Part-B Unit-1

WEB APPLICATIONS

(Cycle-1)

What is a Computer Network?

A computer network is a group of computers and peripheral devices connected through data communication cannel that allow sharing of resources and information

Internet is an example of network

TYPES OF NETWORK

Depending on their size, capabilities and the geographical distance they cover, network can be classified as follows

- Personal Area Network -PAN
- Local Area Network - LAN
- Metropolitan Area Network - MAN
- Wide Area Network - WAN

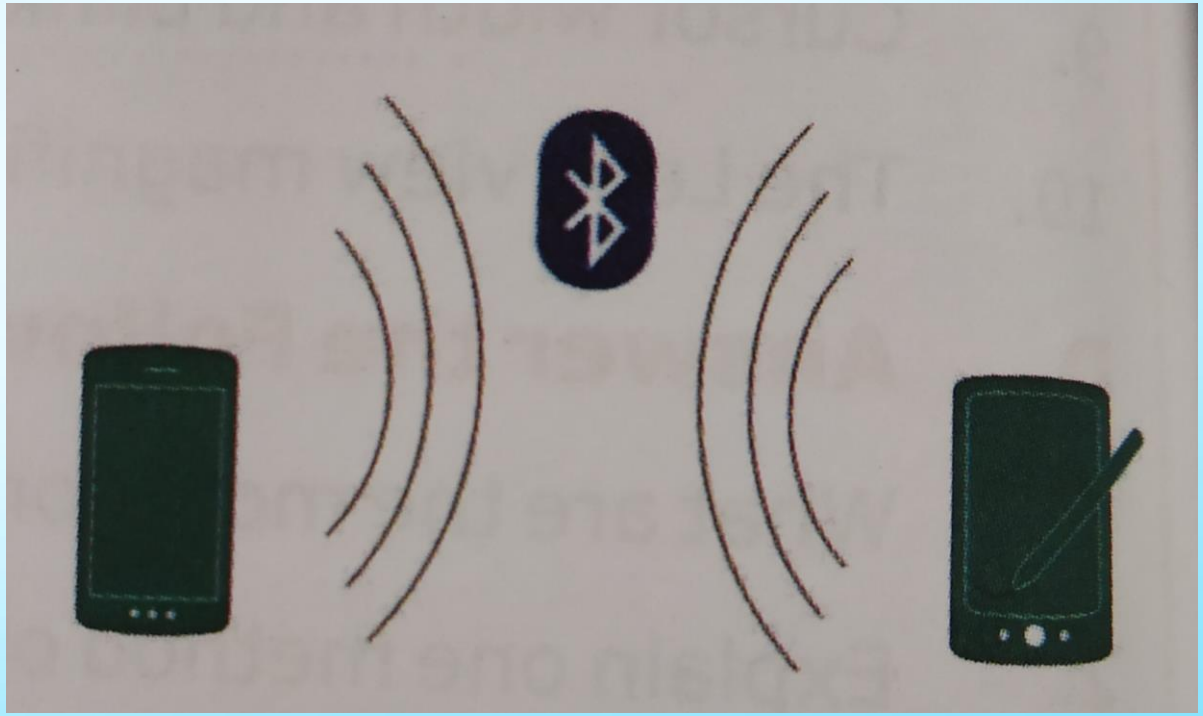
Personal Area Network (PAN)

Very small area network such as home or an office

Computers, tablets, smart phones, printers, wireless headsets are the nodes

Uses Bluetooth, wi-fi technology

Covers less than 10 meters

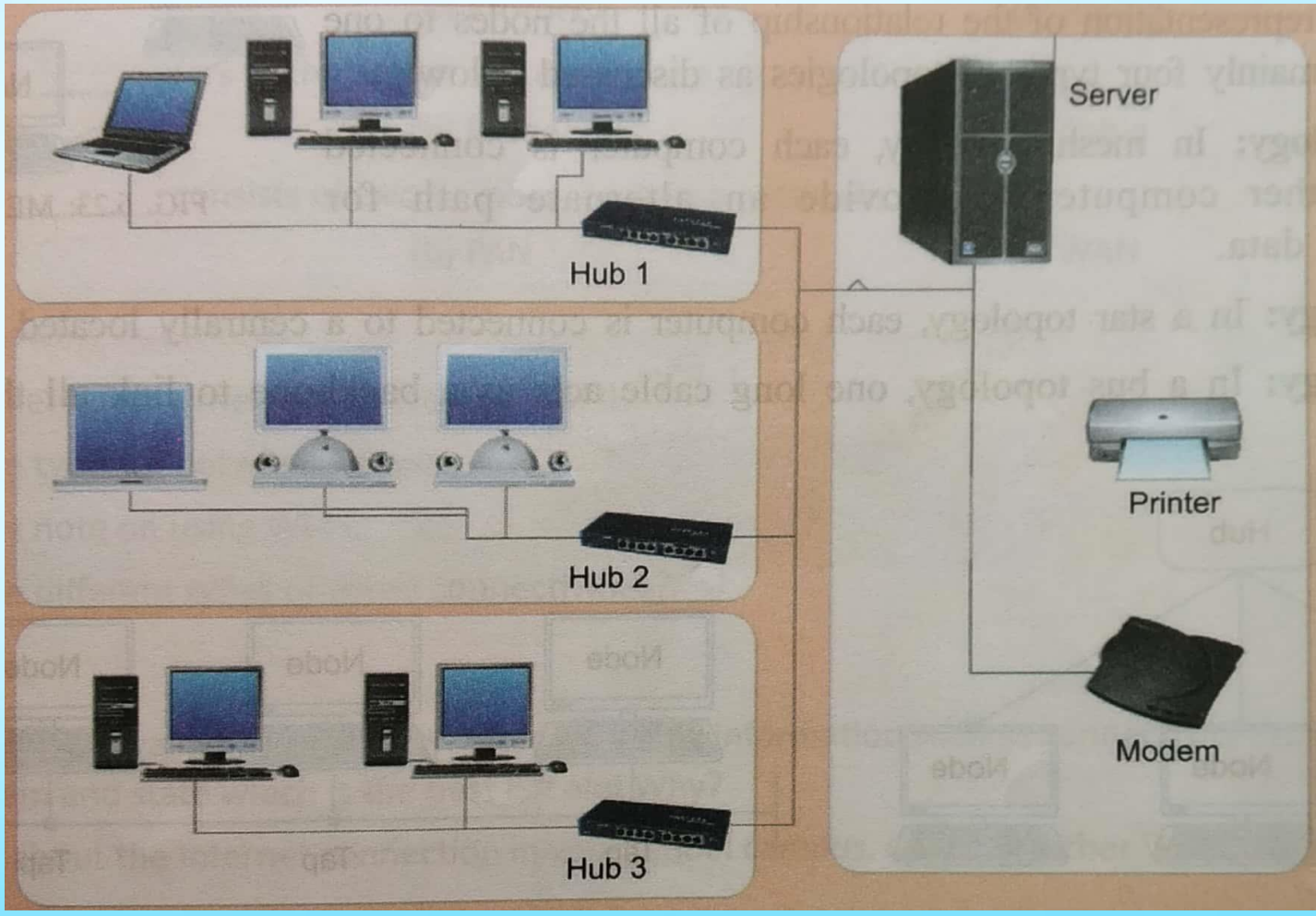


Local Area Network (LAN)

LAN is one which connects computers and devices in a limited geographical area such as home, school, office etc...

It provides high speed.

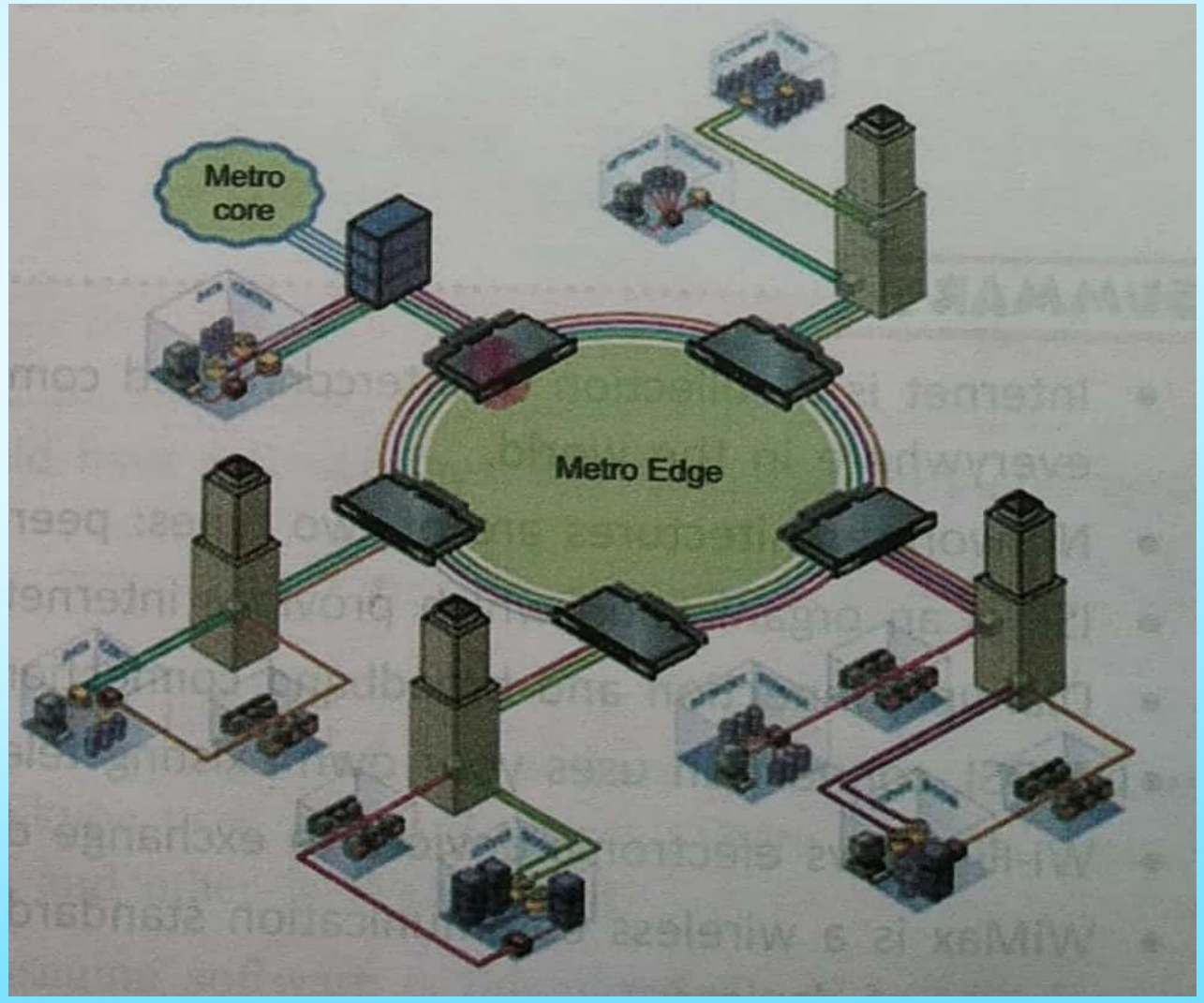
Used for connecting computers an peripherals such as printers and scanners



Metropolitan Area Network (MAN)

MAN is a computer network in which 2 or more computers which are geographically distributed but in the same metropolitan city

Its geographical scope falls between LAN and WAN



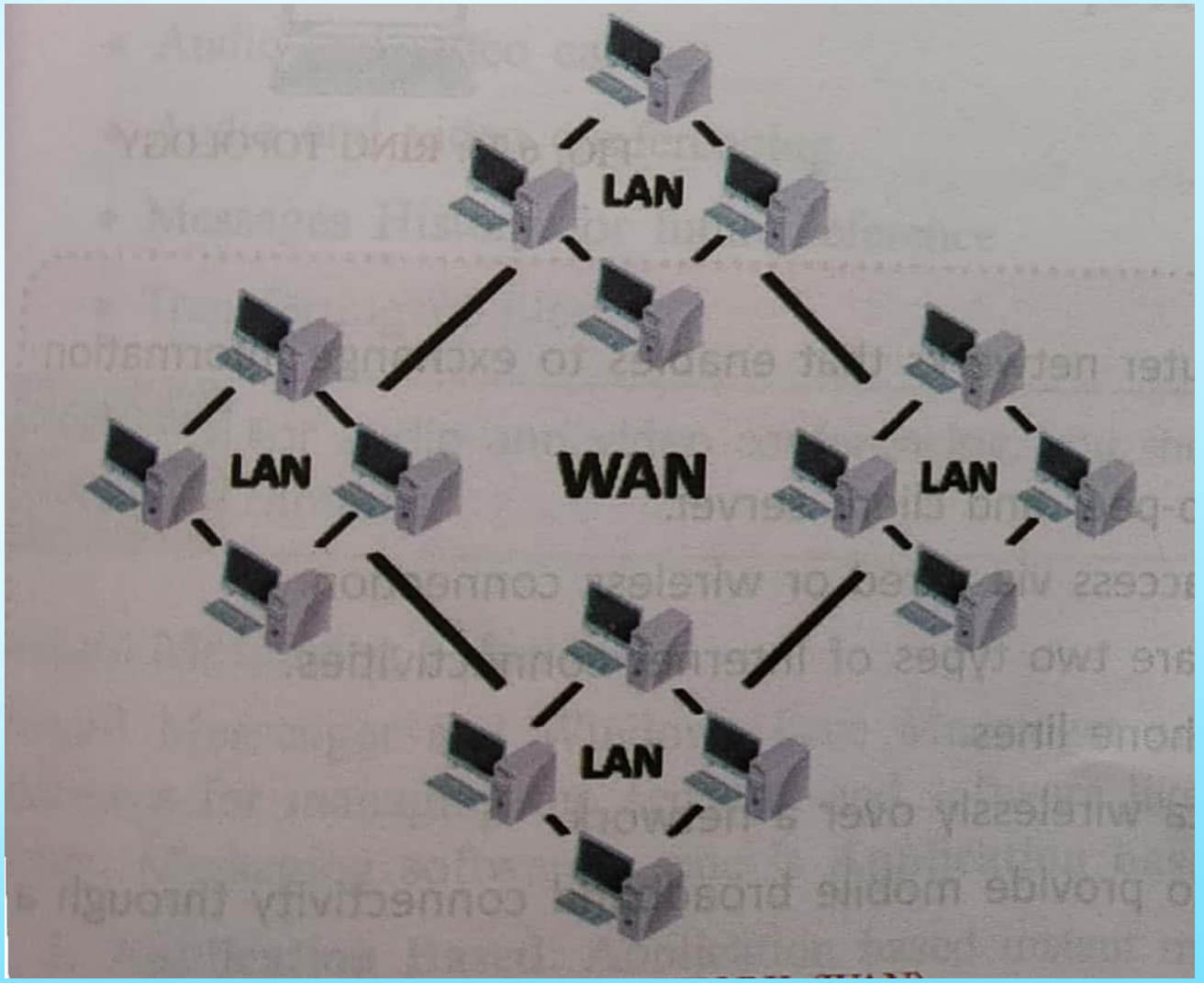
Wide Area Network (WAN)

WAN: One which covers a broad area.

It consists of 2 or more LANs

It is used by government organizations and business

Example : Internet



Advantages of network

- **User communication:** Allows user to communicate
- **File Sharing:** Data or information can be shared or transferred from one computer to another.
- **Hardware Sharing:** Hardware components such as printer scanner etc… can be shared.
- **Software Sharing:** Can share software over the network very easily.
- **Backup:** Can be stored on a central computer or server with a backup system
- **Cost effective:** since hardware, software & storage systems can be shared
- **Minor effect on breakdowns:** A breakdown in the individual computers will not effect the operation of the entire network
- **Saves paper and time:** Reduce the need for generating multiple hardcopies

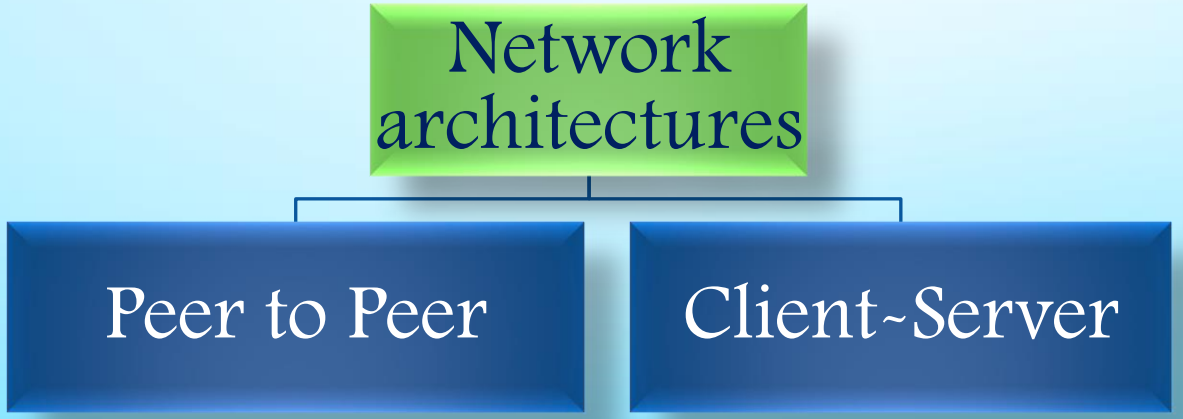
Disadvantages of network

- **Initial Cost**: Initial cost of setting up a network is higher
- **Administration**: If the network is too large, various issues may crop up in the day today operation.
- **Major effect on breakdowns**: If main server breakdown, the entire system would become useless.
- **Virus:** A virus infection in one computer may spread to all the computer
- **Security:** There is a danger of hacking, especially in large networks. Software like firewalls need to be installed

Network architectures

Network architecture is an overall design of a computer hardware and their functional organization and configuration.

Computer Networks are designed in two different ways:

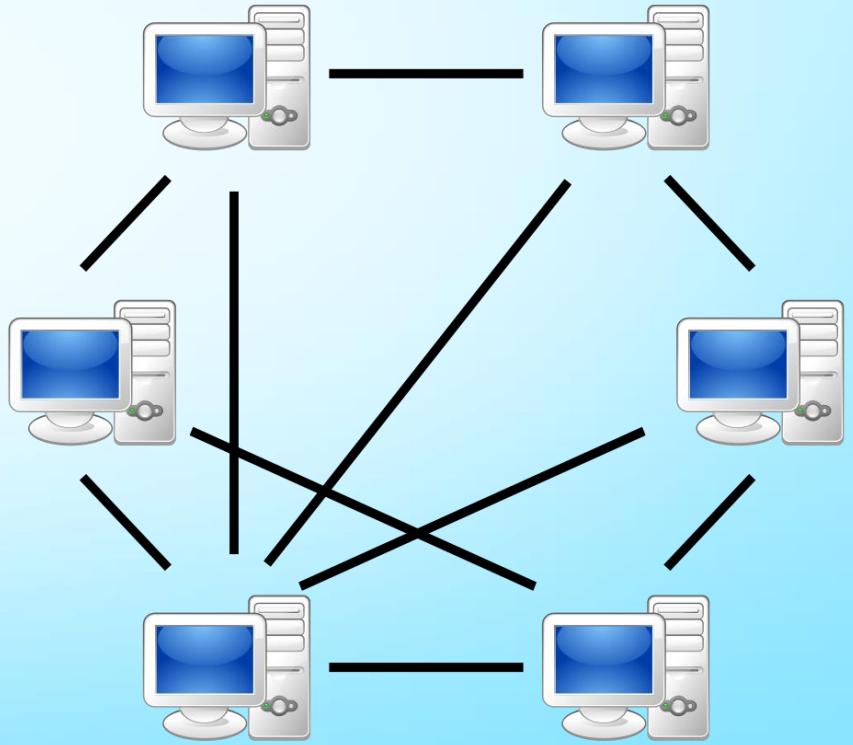


Network architectures

Peer to peer (P2P)

All computers have an equal status or position

All computers are responsible for exchanging/receiving data from one another



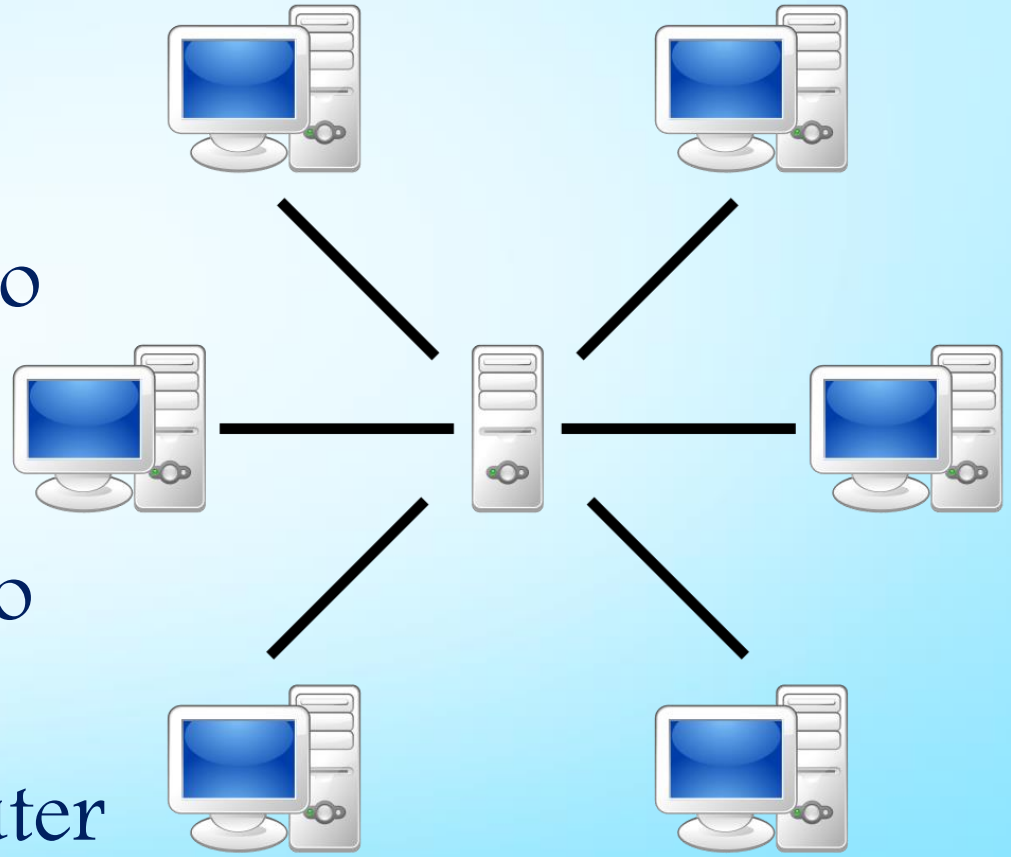
Network architectures

CLIENT-SERVER

Some computers have special dedicated tasks providing services to other computers

Server: A computer which is responsible for providing services to others is called SERVER

Client/Nodes/Workstation: Computer that use these services are called Client



DIFFERENCES

PEER TO PEER	CLIENT SERVER
All computers are equal	A specific computer powerful than other
Each computer can request service and also provide service	Server provide resource, client request resources
Can store its own data	Date stored in centralized computer
Security is a major concern	Easy to make measures to secure the system
Less expensive, Easier to implement	More expensive, Not so easy to implement
Usually implemented for a smaller number of computers located in a limited area	Spread world wide

Switching Techniques

- In large networks there can be multiple paths linking the sender and receiver.
- Information may be switched as it travels through various channel in a digital traffic.

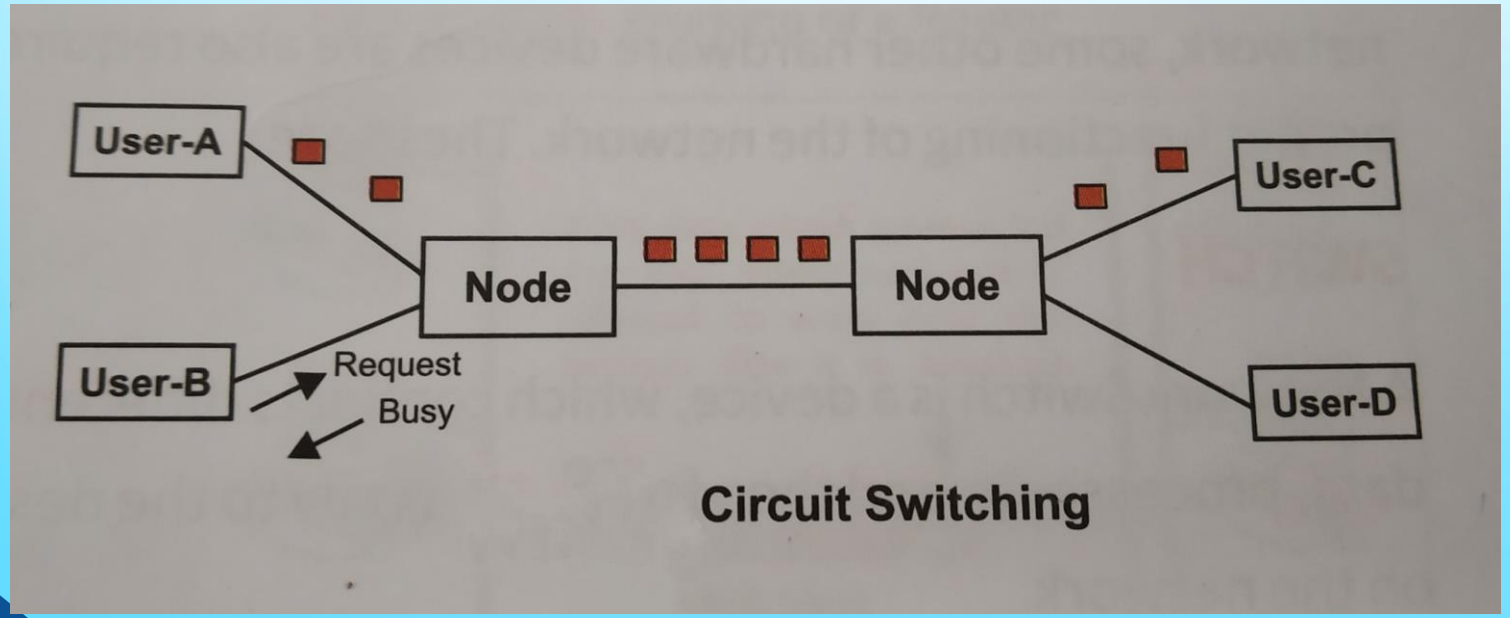
There are 3 types of Switching Techniques employed in Data Communication and Networking:

1. **Circuit Switching**
2. **Message Switching**
3. **Packet Switching**

Circuit Switching

(Circuit – dedicated channels)

- ✓ Technique that connects the sender and the receiver in an unbroken path.
- ✓ A dedicated path exists between the 2 ends unless the connection is terminated.
- ✓ Example: Landline



Circuit Switching

Advantage:

- The communication channel is dedicated

Disadvantages:

- Possible long wait to establish the connection during which no data can be transmitted.
- Most expensive among all other switching techniques as a dedicated line is required.

Message Switching

- ✓ In message switching, the message is send from the sender to the receiver through a series of nodes.
- ✓ Each node receives the message, store it on the disc, and then transmits the message to the next node
- ✓ This type of message is called storage-and-forward network.

Advantage:

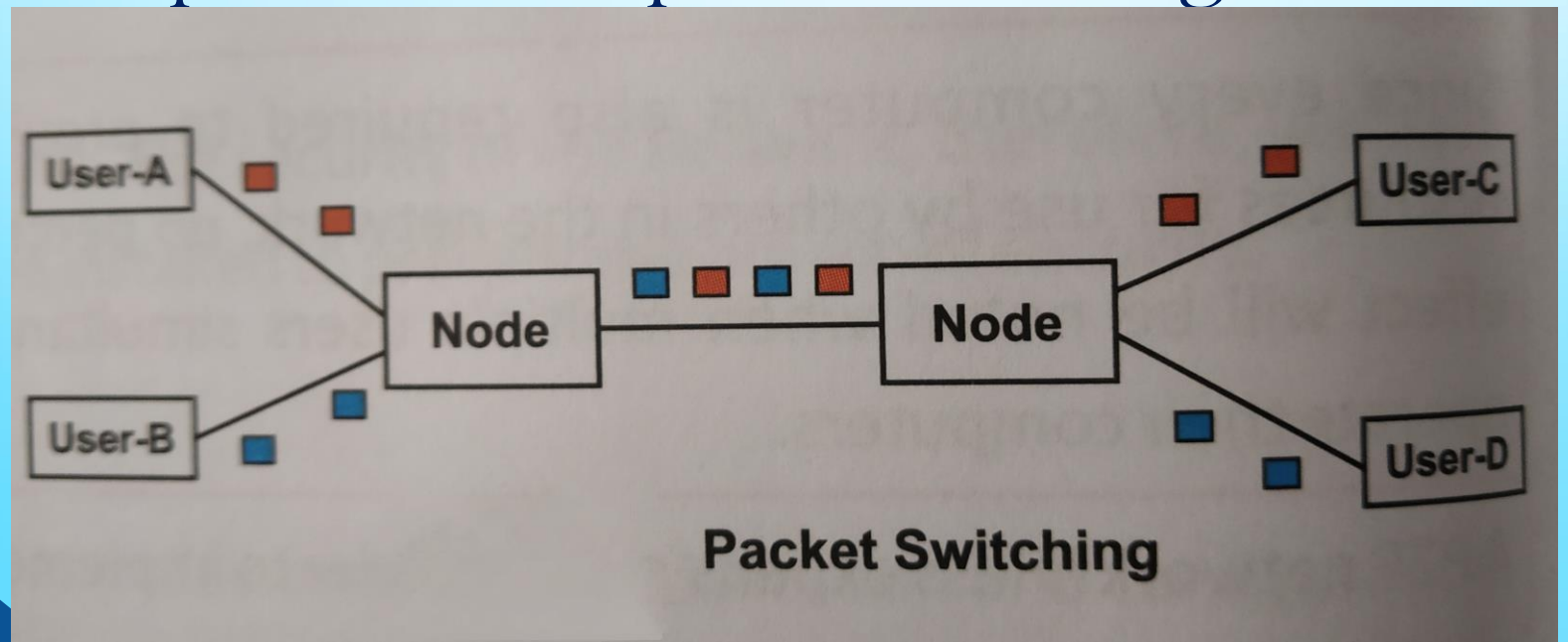
- Channel efficiency is very high because more devices are sharing the channel.
- Traffic congestion is reduced because message can be temporarily stored in the node.

Disadvantage:

- Store and forward devices are expensive as large storage is required to store long message

Packet Switching

- A message is broken into packets of fixed size.
- Each packet has header that contains source and destination address information, error bits and reassembly instruction
- Most efficient for large network
- TCP/IP protocol uses packet switching



Packet Switching

Advantages:

- Cost effective because devices do not require a large amount of switching circuits
- Offers improved delay characteristics as there are no long messages in the queue.
- Packets can be rerouted if the links are busy or disabled.
- Many users can share the same channel at the same time

Packet Switching

Disadvantages:

- Protocols for packet switching are complex and hence have additional cost in implementation.
- If the packet is lost, the sender has to retransmit the data.

Network Devices

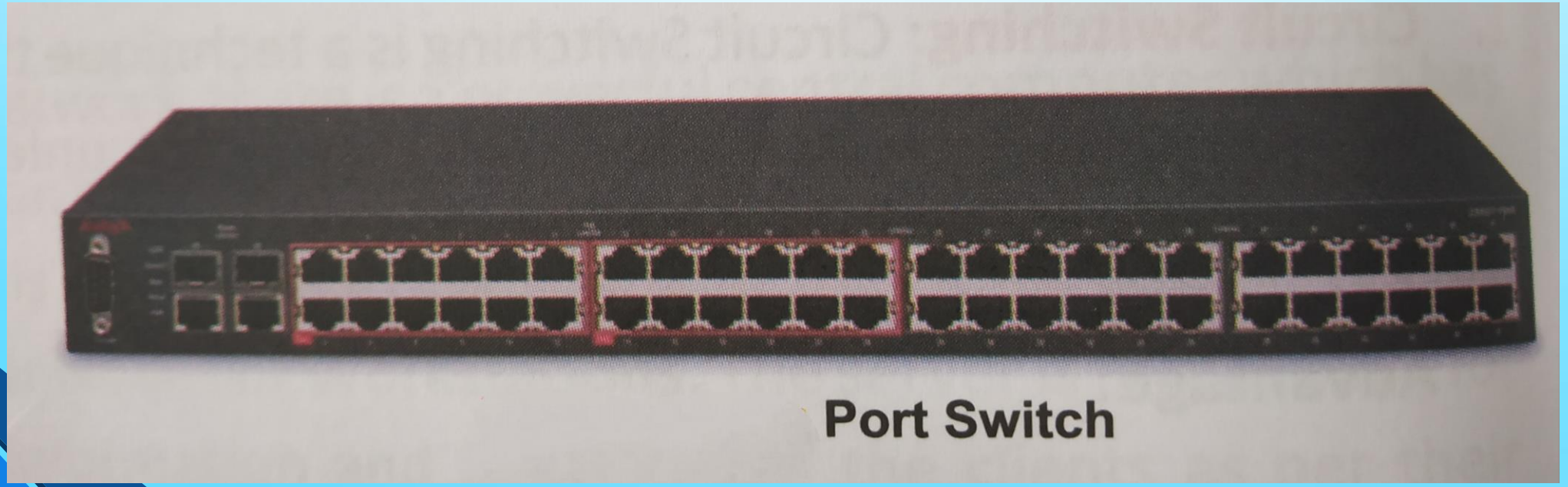
In addition to the computers that make up the terminals of a network, some other hardware devices are also required for the proper functioning of the network. These are

1. **Switch**
2. **Hub**
3. **Router**
4. **Bridge**
5. **Repeater**

Network Devices
Switch

A network switch is a device, which connects different computers and devices on a computer network.

A switch receives data, processes it, and then forwards it only to the destination device. It uses packet switching techniques to transfer data on the network



Port Switch

Network Devices
HUB

HUB is a central device in a network that provides common connection among the computers or nodes. It is used in star topology. Hubs are Known as **Dumb Switches**

Figure 1.2.13: Port Hub

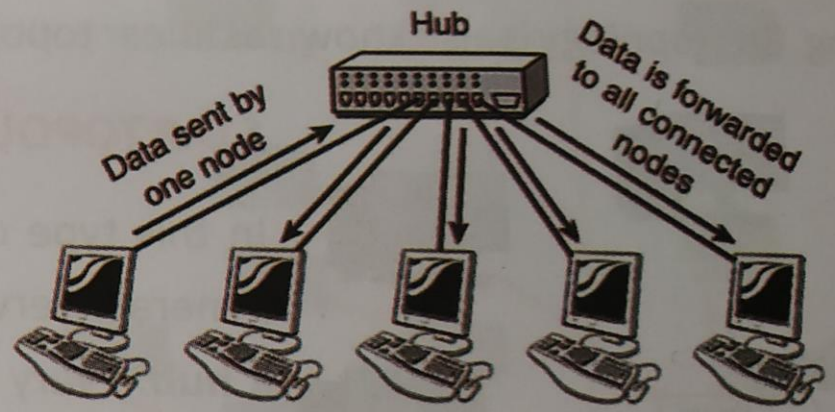


Figure 1.2.14: Working of a Hub

Network Devices
Router

A ROUTER is a network device, which routes the information around the network.

It also used to connect one network to other network.

The header of every packet of the information arriving at a router is checked for the destination and using the best route, the message is forwarded to the next device

Network Devices
Bridge

A BRIDGE is a device that connects and passes packets between two network segments that use the same communication protocols.

A bridge blocks off one segment of a network from another, thus it acts as a filter.

The bridge checks the arriving information and transmits it, only if required.

Network Devices
Repeater

A REPEATER simply copies the information arriving at its input and retransmits it from the output.

This is required at times when the network signal is weakened or distorted over a long distance.

This happens if the network passes through a strong electromagnetic fields.

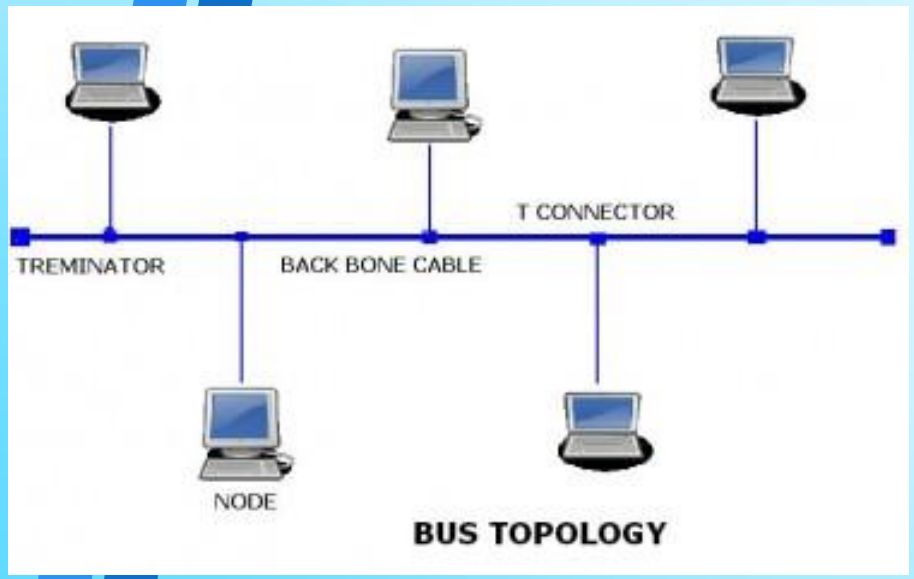
The weakened or distorted signals at the input are regenerated and then retransmitted by the repeater

Network Layout/Topologies

- Layout/Topology : refers the arrangement of connected nodes(computers)
- Its geometric representation of the relationship of all the nodes to one another
- There are mainly 4 types of topologies

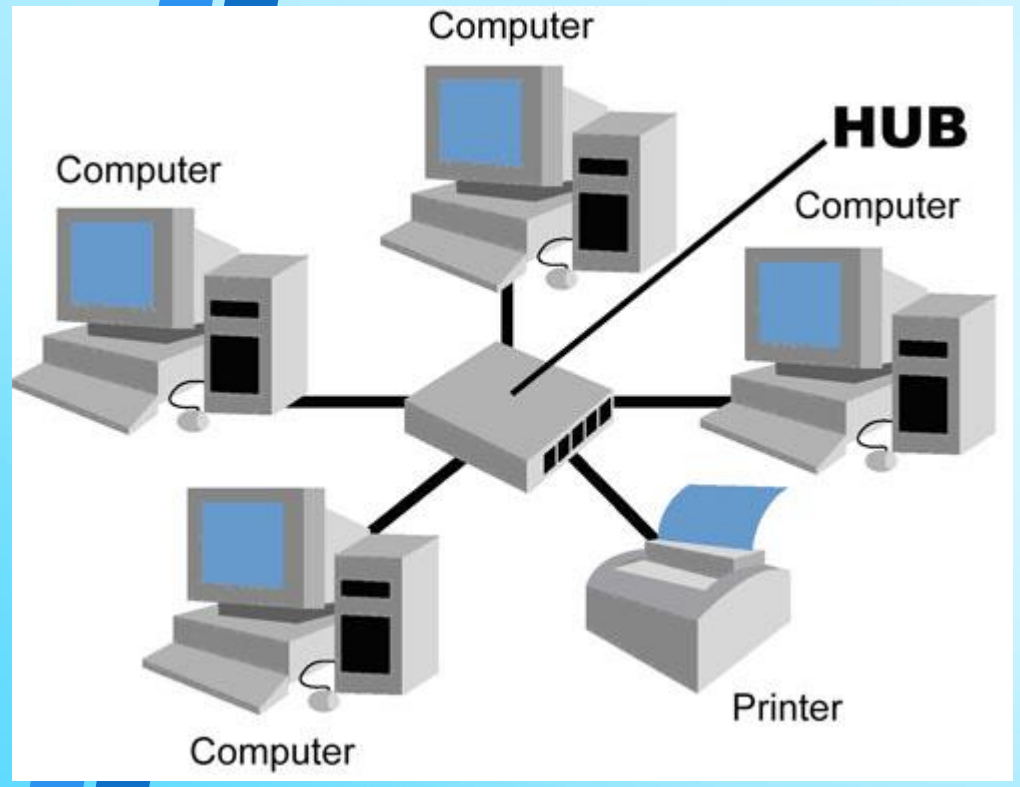
1. Bus Topology
2. Star Topology
3. Ring Topology
4. Mesh Topology
5. Tree Topology
6. Hybrid Topology

Bus Topology



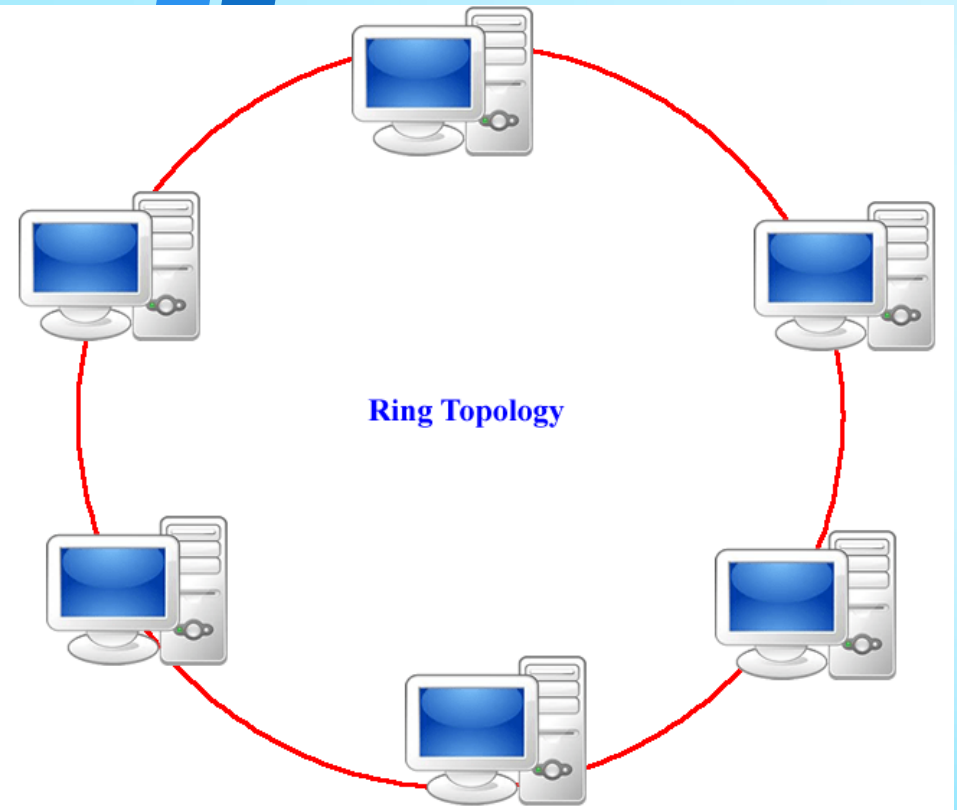
- Central cable – backbone of the network-which joins all the computers.
- One computer acts as a server.
- Long cable acts as a backbone to link all the computers in a network
- Used in small network
- Also known as linear topology
- Disadvantage: If main cable fails, entire network become unstable

Star Topology



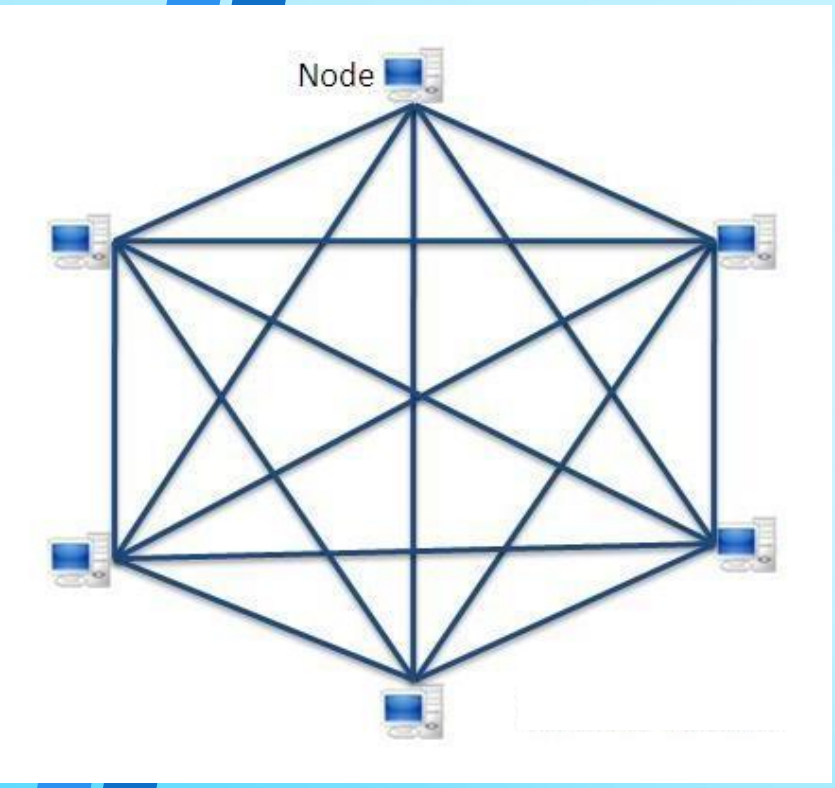
- Each Computer is connected to a centrally located device~server~ called hub
- Every computer can communicate across the network through hub
- Very popular as its initial cost is less
- Very easy to add new devices
- Simple configuration
- If any one connection fails, it will not effect the network
- But if hub fails, the entire network goes down

Ring Topology



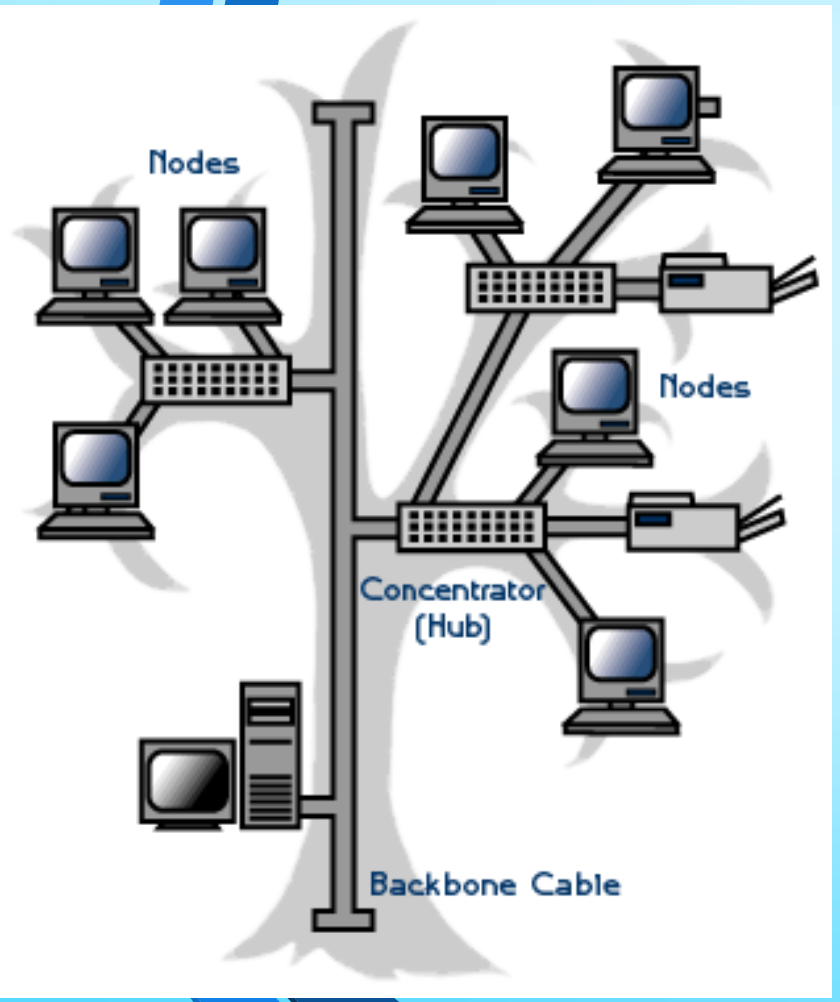
- Each computer is connected with the 2 computer on either side of it in a circular manner
- When one node sends a message to the other node, not adjacent, data travels through all the intermediate nodes until it reaches its destination.
- Slower than star topology
- Used in both LAN and WAN
- If one node fails, the entire network will get effected.

Mesh Topology



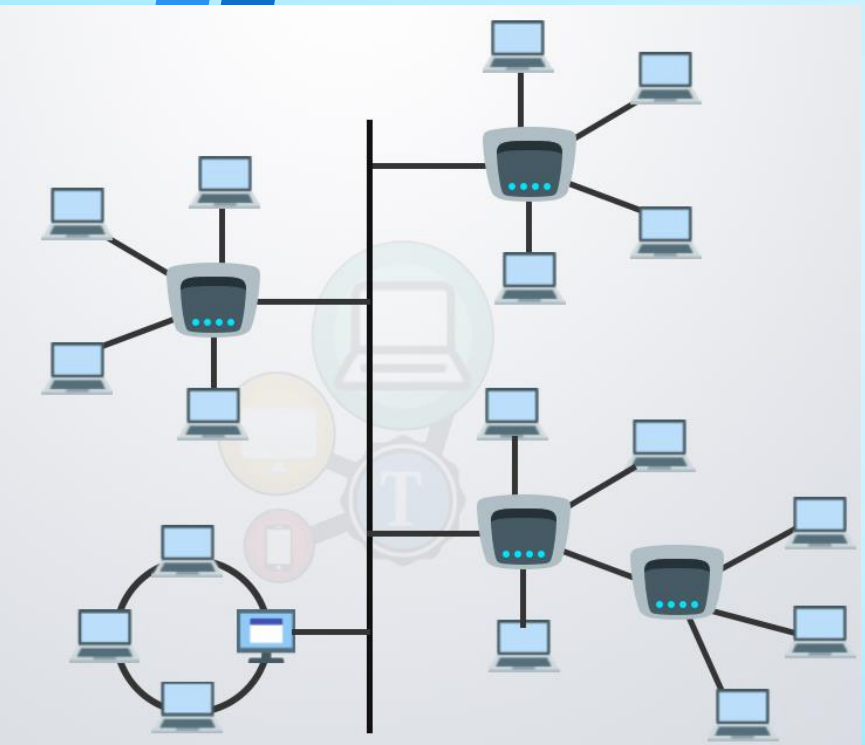
- Each computer is connected to every other computer.
- Not only sends its own signals, but also relays data from other nodes.
- Provides many path for transferring data.
- Can handle a large volume of traffic.
- Commonly used in wireless networks.
- If one node fails, it will not be affecting the entire system.
- Initial cost is very high.

Tree Topology



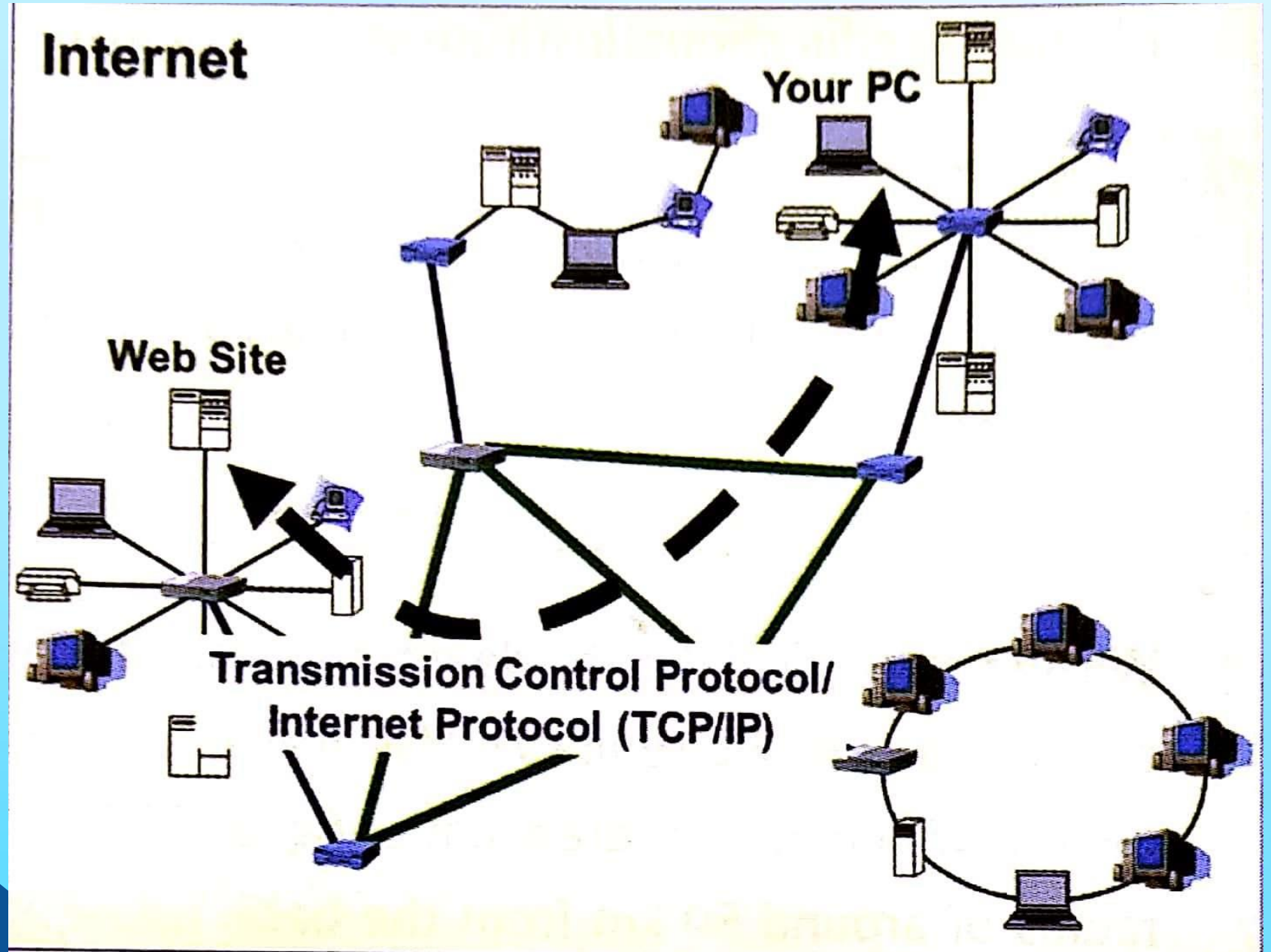
- Combination of star and bus topology.
- One star network is connected to another to a linear bus backbone cables
- Cable failure isolates star network
- If backbone cable is failed, then communication among star networks fail.
- Expansion of network is easy
- But maintenance is difficult

Hybrid Topology



- Combination of 2 or more network topologies.
- Individual network could be Star, ring, bus or even mesh.
- Easy to maintain

Structure of Internet



Internet

- Global interconnection of computer networks.
- Communication over internet is governed by a set of rules known as **protocol**.
- Commonly used protocols are

  TCP/IP ~ **T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol

  HTTP ~ **H**yper-**T**ext **T**ransfer **P**rotocol

  FTP ~ **F**ile **T**ransfer **P**rotocol

Accessing The Internet

To Access internet, following things are required

Computer:

It can be a desktop/laptop/tablet or even a smart phone

Modem:

Stands for **Mo**dulator **Dem**odulator which converts digital data to analog data and viz versa. It is a hardware device allows to send and receive data over a telephone line or cable.

Digital modems are more faster.

Accessing The Internet

An Account with an ISP:

ISP stands for Internet Service Provider.

Provides dial up/direct/wireless connection

Example: BSNL, MTNL, Airtel, Vodafone, Jio etc…

Browser:

It is a software, which allows to access the internet.

Example: Google Chrome, Mozilla Firefox, Internet Explorer, Opera, Safari etc…

Some advantages of Internet

- Widely used by students, teachers, educational institutes, engineers, scientists and others to research, and to gather information
- Largest encyclopedia for all age groups
- Major source of entertainment
- Maintain contacts with friends and relatives through chatting and email system

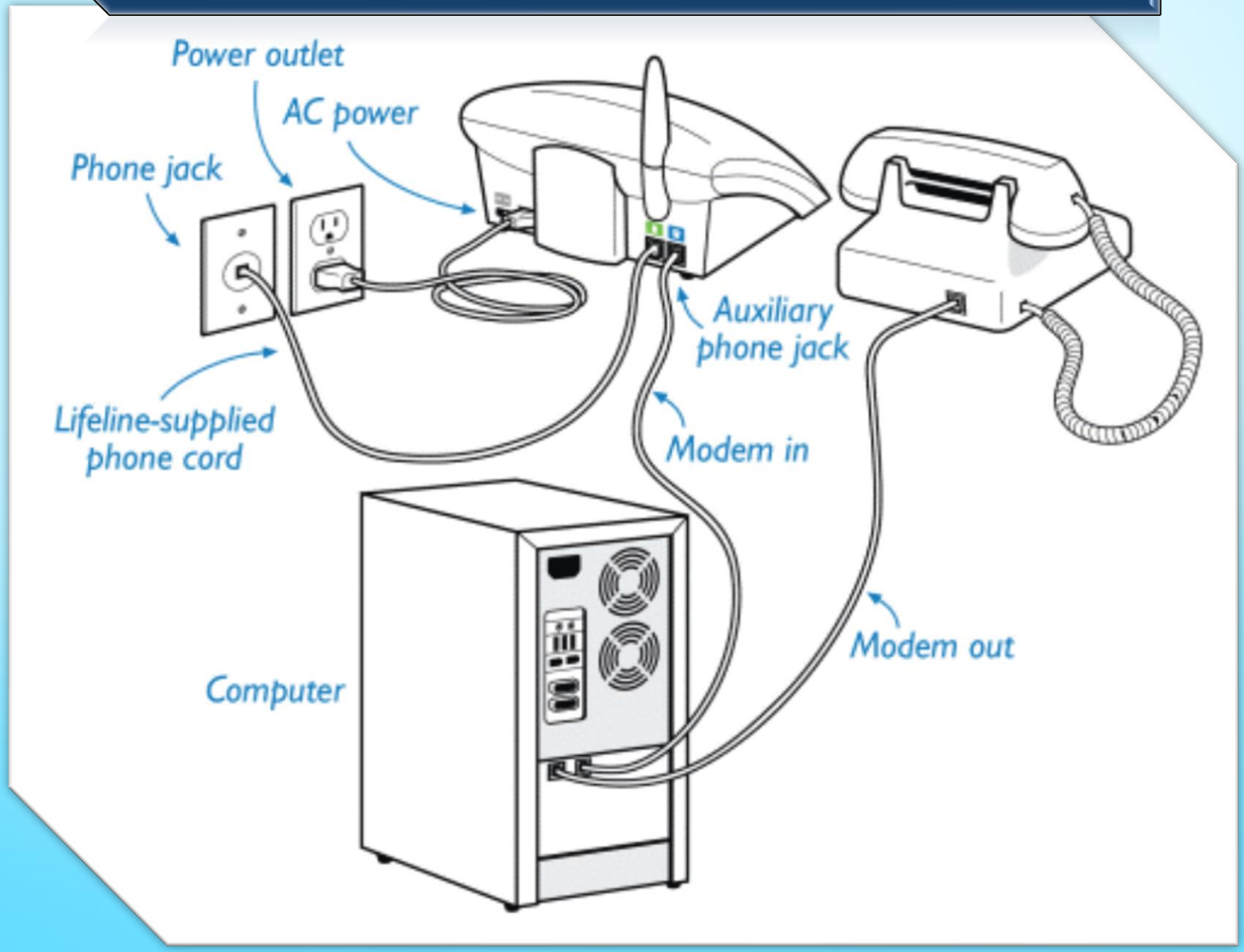
Types of Internet Connections

- Dial up connection
- DSL Digital Subscriber Line
- Cable Internet
- Satellite Connection
- 3G or 4G System
- Wi-Fi (Wireless Fidelity)
- WiMAX
- Wi-Fi Hotspot

Dial up connection

- Connection setup between your computer & ISP Server.
- It is established using a modem.
- The modem connects computer to the telephone lines which serve as the data transfer the medium.
- The modem dials a phone number of an ISP, to receive dial up call.
- Very slow in most of the cases.

Dial up connection



DSL Digital Subscriber Line

- It uses your existing phone line.
- Transferring data at a much higher speed.
- Simultaneous use of telephone and data transmission
- The data is transmitted over wires of a local telephone line.
- Need a DSL Modem and a subscription
- It's a Broadband Internet

What is a broad band ?

Its short term for broad band width and refers to the amount of data that a signal can carry.

Much faster than Dial up connection because these signals carry more data

Measured in Mbps (Megabits per second)

MBps (Megabytes per second)

Cable Internet

- Uses in cable television lines
- It is fast. But not available in all areas

Satellite Connection

- Provide internet access everywhere.
- It is very fast.
- Signal from satellite are received with a dish.

3G or 4G System

- To use the internet on mobile phones
- 3G/4G standards allow higher data transfer speed.
- 5G is the most current generation of cellphones

Wi-Fi Wireless Fidelity

- Its a popular technology through which computers and mobile devices exchanges data over the network.
- A radio link between Customers location and ISP's facility.
- Provides internet connection to the places where it is difficult to use wires.
- Also used in homes, offices etc.. to provide wireless internet to all the users.
- Wi-Fi is available up to a distance of around 100 feet from the router and speed is 54Mbps
- Can keep a password for security

Please note:

- Internet and Wi-Fi are two different things.
- Internet is a global network, where as wi-fi is a way of using radio signal to transmit data from one point to another.
- Wi-Fi can also connect different wi-fi enabled devices without using a physical wire.

WiMAX

- Worldwide Interoperability For Microwave Access
- Covering a radius of 50km from base transmitting station.
- Speed is 70 Mbps

Wi-Fi Hotspot

- It's a physical location from where Wi-Fi access to the internet is available.
- It could be a private (Ex. Home) or public (Ex. Restaurants, hotel, railway station)

Instant Messaging (IM)

- Is a real time communication.
- IM offers an instantaneous transmission of text based messages from the sender to receiver
- One of the first popular IM program was ICQ (I seek you)
- Launched in 1996. In 1998 it was taken over by AOL (America On Line)
- To use IM one must download the software and then create an account in it. Ex. Whatsapp.
- IM is faster than email. So many email providers started their own IM application like Yahoo messenger

Instant Messaging (IM)

Advantages:

- ✓ Faster than any other mode of communication
- ✓ Sending text messages to more than one person at same time
- ✓ Audio & Video Calling
- ✓ Audio & Video Conferencing
- ✓ Message history for future reference
- ✓ Transferring of files

Instant Messaging (IM)

There are 2 types of Instant Messaging

- ✓ **Appilication Based**

  Application based IM software is downloaded and installed on one's computer

  Examples: Hangouts, Yahoo Messenger, Windows Live messenger, Skype, Google talk

- ✓ **Web Based:**

  Web based IM software is accessed using web browsers such as Mozilla Firefox, Google Chrome etc…

  Example: Meebo messenger, MSN Messenger

Instant Messaging-Google Hangouts

- It is developed by Google. It replaces Google Chat and Google Talk
- Allows you to communicate via text, voice and video.
- Its developed by Google Inc.
- Need to install/ download in your computer/mobile phone
- Its freely downloadable
- Gmail account is required (account with google)
- It can also use through browser
- URL for Google Hangout: http://hangouts.google.com

Instant Messaging-Google Hangout

- URL for using Google Hangout is http://hangouts.google.com or
- If you are logged onto any google service just click on the multiple dotted area of the Google service.
- If hangout not show up, click on more and Click on Hangout. You can see your contact list.
- Whenever your friends will be online, you can see them along with a green dot.
- To start chatting, double click on a contact (visible with green dot) you wish to chat with.
- A window will popup. Type the messages in the text box and Press enter key to send the messages.

General Rules & Netiquette while chatting

- ✓ Introduce yourself.
- ✓ Always ask if the person has time to chat.
- ✓ Use short messages
- ✓ Do not use ALLCAPS as it shows aggressiveness
- ✓ Do not use abbreviations, if conversation is professional
- ✓ Give people time to respond
- ✓ Be polite while online
- ✓ Respect others while chatting
- ✓ A good etiquette to sign off from chatting with a Thank you and Bye.

Sending messages

- ✓ From hangout interface click on the person to which you wish to send a message.
- ✓ You can see past conversations.
- ✓ Bottom window allows o type new chat and press enter
- ✓ You can also send pictures by clicking on Picture icon.
- ✓ You can draw pictures using Draw an Image icon.
- ✓ Emoticons or stickers can be added to the messages by clicking on Add an emoji or sticker icon

Sending messages

- One can archive the conservation for future reference, delete entire conversations, even block the particular contact by clicking on the **More button** and selection the **Option** from the drop down menu.
- To start video call with the selected contact, click on Video call icon.
- Hangouts can also be used from GMAIL by clicking on Hangout contact button on the bottom left of the screen.

Yahoo Messenger

- ✓ It is integrated with the yahoo mail.
- ✓ Its available on Desktop app, web app as well as on Android and iOS platforms for mobile devices
- ✓ After downloading you can open it to chat by signing in the Yahoo Id.

Chatting on Yahoo! Messenger

- ✓ It supports chatting and voice conferencing.
- ✓ Need to download and install Yahoo! Messenger.
- ✓ You need a yahoo mail account for chatting.
- ✓ If you do not have a yahoo mail account, you can create one.
- ✓ As you sign in your account, your contact list will be available to chat.
- ✓ If you do not have any contacts, then you can add Yahoo mail account to your contact list by sending an invitation.

- ✓ Other chat services are MSN, Rediff, Sify etc…

Continued in next ppt…