

NETWORKING

- Networking
- Types of network
- Topology
- Network Devices
- Cables and connectors
- OSI model
- Introduction of IP addressing
- Classes of IP address
- Subnetting and subnetmask

Networking is the practice of linking with two or more computing devices together for the purpose of sharing the data

Networks computer basically built with computer H/w & S/w

LAN

LANs are typically used to connect a limited geographical area: a home, a school, an office, a campus, etc.

WAN

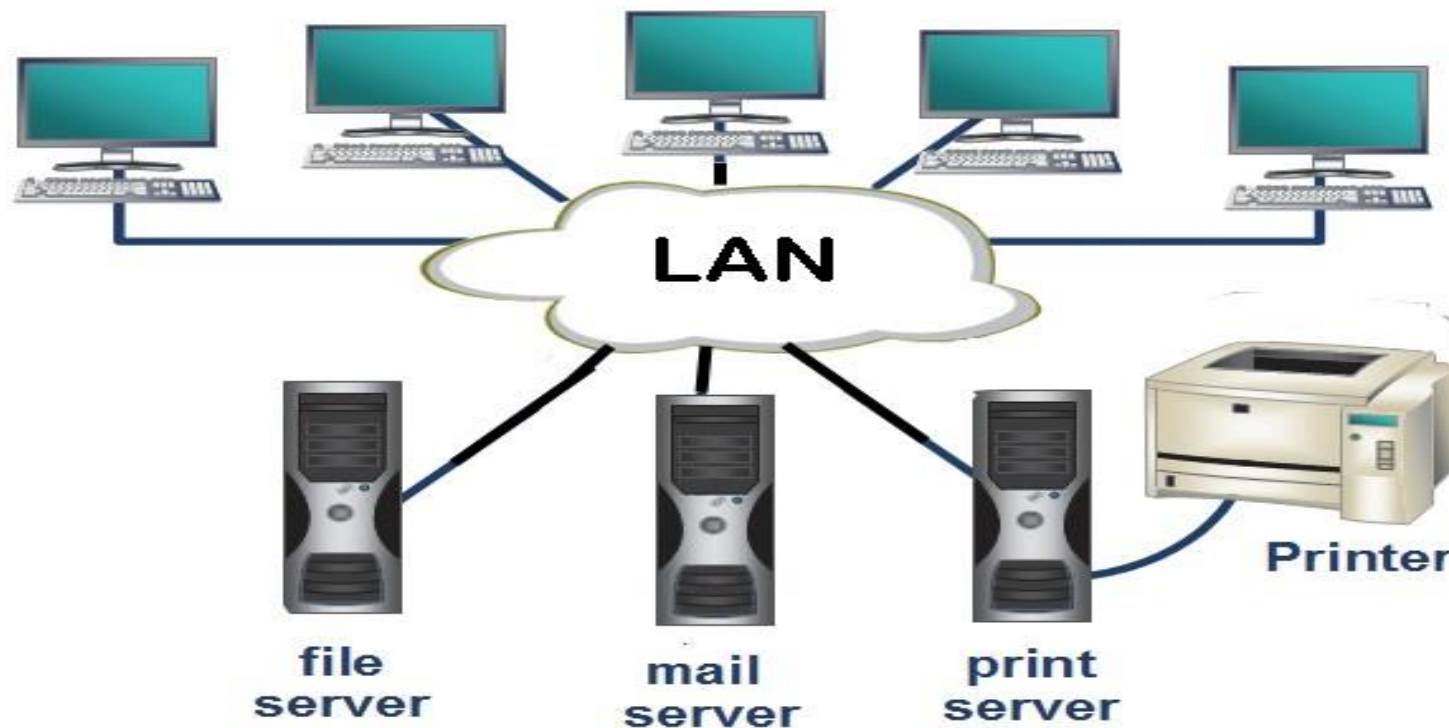
WANs are typically used to connect a large geographical area: a county, a state, a continent, the Internet.

MAN

MANs are typically used to connect two or more LANs in a common geographic area: a city or a group of buildings.

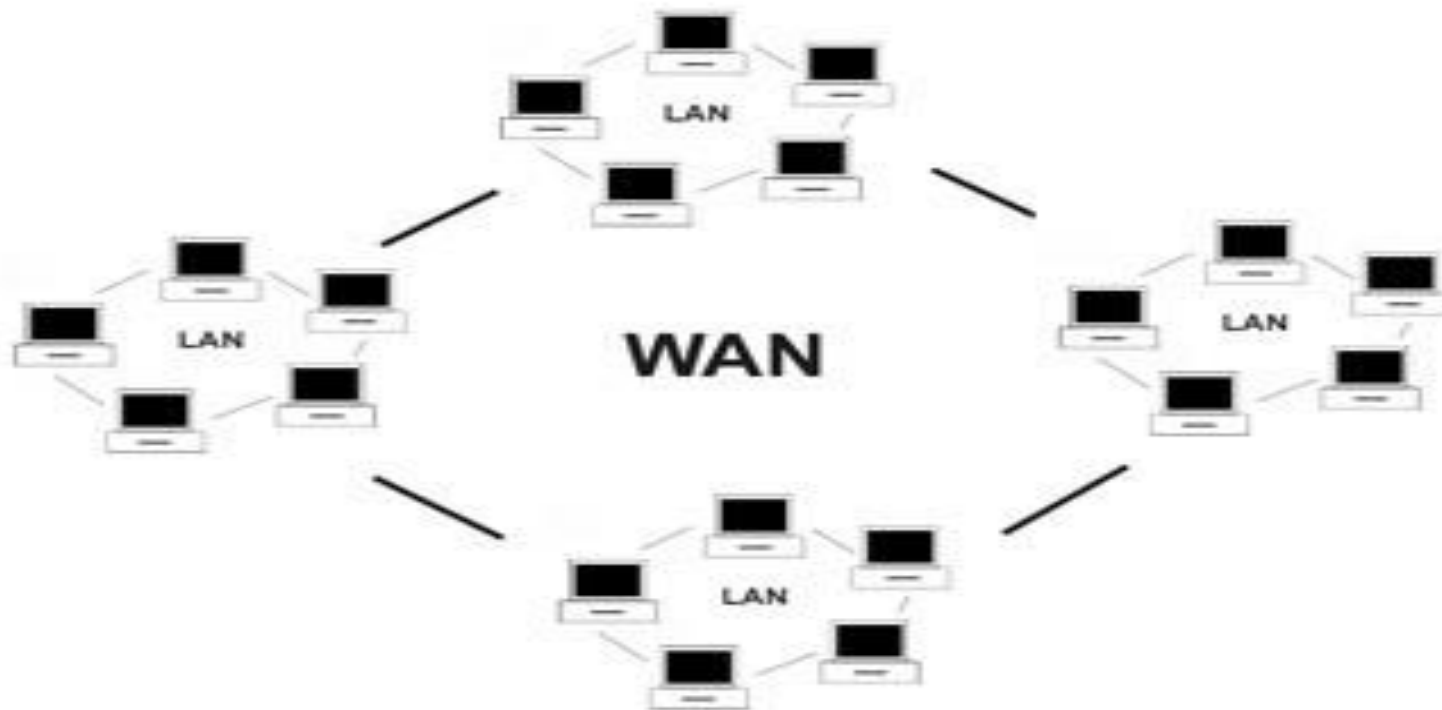
Interprocessor distance	Processors located in same	Example
1 m	Square meter	Personal area network
10 m	Room	Local area network
100 m	Building	
1 km	Campus	
10 km	City	Metropolitan area network
100 km	Country	Wide area network
1000 km	Continent	
10,000 km	Planet	The Internet

- The smallest LAN can be composed of 2 computers.
- LANs are managed typically owned, controlled, and by a single person or organization.

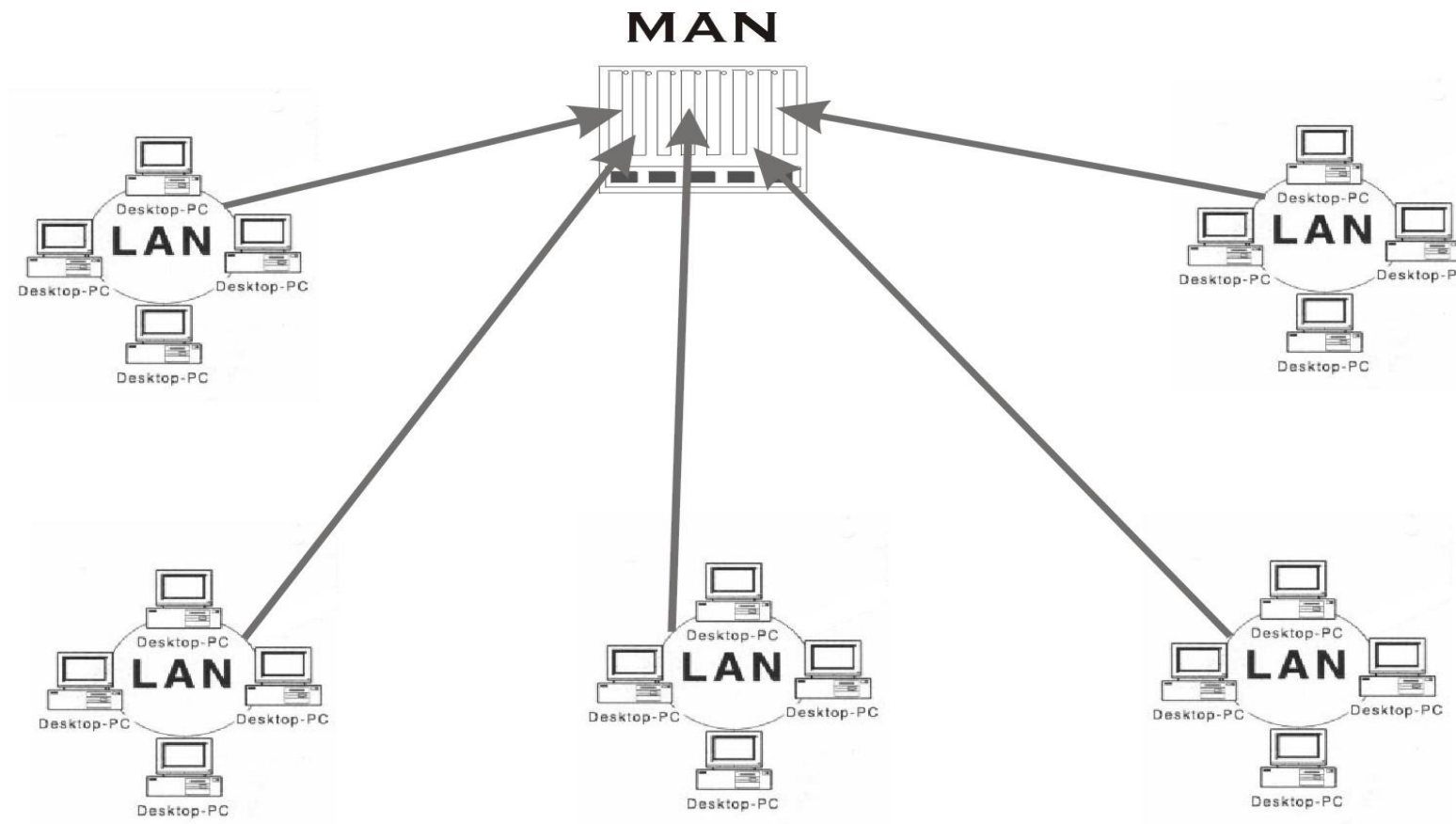


Wide area network

- WANs are not owned, controlled, or managed by any one person or organization, instead its ownership and management is distributed
- Speed depends on cost of connection



- A MAN is a larger version of a LAN and allows users to share resources at a greater distance than a LAN allows



a arrangement of various elements like links, nodes etc...

Physical

Actual layout of computer cables & other network devices

Logical

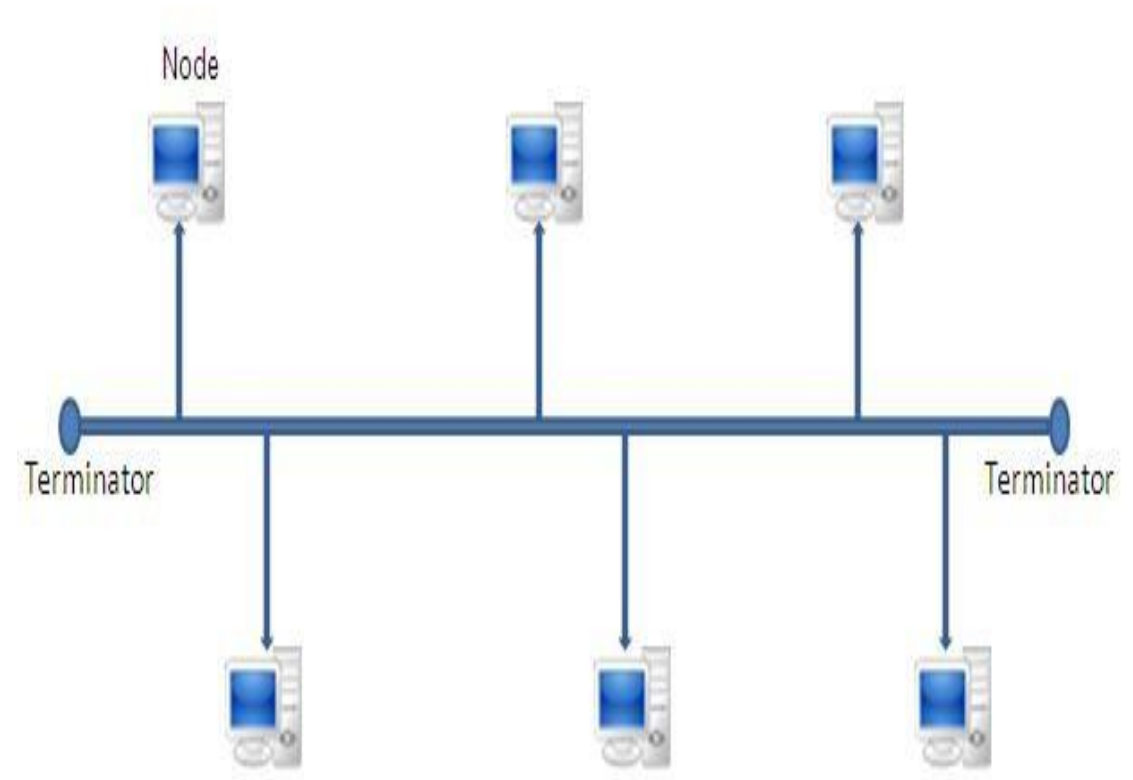
The way to the device that in which the network appears use

Bus

- Bus networks use a common backbone to connect all devices.
- A single cable, the backbone functions as a shared communication

Advantage

- Easy to implement
- Need less cables
- less cost

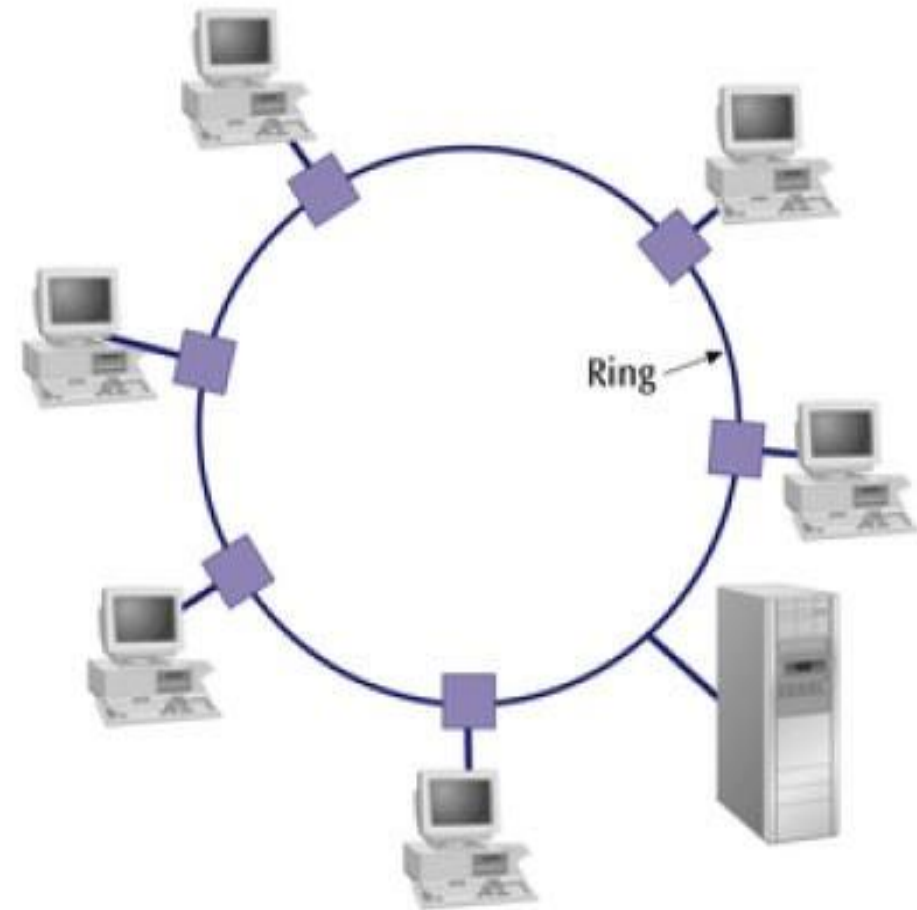


Ring

- In a ring network, every device has exactly two neighbors for communication purposes.
- All messages travel through a ring in the same direction

Advantage

- Easy to implement.
- To find the error is easy.

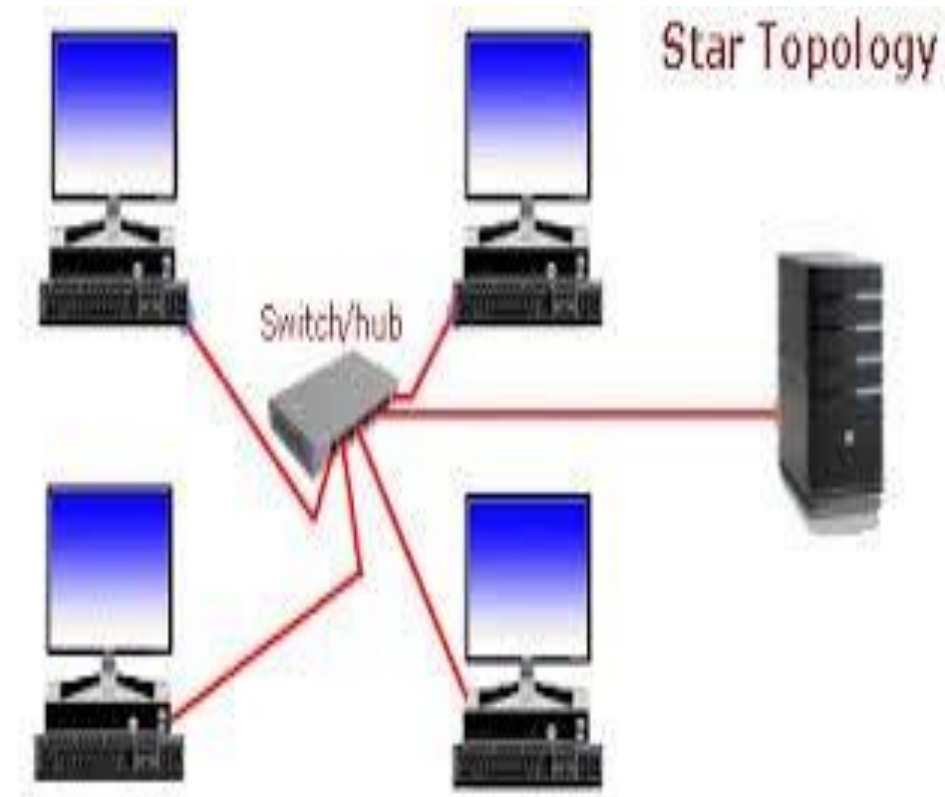


Star

- A star network features a central connection point called a "hub node"
- Devices typically connect to the hub

Advantage

- Failure will occur only one device.
- Many home networks use the star topology.

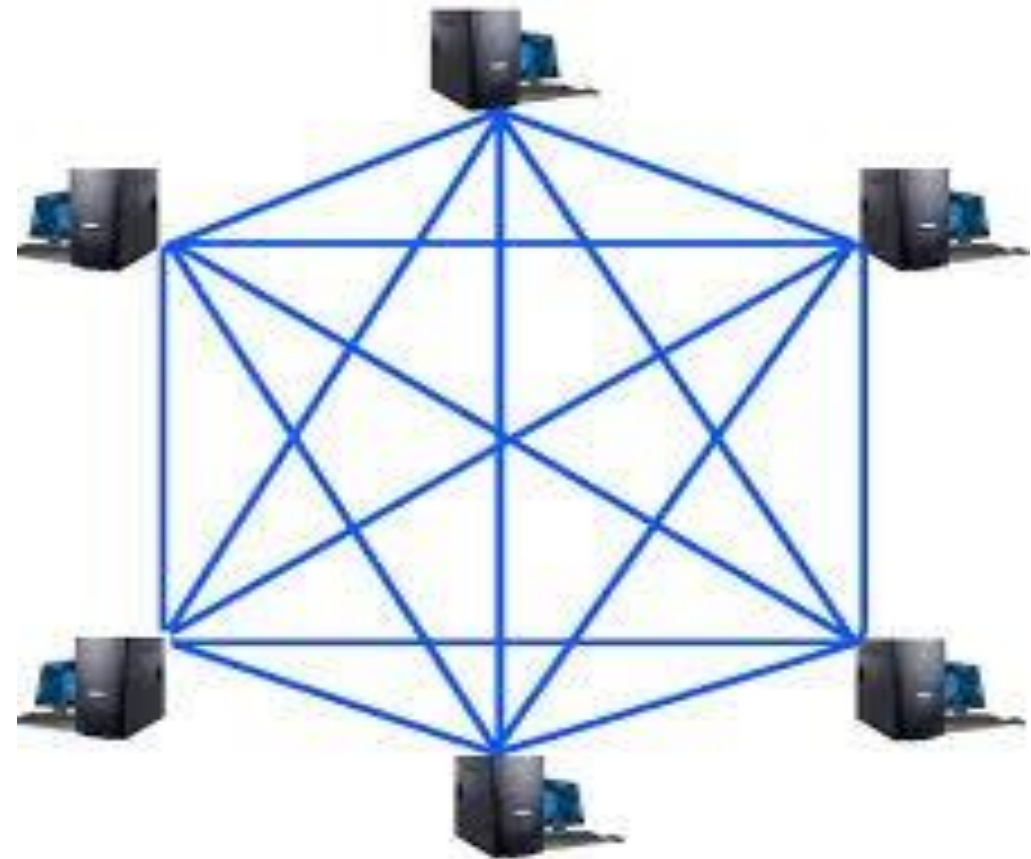


Mesh

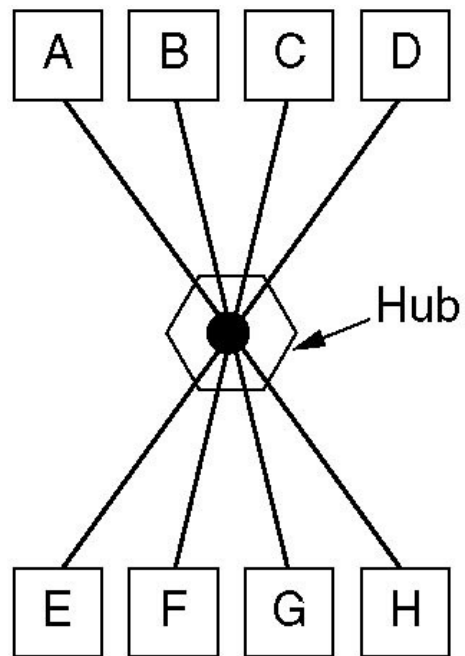
- In a network each and every device connected together.
- mesh network can take any of several possible paths from source to destination.

Advantage

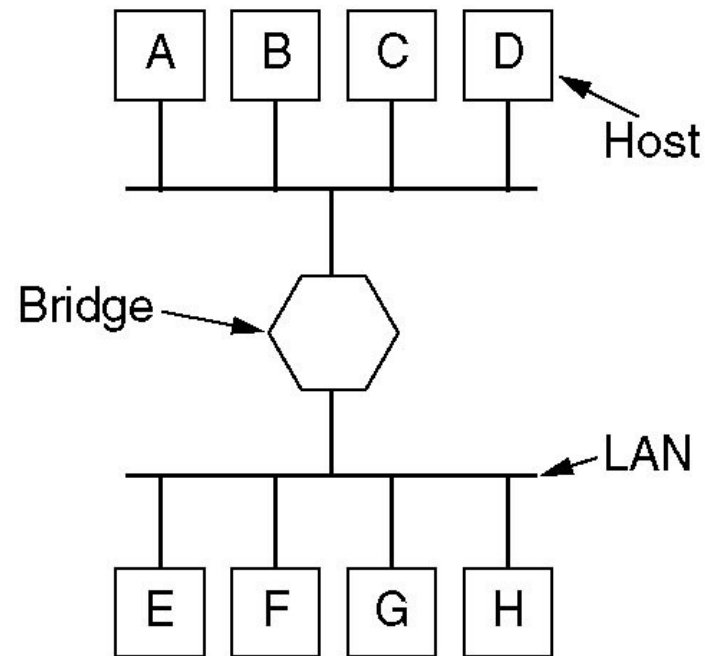
- Reception & Transmission is possible to entire network



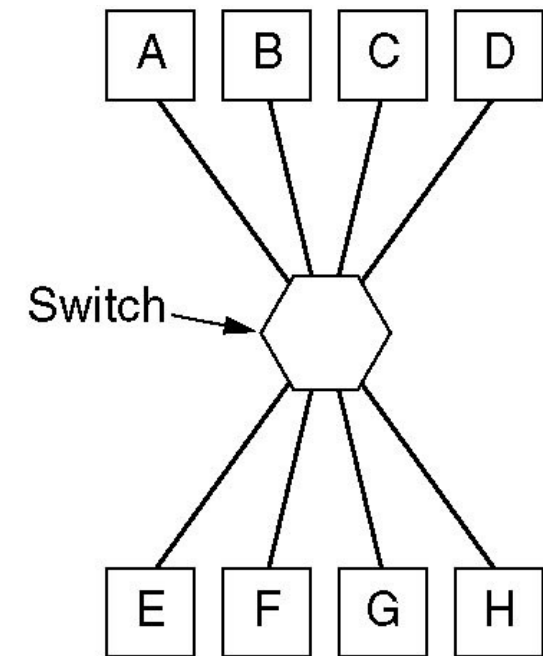
- Hub -A common connection point for devices in a network.
- Bridge - Networks separate to communicate independently as networks.
- Switch - Send a message to the device that needs / requests it



(a)



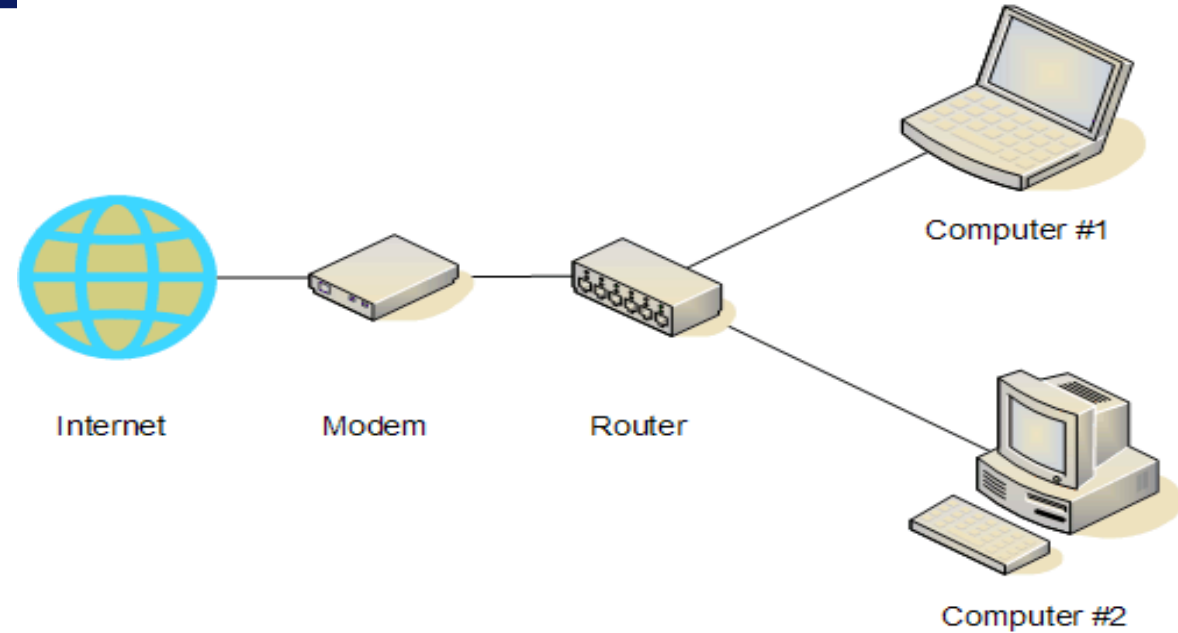
(b)



(c)

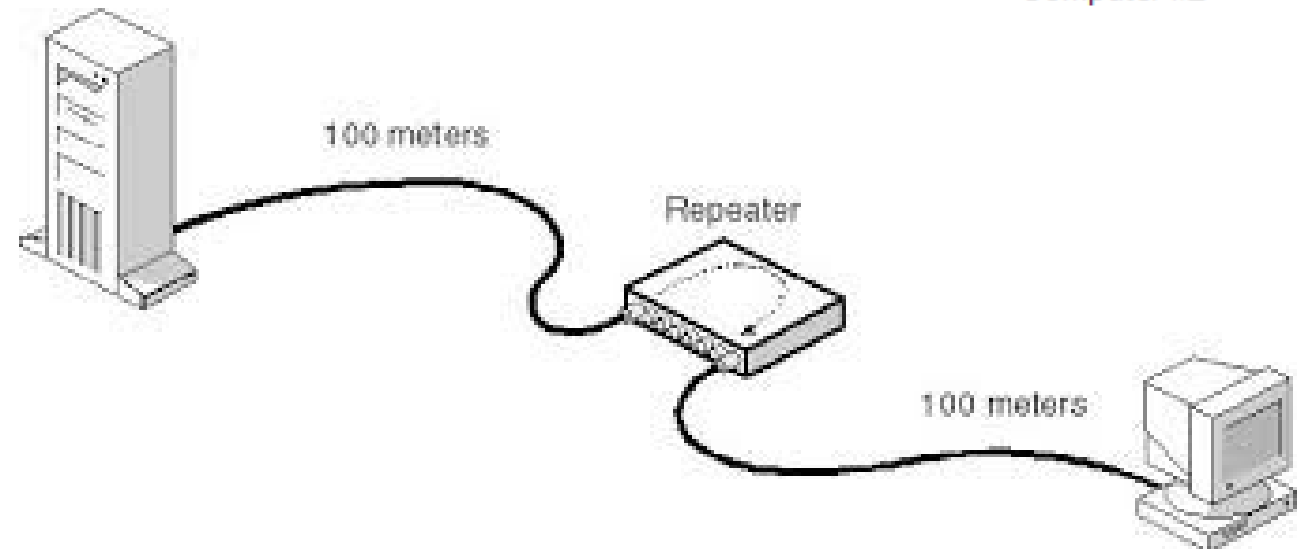
Router

- Connected to two or more data lines from different networks.
- Many ports



Repeater

- Device that receives a signal and retransmits it at a higher level or higher power



- Networking cables are used to connect one network device to other network devices or to connect two or more computers to share the data
- Connector is a connection for network cables. (RJ45)

Types of cables:

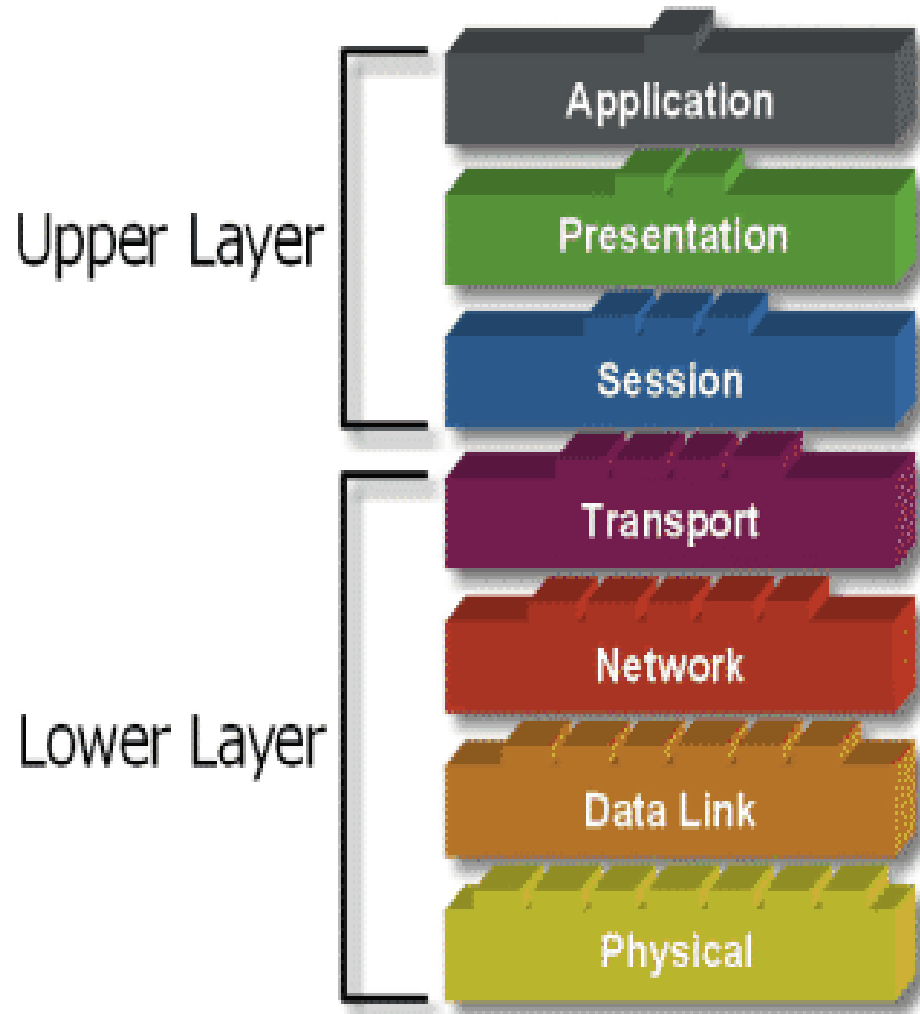
- Twisted pair
- Co-axial cable
- Optic fiber cable

(OSI) Open System Interconnection Model

This model deals with the connection of open system that is, system that are open for communication with other system

There are seven layers in OSI model, they are divided into two,

- Upper layer
- Lower layer



- Upper layer interacts with software
- Lower layer interacts with hardware
- Each layer formats the data packet

- Purpose - Handle input and output with end user
- User application to handle network management
- Examples File request from server E-mail services Browsers
- Protocols Http, https used

- Presentation layer is the only capable of touching/holds the data
- Purpose: -It present the data to application layer
- Examples
 - Data en(de)cryption
 - (de)compression (reduce size)
- Character set: -ASCII ,unicode



- It keeps the continuity of data transaction
- Purpose
 - session establishment of process running on diff station
 - Maintenance and termination
- Example
 - Simplex,
 - half duplex,
 - full duplex



- Ensure the data will be delivered error free, in sequence and with no losses
- Purpose
 - Message acknowledgment
 - Flow control between Host to Host(TCP)
 - check whether data is reached (check sum)
- Protocols
 - Tcp & Udp used



- This layer will decide which physical path the data takes
- Purpose
 - Contains IP address (logical address)
 - Routing(packets)
- Examples
 - Fragmentation
- - Traffic control while transferring the data
- Protocol used - IP



- Provides error free transfer of data frame from one to another over physical layer
- Purpose
 - Contains mac address(physical address 48bit)
 - Identify of machine Example
 - Establishing and terminating the logical link of frame



Physical layer

- It deals with transmission & reception of the unstructured raw bit stream into electrical signal over physical layer
- Purpose
 - Medium of data transfer
 - Bit stream
- Examples
 - Receiving the data by cables, network card and physical aspects



- Physical layer -

Hubs, repeater

Media: Coax, Fiber, Twisted Pair, Wireless

- Datalink layer -

Bridge, Switch

- Network layer -

Router

Internet Protocol

- An IP address is a binary number (0's & 1's)
- Uniquely identifies computers and other devices on a network.
- Each device on a network is assigned an IP address.
- Standards in IP
 - IPv4-consist of four bytes (32 bits)
 - IPv6-consist of sixteen bytes (128 bits)
(2001:0db8:ac10:fb01:0000:0000:0000:0000)

- IP addresses are written in dotted decimal format.
- Four sections are separated by dots.
- Each section contains a number between 0 and 255.

Dots separate the sections



10.1.1.1

Each section contains a number between 0 and 255

- Computers treat IP addresses as a single large 32 digit binary number, but this is hard for people to do.(256 numbers)
- So, we split them up into four smaller sections so we can remember and work with them better!
- But, computers number starting at 0, so to make a space of 256 numbers, we number from 0 to 255.
- An IP address can be private - for use on a local area network (LAN)
- Public - for use on the Internet or other wide area network (WAN).
- IP addresses can be determined

Statically - assigned to a computer by a system administrator

Dynamically - assigned by another device on the network on demand

- 5 Classes of IP address A B C D and E
- Class A reserved for governments
- Class B reserved for medium companies
- Class C reserved for small companies
- Class D are reserved for multicasting
- Class E are reserved for future use

Network 

Local 

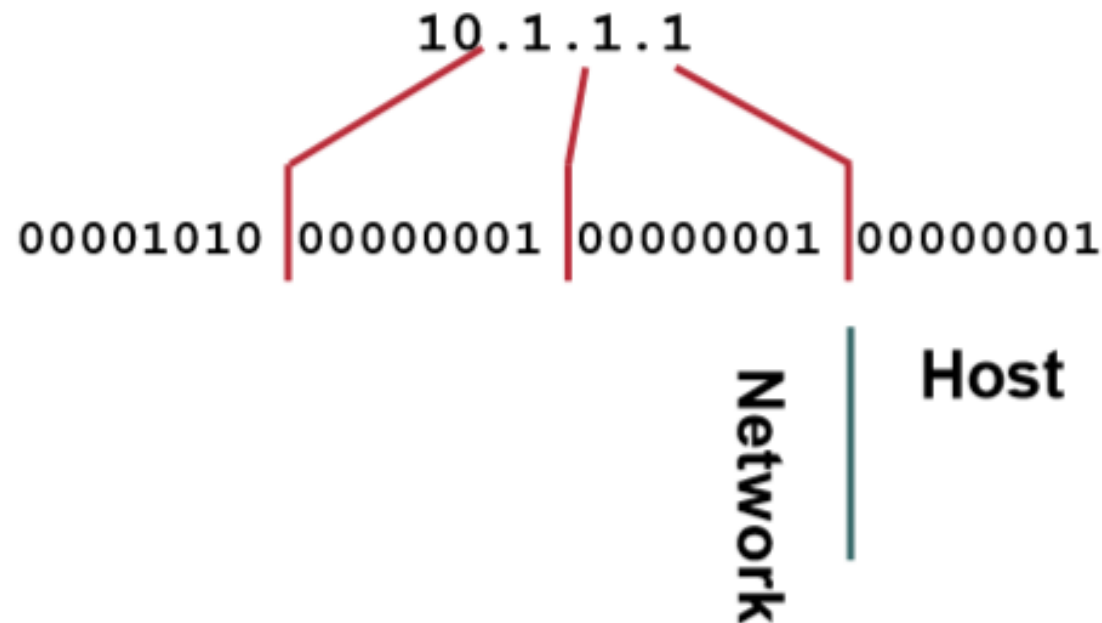
Class A 35.0.0.0

Class B 128.5.0.0

Class C 192.33.33.0

- Class A begins 1 to 126
- Class B begins 128 to 191
- Class C begins 192 to 223
- Addresses beginning 127 are reserved for loopback and internal testing

- Each IP address has two fundamental parts:
- The network portion, which describes the physical wire the device is attached to.
- The host portion, which identifies the host on that wire



- Subnet
- Makes it possible to divide a single network into multiple logical networks
- More manageable networks
- Save IP Addresses
- Default Subnet Mask

CLASS A - 255.0.0.0

CLASS B - 255.255.0.0

CLASS C - 255.255.255.0

- 1) Write down the class of network
- 2) Write down the default network mask
- 3) Identify bits available for stealing (a)
- 4) Identify bits to be stolen (b)
- 5) Number of network = 2^b
- 6) Number of host = $2^{(a-b)}$

- 1) What are Unicasting, Anycasting, Multicasting and Broadcasting?
- 2) What is Network Topology?
- 3) Explain ring topology
- 4) Define Network?
- 5) What is a node?
- 6) What is a Firewall?
- 7) What is NIC?
- 8) What is the difference between Internet, Intranet, and Extranet?
- 9) What are ipconfig and ifconfig?
- 10) What are the different types of a network? Explain each briefly.
- 11) How many types of modes are used in data transferring through networks?
- 12) Name the different types of network topologies and brief its advantages?
- 13) What are the responsibilities of Data Link Layer?
- 14) What are the responsibilities of Transport Layer?
- 15) What is the role of LLC in data link layer

- 16) explain session layer
- 17) What is the difference between TCP and UDP
- 18) Which service use both TCP and UDP ?
- 19) what is the port number for HTTP, HTTPS, DNS, DHCP, RDP, telnet, SMTP, FTP, POP3, IMAP4
- 20) what is mean by protocol?
- 21) Which layer provides logical addressing that routers will use for path determination ?
- 22) Which layer is responsible for keeping the data from different applications separate on the network ?
- 23) Difference MAC address and IP address
- 24) What is the difference between flow control and error control?
- 25) What is the difference between Hub, Switch, and Router?
- 26) What is HTTP and HTTPS what port does it use?
- 27) What is DNS Explain working of it?
- 28) Explain DHCP briefly?
- 29) Explain working of hub, switch, bridge
- 30) How many types of modes are used in data transferring through networks?

- 31) What is the maximum number of IP addresses that can be assigned to hosts on a local subnet that uses the 255.255.255.224 subnet mask?
- 32) Difference between public and private IP address
- 33) What is subnet mask?
- 34) In class B if subnet mask is 255.192.0.0 Total Number of networks than can be joined
- 35) What is APIPA and what is the range?
- 36) What is the difference between IPV4 and IPV6 address.
- 37) Is It Possible To Have An Ipv4 And An Ipv6 Addresses Simultaneously?
- 38) If a class B network on the Internet has a subnet mask of 255.255.248.0, what is the maximum number of hosts per subnet?
- 39) What is Loopback address ?
- 40) What is Proxy server ?