree

1 Bus Topology

- Bus topology is simplest way of organizes network in bus topology all computer are connected to the same transmission line by using coaxial cable.
- The word bus means all machine joint in single straight cable call backbone.
- In bus topology both end of the main cable need to be terminated, if there is no terminator the signal will bounce from the end hence collision of signal and noise generator.



Advantages

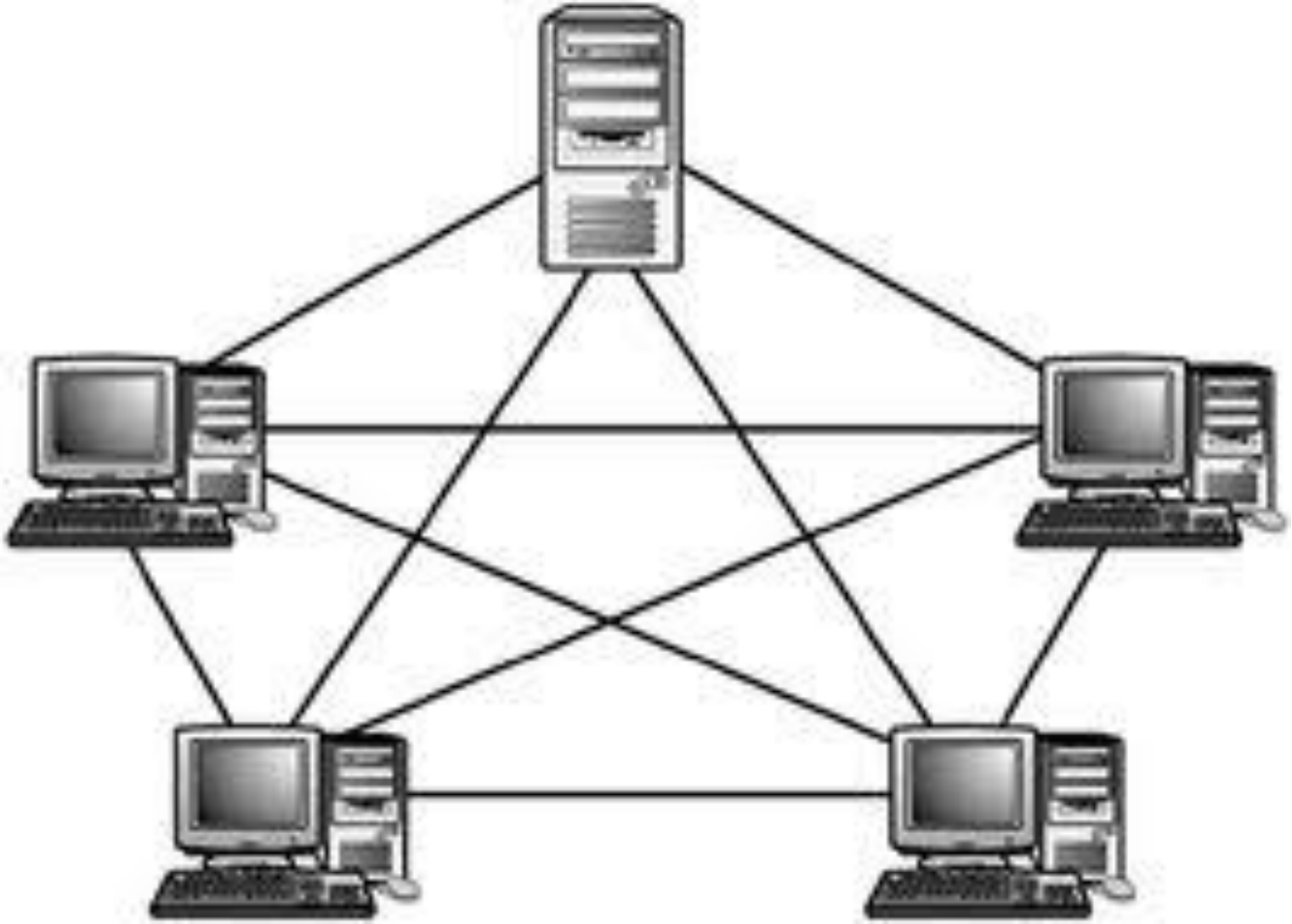
- Easy to connect a computer to the single linear cable.
- Required less cable compare to star topology.

Disadvantages

- The entire network will fail if backbone fail
- Terminator required at the both end of the cable.

2 Star Topology

- Star topology mostly use in LAN star topology can be implemented home, offices and small organization.
- All computer in star topology are connected to central device like hub, switch or concentrator.
- Computer in network are connected with hub or switch through STP or UTP cable.



Advantages

- Easy to install and removing device from network
- If one of the cable or wire fail than entire network will not effected
- Easy to delete fault

Disadvantage

- Required more cable compare to linear/bus topology.
- If hub switch contradictor fail then entire network will fail.
- More expensive then linear bus because of cost of hub and switch.

3 Ring Topology

There are two type :

1)single ring

2)double ring

1) Single ring :

- In ring topology every devices has neighbor for communication purpose.
- Message travel throw a ring in the same direction.

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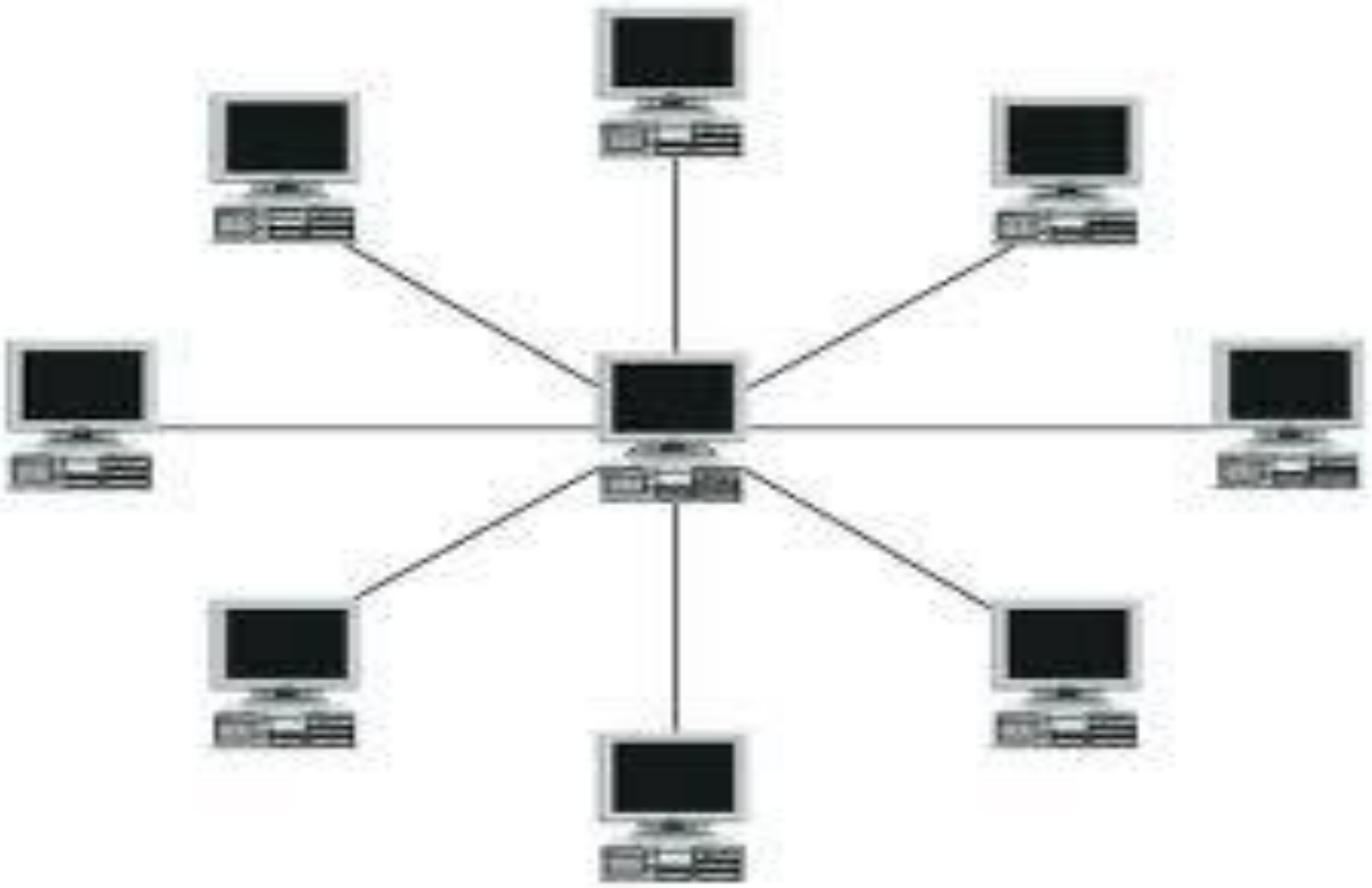
2) double ring :

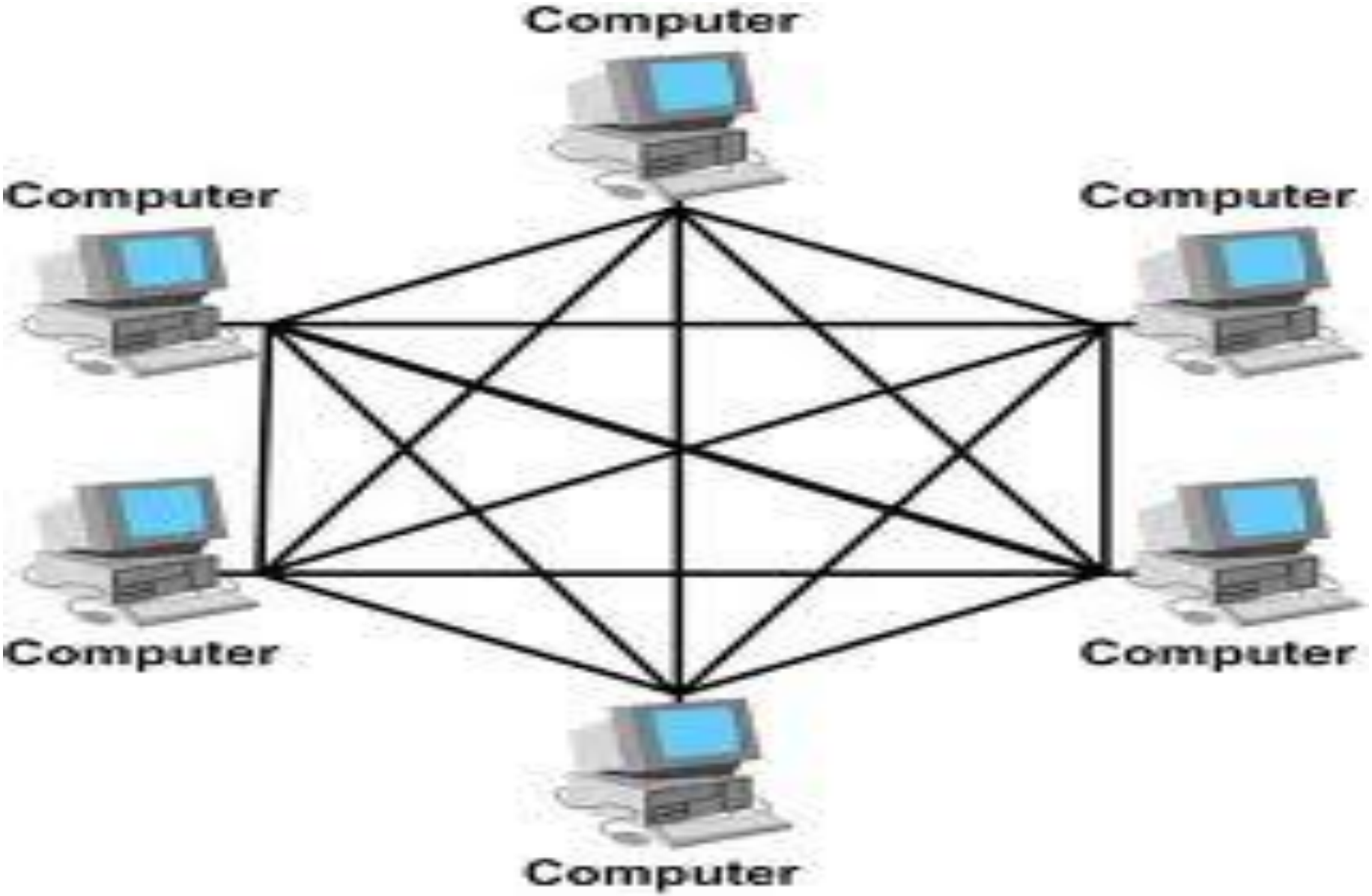
- In double ring topology we use two ring instated of single ring
- If one of the ring is fail than another ring will transfer message.



4 Mesh Topology

1) Full mesh topology : The full mesh topology connect every single node together.

- this will create most redundant and reliable network.
- if any link on wire will fail we always have another link to send data.


Computer
Computer
Computer
Computer
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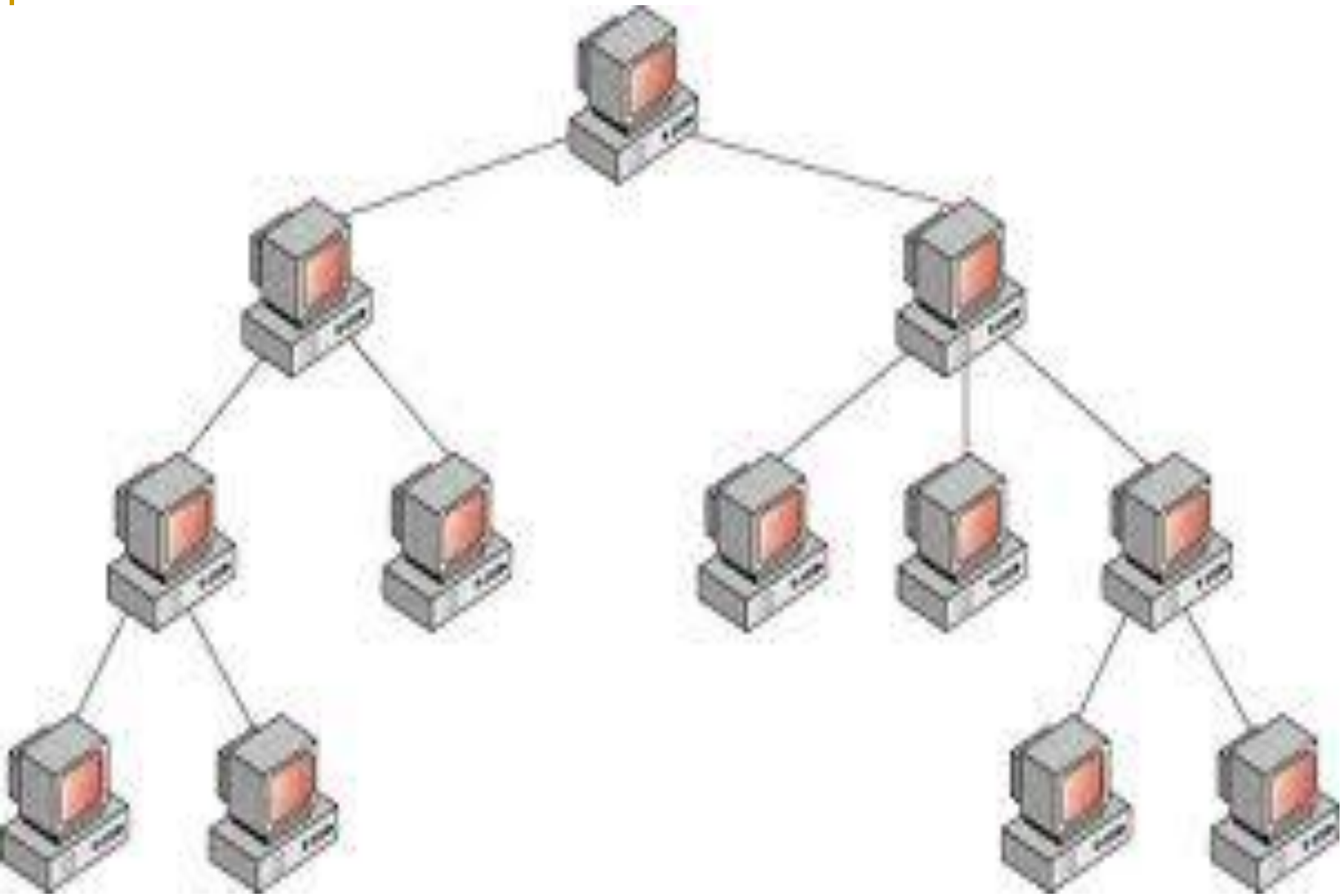
Computer

Cont....

2) Partial mesh topology : The partial mesh topology is much like the full mesh topology only difference is that it don't connect each device to every other devices on network.

5. Tree Topology

- A tree topology connect multiple star networks to other networks.
- A tree topology combine characteristics of linear bus and star topology.
- It consists of group of star configured workstation to a linear Bus backbone cable



➢ Advantages /Disadvantages :

- Advantages :

- point to point wiring for individual segment.

- supported by several hardware and software service.

- Disadvantages :

- overall length of each segment is limited by the type of cabling used.

- If the backbone line breaks the entire segment goes down.

➢ Network model

- The network model has main two type :

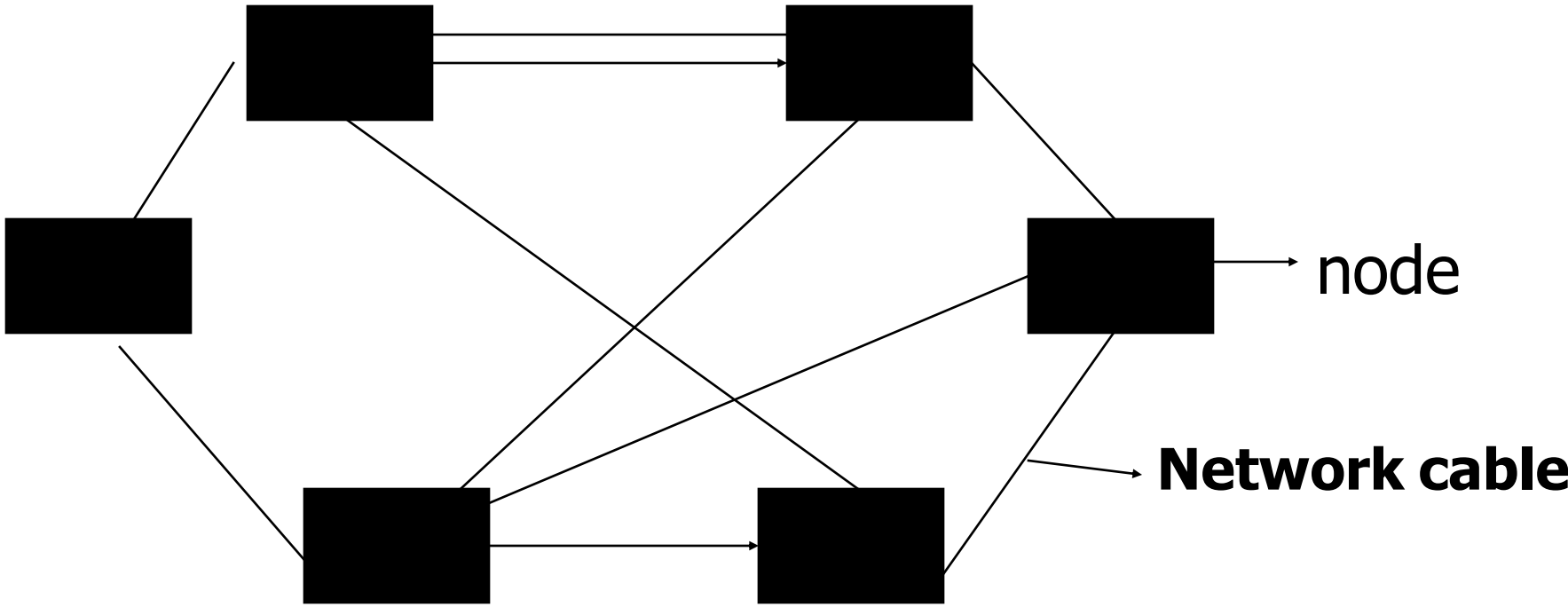
1. - Client / Server
2. - Peer to Peer

1 Client / Server :

➢ Client / server :

- Client / server : client server network is discernable relationship between client and server a client make services request and server full fill the request of client.
- In network the client server model provide a convenient way to inter connect program that are distributed accroce different location.

2 peer to peer :



2 peer to peer :

- Peer to peer :
- Peer to peer network is decentralizes network model means non centralized control over sharing of file or resource.
- All system on peer to peer network can share the resource on there local computer as well as use resource of other system.
- Peer to peer network in share resource directly without need for intermediate server.

➢ Network Access Method

1. CSMA /CD (carrier sense multiple access/ collision detection)
2. CSMA/CA (carrier sense multiple access/ collision avoidance)
3. TOKEN PASSING
4. POLLING

1 CSMA/ CD

- In CSMA/CD access method every host has equal access to place data on wire when the wire is free from traffic.
- When host want to place data on the wire it will sense wire to fiend whater there is signal already on the wire.
- But if two system place data on the medium at the same time they will collide with each other hence data will destroy.

Cont.....

- If data will destroy during transmission data will need to be retransmitted.
- After collision each host will wait for small interval of time and again data will retransmitted to avoid collision.

2 CSMA/CA

- In CSMA/CA host before sending real data on the wire it will sense the wire to check if the wire is free.
- If the wire is free it will sense dummy data on the wire to see weather it collide with any other data or not.
- If it does not collide the host will assume that riel data also will not collide.

3 TOKEN PASSING

- In CSMA/CD and CSMA/CA chance of colisition are there.
- As the number of host in the network increase the chance of colisition also will increase.
- In token passing there are one empty packed called token and token is continue moving in the network.

4 POLLING

- Polling is an access method that have one device called controller master device or primary device as a channel access administrator.
- One of the most common polling topology is star where the point of star are secondary and the master is hub.

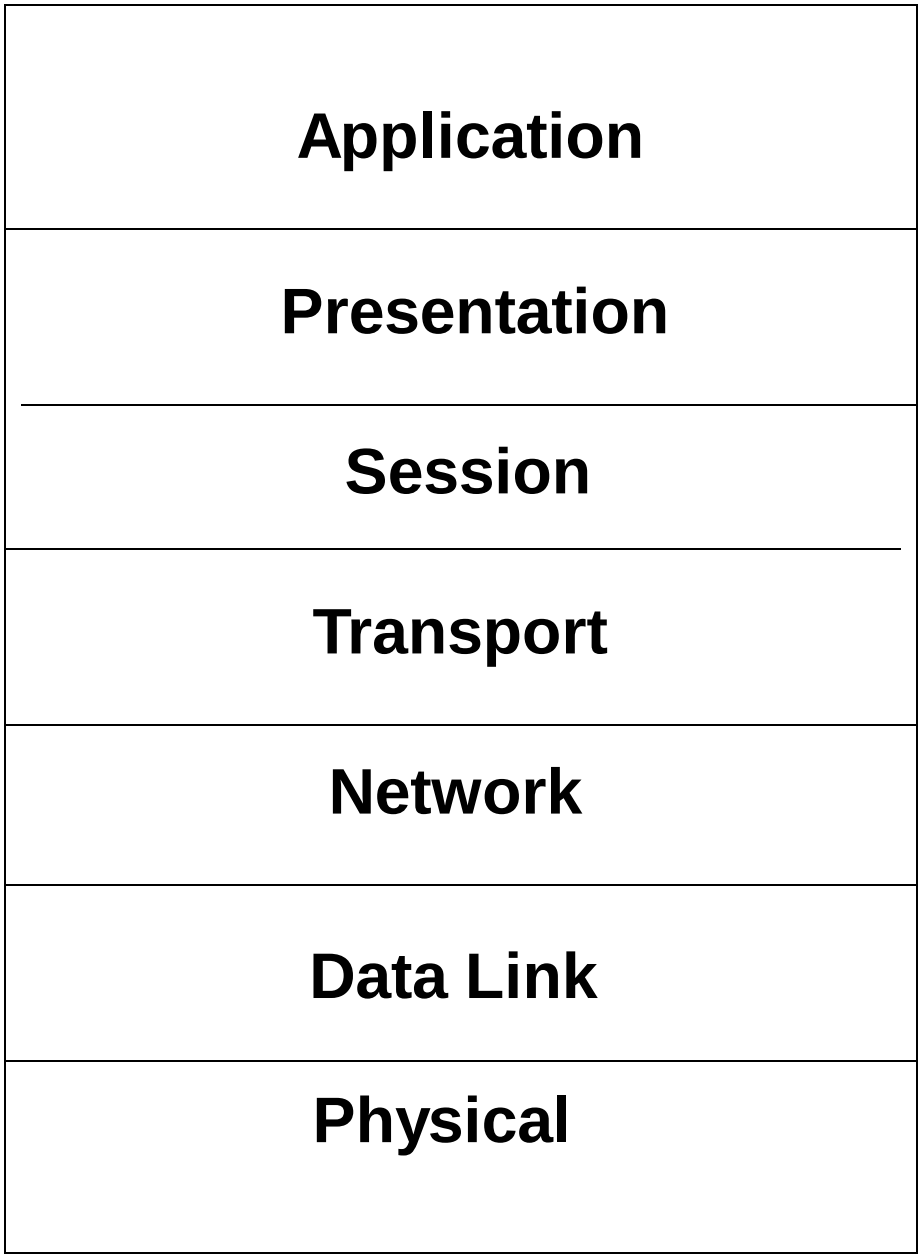
➢ Advance Network Topologies :

- Ethernet : Ethernet is LAN protocol that was developed by the Intel , Xerox digital equipment system.
- Ethernet is most widely used LAN communication standard.
- FDDI : Fiber Distributed Data Interface is a protocol that is used to transmit the data over the fiber optic cable.

- Hybrids : Hybrids networks use a combination of any two or more topology in such a way that the resulting network dose not exhibit one of the standards topologies.
- Ex: Star, Bus , ring

The OSI Model

- The OSI model first released in 1984 by the International Standards Organization (ISO) , provides a useful structure for defining and describing the various process underlying networking communication.
- The OSI model organizes communication protocol into seven levels.


Application
Presentation
Session
Transport
Network
Data Link
Physical

1. Physical Layer :

- The Physical Layer describes the physical properties of the various communication media as well as the electrical properties and interpretation of the exchanged signal.

- Specifically the Physical layer is concerned with transmitting and receiving bits.

2 . Data Link Layer :

- The Data link layer describe the logical organization of data bits transmitted on a particular medium.

- The Data link layer has other function as well such as addressing , error control , and flow control for a signal link between network devices.

2 . Data Link Layer :

- Data link layer into two sub layer :

1) MAC : Media Access Control the means by which devices share the same media channel for the transmission of information.

2) LLC : Logical Link Control sub layer establishes and maintains links between communicating devices.

3. Network Layer :

- The Network layer describe how a series of exchange over various data links can deliver data between any two nodes in a network.
- The Network layer handles communication with devices on logically separate network that are connected to from internet work.

4. Transport Layer :

- The Transport layer can implement procedures to ensure the reliable delivery of messages to their destination devices.
- One of the function of the Transport layer is to break large messages into segment suitable for network delivery.

5. Session Layer :

- The session layer provide a structured means for data exchange between user process on communicating hosts.
- It provide for full duplex , half duplex or simplex operation and check pointing , termination and restart procedures.

6. Presentation Layer :

- The presentation layer describe the organization of data being transferred.
- Ex : this layer describe how floating point number can be exchanged between hosts with different math function.
- The presentation layer also attends to other details of data formatting ,such as data encryption & data compression.

7. Application Layer :

- The application layer is concerned with the semantics of data .
- The application layer interface directly to and performance common application services for the application processes.
- The application layer provide standards for supporting a variety of application independent services.

➢ TCP / IP MODEL :

- The internet protocol suite, TCP/IP, is a suite of protocols used for communication over the internet.
- The TCP/IP model was created after the OSI 7 layer model for two major reasons.
- Second, a project researched by the Department Of Defense (DOD) consisted of creating the TCP/IP protocols.

- [Transmissions Cantrol protocols]

➢ TCP / IP MODEL :

- The TCP/IP model, similar to the OSI model, is comprised of layers. The OSI has seven layers and the TCP/IP model has four or five layers depending on different preferences.
- TCP/IP defines how electronic devices (like computer) should be connected to internet and how data should be transmitted between them.
- TCP is known as fixed connection, communication between application.

➢ TCP / IP MODEL :

- IP is connection less, communication between computers.
- IP is responsible for routing each packets to the correct destination.
- TCP/IP is a large collection of different communication protocols based upon the two original protocols TCP and IP are having following other protocols.

➢ Internet :

- The routing and delivery of data is the responsibility of this layer and is the key component of this architecture.
- The upper layers are responsible for the recording of the data.
- This layer can be compared to the network layer of the OSI model.

➢ Network Access :

- This is combination of the Data Link and physical layers of the OSI model which consists of the actual hardware.
- This includes wires, network interface cards, etc.
- It will use the required LAN operating algorithms, such as Carrier Sense Multiple Access with Collision Detect (CSA/CD) or Token passing etc.

➢ File & Printing Sharing :

- File and printer sharing is the part of Microsoft networking that enables you to share files and local printers with other user on small networks.
- If this services is enabled on your windows computer and you are connected to a LAN you are allowing others to connect to your computer and access your files and printers.

File & Printing Sharing :

- While you can setup passwords to protect your files and printers when using this service.

➢ Mapping Drive :

- Drive mapping is how operating systems , such as Microsoft Windows ,associate a local drive letter with a shared storage area to another computer over a network.
- After a drive has been mapped a software application clients computer can read and write files from he shared storage area by accessing that drive.

➢Disk Quota :

- A disk quota is a limit set by a system administrator that restricts certain aspects of file system usage on modern operating system.
- There are two basic types of disk quotas.
- The first , known as a usage quota or block quota , limits the amount of disk space that can be used.
- The second , known as a file quota or inode quota limits the number of files and directories that can be created.

➢Encryption :

- Encryption is the conversion of data into form called a ciphertext that cannot be easily understood by unauthorized people.
- Decryption is the process of converting encrypted data back into its original form so it can be understood.
- Network encryption is a network security process that applies crypto services at the network transfer layer above the data link layer.

➢Cont...

- Data is encrypted only while in transit existing as plaintext on the originating and receiving hosts.
- Network encryption is implemented through internet protocol security a set of open Internet Engineering Task Force (IETF) standards that used in conjunction created a framework for private communication over IP networks.

➢ Compression :

- Compression is the reduction in size of data in order to save space or transmission time.
- For data transmission , compression can be performed on just the data content or on the entire transmission unit.
- Graphic image file formats are usually designed to compress information as much as possible.

➢Cont...

- Graphic image compression can be either lossy or lossless.

- When you send or receive information on the internet large text files , either singly or with other as part of an archive file , may be transmitted in zip , gzip or other compressed format.

➢NetMeeting :

- Microsoft introduced the NetMeeting application to allow for IP communications and video conferencing .
- It also allowed for application and desktop sharing , remote desktop sharing and transfer of files between client computer.
- NetMeeting was available for use starting with later version of Internet Explorer 3 and windows 95 and continued Windows XP.