SRI AKILANDESWARI WOMEN'S COLLEGE, WANDIWASH

INTRODUCTION TO INFORMATION TECHNOLOGY

Class: II UG NME

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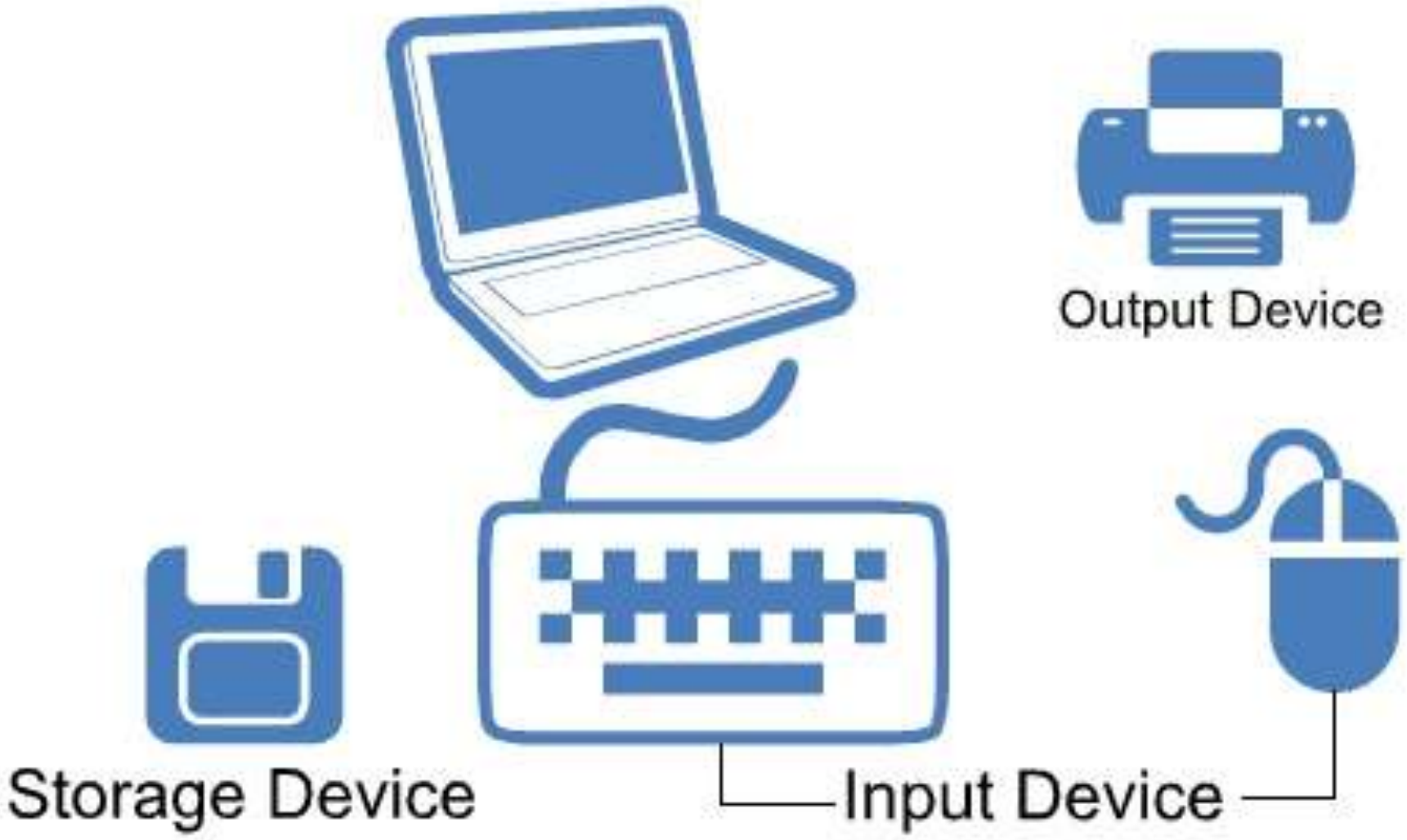
UNIT I

- Introduction to Computers:
- Definition - Characteristics of a Computer - Classification of Computers –

- Basic Anatomy of the Computer - Applications / Uses of Computers in different fields



COMPUTER BASICS

COMMUNICATION

Computer

Definition:

A computer is an electronic machine that
1) takes in data and instructions (input)
2) works with the data (processing)
3) puts out information (output)

Explanation:

Computers are made of HARDWARE
- input devices like the keyboard and mouse
- the CPU and memory
- storage devices like hard drives
- output devices like printers and monitors

and SOFTWARE
(the instructions that tell the computer what to do)
- system software
- programs (application software)

INTRODUCTION

- The word "computer" comes from the word ‘compute’, which means to calculate.

- So a computer is normally considered to be a calculating device. In fact the original objective for inventing the computer was to create a fast calculating machine.

- But more than 90% of the work done by computers today is of non-mathematical or non-numerical nature.

INTRODUCTION

- Definition : A Computer is an electronic device that can perform activities that involve Mathematical, Logical and graphical manipulations.

- Generally, the term is used to describe a collection of devices that function together as a system.

- It performs the following three operations in sequence.
    1. It receives data & instructions from the input device.
    2. Processes the data as per instructions.
    3. Provides the result (output) in a desired form.

INTRODUCTION

INTRODUCTION

- The processes that can be applied to data are of two types −

- **Arithmetic operations** − Examples include calculations like addition, subtraction, differentials, square root, etc.

- **Logical operations** − Examples include comparison operations like greater than, less than, equal to, opposite, etc.

INTRODUCTION

- Data : It is the collection of raw facts, figures & symbols.
- Ex : Names of students and their marks in different subjects listed in random order.

- Information : It is the data that is processed & presented in an organized manner.
- Ex : When the names of students are arranged in alphabetical order, total and average marks are calculated & presented in a tabular form, it is information.

- Program : Set of instructions that enables a computer to perform a given task.

Characteristics of a Computer

1. SPEED

- Typically, a computer can carry out 3-4 million instructions per second.

- A computer is a very fast device capable of data processing at unbelievable speed.
- It can perform in a few seconds the amount of work that a human being may not be able to do in an entire year even if he works day and night and does nothing else.
- Computers can process millions of instructions per second thus carrying out even the complex tasks in fractions of seconds without any mistake.
- While talking about the speed of a computer, we do not talk in terms of seconds or even milliseconds (10-3).
- Our units of speed are the microseconds (10-6), the nanoseconds (10-9), and even the picoseconds (10-12). A powerful computer is capable of performing about 3 to 4 million simple arithmetic operations per second.

Characteristics of a Computer

RELIABILITY

- Computers can carry out same type of work repeatedly without throwing up errors due to tiredness or boredom, which are very common among humans.

- Reliability of the computers is indeed very high.

- Modern electronic components have long failure free lives.
- A microprocessor chip is said to have a life of 40 years even under adverse conditions and much before it fails, it will become obsolete.

- Computers are also designed in modular form so as to make maintenance easy; when a component fails, it can be replaced or repaired at a minimal cost.

Characteristics of a Computer

ACCURACY

- In addition to speed, the computer has high accuracy in computing.
- The accuracy of a computer is consistently high and the degree of accuracy of a particular computer depends upon its design.
- But for a particular computer, each and every calculation is performed with the same accuracy.
- Errors can occur in a computer, but these are mainly due to human rather than technological weakness. The errors in computer are due to errors in programming and operation by human and due to inaccurate data.
- Computers exhibit a very high degree of accuracy. Errors that may occur are usually due to inaccurate data, wrong instructions or bug in chips – all human errors.

Characteristics of a Computer

VERSATILITY

- A computer is a very versatile machine.
- Versatility is one of the most wonderful features of the computer in the sense that they are not only capable of handling complex arithmetical problems, but can do equally well other number of jobs.
- They can perform activities ranging from simple calculations to performing complex CAD modeling and simulations to navigating missiles and satellites.
- In 7 other words, computers can be programmed to perform any task that can be reduced to a series of logical steps.
- Computers can communicate with other computers and can receive and send data in various forms like text, sound, video, graphics, etc.
- We, now, live in a connected world and all this is because of computers and other related technologies.
- Computers can carry out a wide range of work from data entry and ticket booking to complex mathematical calculations and continuous astronomical observations. If you can input the necessary data with correct instructions, computer will do the processing.

Characteristics of a Computer

STORAGE CAPACITY

- Computers can store a very large amount of data at a fraction of cost of traditional storage of files. Also, data is safe from normal wear and tear associated with paper.

- Computers have their main memory and auxiliary memory systems. A computer can store a large amount of data.

- With more and more auxiliary storage devices, which are capable of storing huge amounts of data, the storage capacity of a computer is virtually unlimited. The factor that makes computer storage unique is not that it can store vast amount of data, but the fact that it can retrieve the information that the user wants in a few seconds.

- Every piece of information can be retained as long as desired by the user and can be recalled as and when required. Even after several years, the information recalled is as accurate as on the day when it was fed to computer. A computer forgets or looses certain information only when it is asked to do so. So it is entirely up to the user to make a computer retain or forget particular information.

Classification of Computers

SUPER COMPUTERS

- The super computers are the most high performing system.

- A supercomputer is a computer with a high level of performance compared to a general-purpose computer.

MAINFRAME COMPUTERS

- These are commonly called as big iron, they are usually used by big organisations for bulk data processing such as statics, census data processing, transaction processing and are widely used as the severs as these systems has a higher processing capability as compared to the other classes of computers, most of these mainframe architectures were established in 1960s, the research and development worked continuously over the years and the mainframes of today are far more better than the earlier ones, in size, capacity and efficiency.
  Eg: IBM z Series, System z9 and System z10 servers.

MINI COMPUTERS

- These computers came into the market in mid 1960s and were sold at a much cheaper price than the main frames, they were actually designed for control, instrumentation, human interaction, and communication switching as distinct from calculation and record keeping, later they became very popular for personal uses with evolution.

- In the 60s to describe the smaller computers that became possible with the use of transistors and core memory technologies, minimal instructions sets and less expensive peripherals such as the ubiquitous Teletype Model 33 ASR.They usually took up one or a few inch rack cabinets, compared with the large mainframes that could fill a room, there was a new term “MINICOMPUTERS” coined Eg: Personal Laptop, PC etc.

MICRO COMPUTERS

- A microcomputer is a small, relatively inexpensive computer with a microprocessor as its CPU.
- It includes a microprocessor, memory, and minimal I/O circuitry mounted on a single printed circuit board.
- The previous to these computers, mainframes and minicomputers, were comparatively much larger, hard to maintain and more expensive.
- They actually formed the foundation for present day microcomputers and smart gadgets that we use in day to day life. Eg: Tablets, Smartwatches.

Basic Anatomy of the Computer

- The computer system consists of three units:
  1. Input device
- 2. Central Processing Unit (CPU)
- 3. Output device

BASIC ANATOMY OF THE COMPUTER

- 1.Input device
  - Reads information from input media and enters to the computer in a coded form
- 2.CPU
  - (a) Memory unit : Stores program and data
  - (b) Arithmetic Logic unit : Performs arithmetic and logical functions
  - (c) Control Unit : Interprets program instructions and controls the input and output devices
- 3. Output device : decodes information and presents it to the user

CPU

- Central Processing Unit: It is the part of the computer that carries out the instructions of a computer program. It is the unit that reads and executes program instructions.

- Hence it is known as the —brain‖ of the computer. The CPU consists of storage or memory unit, Arithmetic Logic Unit (ALU) and control unit.

CPU

(a). Memory Unit:

- It is also known as the primary storage or main memory.

- It stores data, program instructions, internal results and final output temporarily before it is sent to an appropriate output device.
- It consists of thousands of cells called ―storage locations‖ These cells activate with ―off-on‖ or binary digits(0,1) mechanism.
- Thus a character either a letter or numerical digit is stored as a string of (0,1) Binary digits (BITS).

- These bits are used to store instructions and data by their combinations.

CPU

(b) Arithmetic and Logical Unit(ALU):

- It is the unit where all Arithmetic operations (addition, subtraction etc.) and logical functions such as true or false, male or female are performed.
- Once data are fed into the main memory from input devices, they are held and transferred as needed to ALU where processing takes place.
- No process occurs in primary storage. Intermediate generated results in ALU are temporarily placed in memory until needed at later time.
- Data may move from primary memory to ALU and back again to storage many times before the process is finalized.

CPU

(c).Control Unit :

- It acts as a central nervous system and ensures that the information is stored correctly and the program instructions are followed in proper sequence as well as the data are selected from the memory as necessary.

- It also coordinates all the input and output devices of a system .

Input Devices

1. Keyboard:

- The Key board is used for typing text into the computer.
- It is also known as standard Input device.
- A computer keyboard is similar to that of a type writer with additional keys.
- The most commonly available computer keyboard has 104 keys.
- There are different types of keys on the keyboard. The keys are categorized as : Alphanumeric keys , including letters & numbers. Punctuation keys, such as colon (:), semicolon (;) Question mark (?), Single & double quotes (_,‖) Special keys such as arrow keys, control keys, function keys (F1 to F12), HOME, END etc.

Input Devices

2. Mouse:

- It is a device that controls the movement of the cursor on a monitor.
- A mouse will have 2 buttons on its top.
- The left button is the most frequently used button. There will be a wheel between the left and right buttons.
- This wheel enables us to smoothly scroll through screens of information. As we move the mouse, the pointer on the monitor moves in the same direction.
- Optical mouse is another advanced pointing device that uses a light emitting component instead of the mouse ball.
- Mouse cannot be used for entering the data. It is only useful to select the options on the screen.

Input Devices

3. Scanner:

- It is an input device that can read text or illustrations printed on paper and translate into digital form.
- The main advantage of these scanners is that the data need not be entered separately resulting in saving lot of time

Input Devices

- Scanners are of two types:
  - i) optical scanners
  - ii) MICR
- i) Optical scanners:
  - a. Optical character Recognition(OCR): In this, characters are read with the help of a light. This is used in office atomization, documentation in library etc.
  - b. Optical mark recognition(OMR): It is a technology where an OMR device senses the presence or absence of a mark such as a pencil mark. OMR is used in tests such as aptitude tests.
  - c. Optical barcode recognition(OBCR): Barcode readers are photoelectric scanners that read the bar codes or vertical zebra striped marks printed on product containers. This is used in super markets, book shops etc. ii. MICR: This is widely used in banks to process the cheques. This allows the computer to recognize characters printed using magnetic ink.

Input Devices

4. Magnetic Ink Character Recognition(MICR):

- It is a character recognition technology used primarily by the banking industry to facilitate the processing of the cheques.
- MICR characters (cheque No., Acc.No.etc) are printed in special ink usually containing iron oxide.
- When a document that contains the ink needs to be read, it passes through a machine which magnetizes the ink and there will be a reader sorter unit which translates the magnetic information into characters.
- MICR provides a secure, high speed of scanning and processing information. It scans about 2600 cheques/min.

Output devices

- Monitor
- Printer

Output devices

1 .Terminal/Monitor:

- It is similar to TV screen- either a monochrome (black & white) or colour – and it displays the output.
- It is also referred as Visual Display Unit(VDU). Several types of monitors are in use.
- Some of them are Colour Graphic Adapter(CGA), Enhanced Graphics Adaptor(EGA) , Video Graphics Adapter (VGA) and Super Video Graphics Adapter (SVGA).
- The screen sizes differ from system to system. The standard size is 24 lines by 80 characters.
- Most systems have provision for scrolling which helps in moving the text vertically or horizontally on the screen

Output devices

2 . Printer:

- A printer is used to transfer data from a computer onto paper. The paper copy obtained from a printer is often referred as ―printout‖.

- The different printers and their speeds are as follows: S. No. Type Mode of Printing Speed 1 Dot – Matrix printer Prints the character in dotted pattern through printer ribbon using either 24 pin or 9 pin 200/300 to 700 CPS 2 Ink Jet printer Work by spraying ionized ink Slow, 90 CPS 3 Laser printer Also called page printer.

- Uses laser beam to produce an image. 6 to 12 PPM 4 Line printer Prints lines at a time instead of single characters.

- 300 to 600 LPM 5 Plotter Produces drawings or graphs through pens which are filled with different colours. (CPS: Characters Per Second; PPM: Pages Per Minutes; LPM : Lines Per Minute)

Uses/ Banking

- Today, banking is almost totally dependent on computers.
- Online accounting facility, which includes checking current balance, making deposits and overdrafts, checking interest charges, shares, and trustee records.
- ATM machines which are completely automated are making it even easier for customers to deal with banks.

Insurance

- Procedure to continue with policies
- Starting date of the policies
- Next due installment of a policy
- Maturity date
- Interests due
- Survival benefits
- Bonus

Education

- The computer helps in providing a lot of facilities in the education system.
- The computer provides a tool in the education system known as CBE (Computer Based Education).
- CBE involves control, delivery, and evaluation of learning.
- Computer education is rapidly increasing the graph of number of computer students.
- There are a number of methods in which educational institutions can use a computer to educate the students.
- It is used to prepare a database about performance of a student and analysis is carried out on this basis.

MARKETING

- **Advertising** − With computers, advertising professionals create art and graphics, write and revise copy, and print and disseminate ads with the goal of selling more products.

- **Home Shopping** − Home shopping has been made possible through the use of computerized catalogues that provide access to product information and permit direct entry of orders to be filled by the customers.

HEALTHCARE

- **Diagnostic System** − Computers are used to collect data and identify the cause of illness.
- **Lab-diagnostic System** − All tests can be done and the reports are prepared by computer.
- **Patient Monitoring System** − These are used to check the patient's signs for abnormality such as in Cardiac Arrest, ECG, etc.
- **Pharma Information System** − Computer is used to check drug labels, expiry dates, harmful side effects, etc.
- **Surgery** − Nowadays, computers are also used in performing surgery.

UNIT III

- Data Communication
- Computer Network
- The Uses of a Network
- Types of Networks
- Network Topologies
- Transmission Media: Guided Transmission Media -Wireless Transmission

Data Communication

- **Data communication** refers to the exchange of data between a source and a receiver via form of transmission media such as a wired or wireless.

- Data communication is said to be local if communicating devices are in the same building or a similarly restricted geographical area.

Data Communication

- **Datum** mean the facts information statistics or the like derived by calculation or experimentation.

- The term **data** used to describe information, under whatever form of words you will be using.

Data Communication

- Characteristics
  - **Delivery**: The data must be deliver in correct order with correct destination.
  - **Accuracy**: The data must be deliver accurately.
  - **Timeliness**: The data must be deliver in a timely manner.late delivered Data useless.

Computer Network

- **Open system:**
  A system which is connected to the network and is ready for communication.

- **Closed system:**
  A system which is not connected to the network and can’t be communicated with.

Computer Network

Computer Network

- A **computer network** is a system in which multiple computers are connected to each other to share information and resources.
- Share resources from one computer to another.
- Create files and store them in one computer, access those files from the other computer(s) connected over the network.
- Connect a printer, scanner, or a fax machine to

THE NETWORK USES

- Hardware

  Computer Resources

  Disks

  Printers

- Software
  - Application software
  - Ms-word , Ms-Excel
  - Anti virus

THE NETWORK USES

- Communication
  - Email
  - Message broadcast

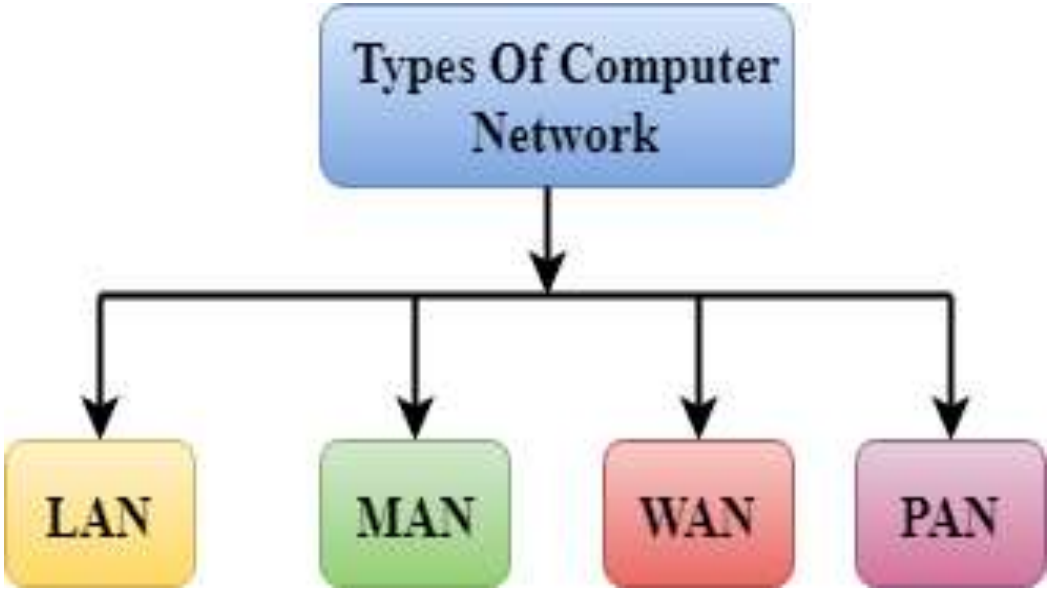
Types of Networks

- A computer network is a group of computers linked to each other that enables the computer to communicate with another computer and share their resources, data, and applications.

- A computer network can be categorized by their size. A **computer network** is mainly of **four types**:

  - LAN(Local Area Network)
  - PAN(Personal Area Network)

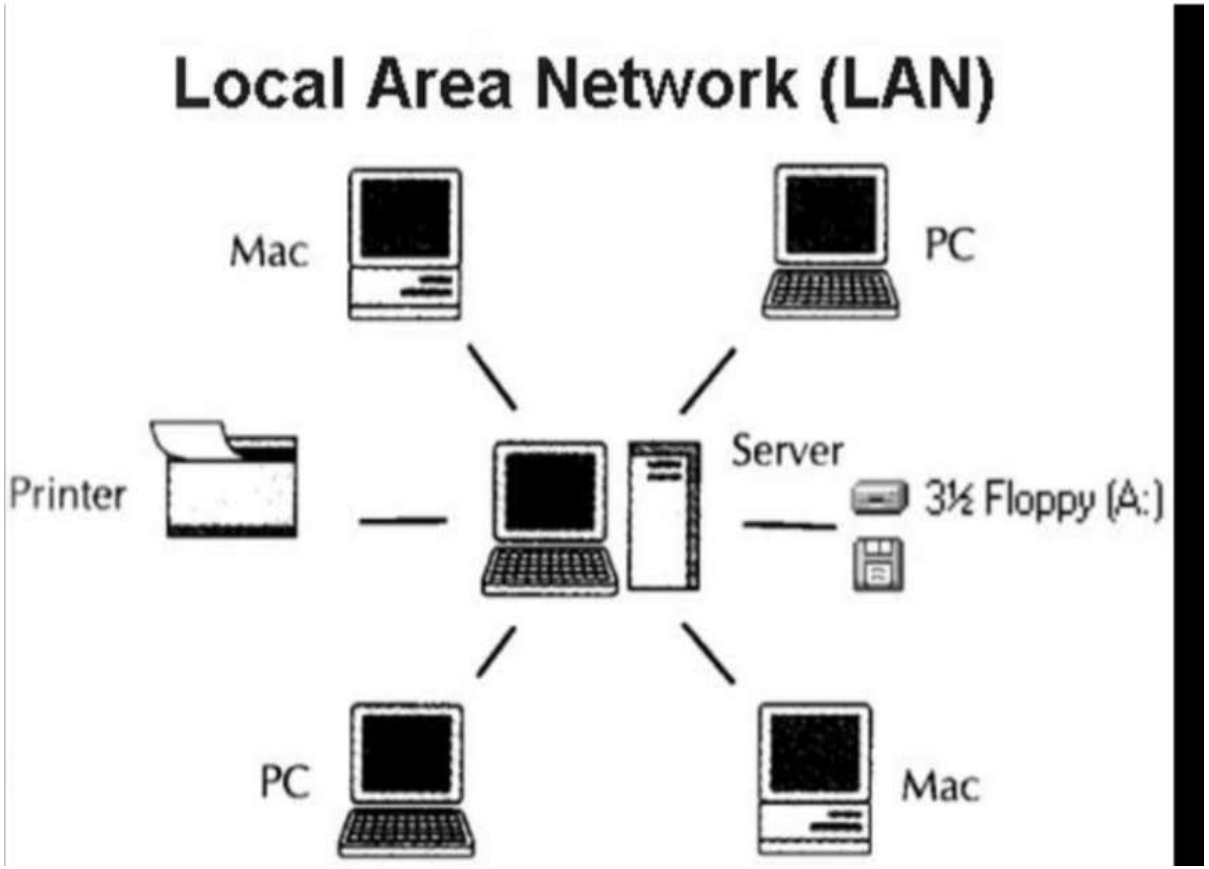
Types of Networks



LAN(Local Area Network)

- Local Area Network is a group of computers connected to each other in a small area such as building, office.
- LAN is used for connecting two or more personal computers through a communication medium such as twisted pair, coaxial cable, etc.
- It is less costly as it is built with inexpensive hardware such as hubs, network adapters, and ethernet cables.
- The data is transferred at an extremely faster rate in Local Area Network.

LAN


Local Area Network (LAN)
Mac
PC
Printer
Server
3½ Floppy (A:)
PC
Mac

PAN (Personal Area Network)

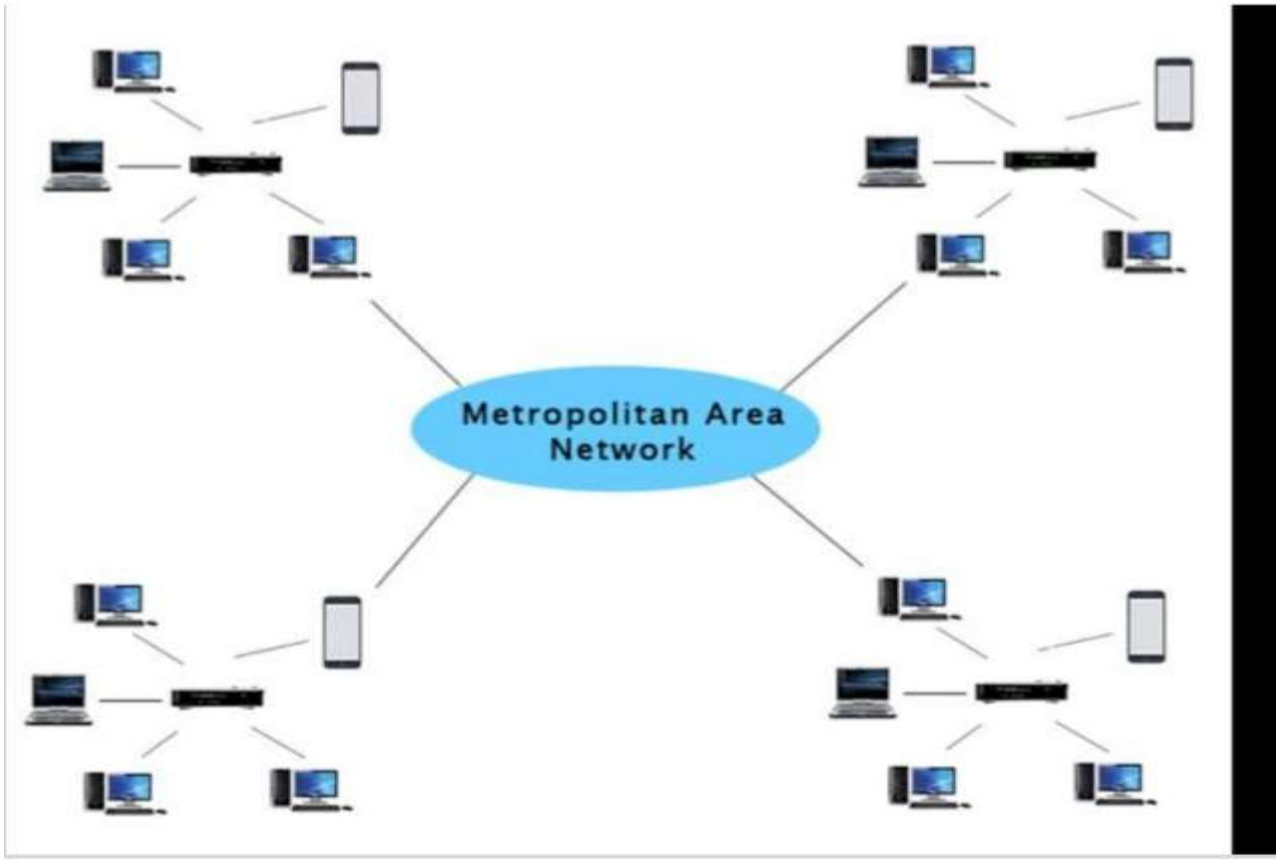
- Personal Area Network is a network arranged within an individual person, typically within a range of 10 meters.
- Personal Area Network is used for connecting the computer devices of personal use is known as Personal Area Network.
- Personal Area Network covers an area of **30 feet**.

PAN

MAN(Metropolitan Are Network)

- A metropolitan area network is a network that covers a larger geographic area by interconnecting a different LAN to form a larger network.
- Government agencies use MAN to connect to the citizens and private industries.
- In MAN, various LANs are connected to each other through a telephone exchange line.
- The most widely used protocols in MAN are RS-232, Frame Relay, ATM, ISDN, OC-3, ADSL, etc.
- It has a higher range than Local Area Network(LAN).

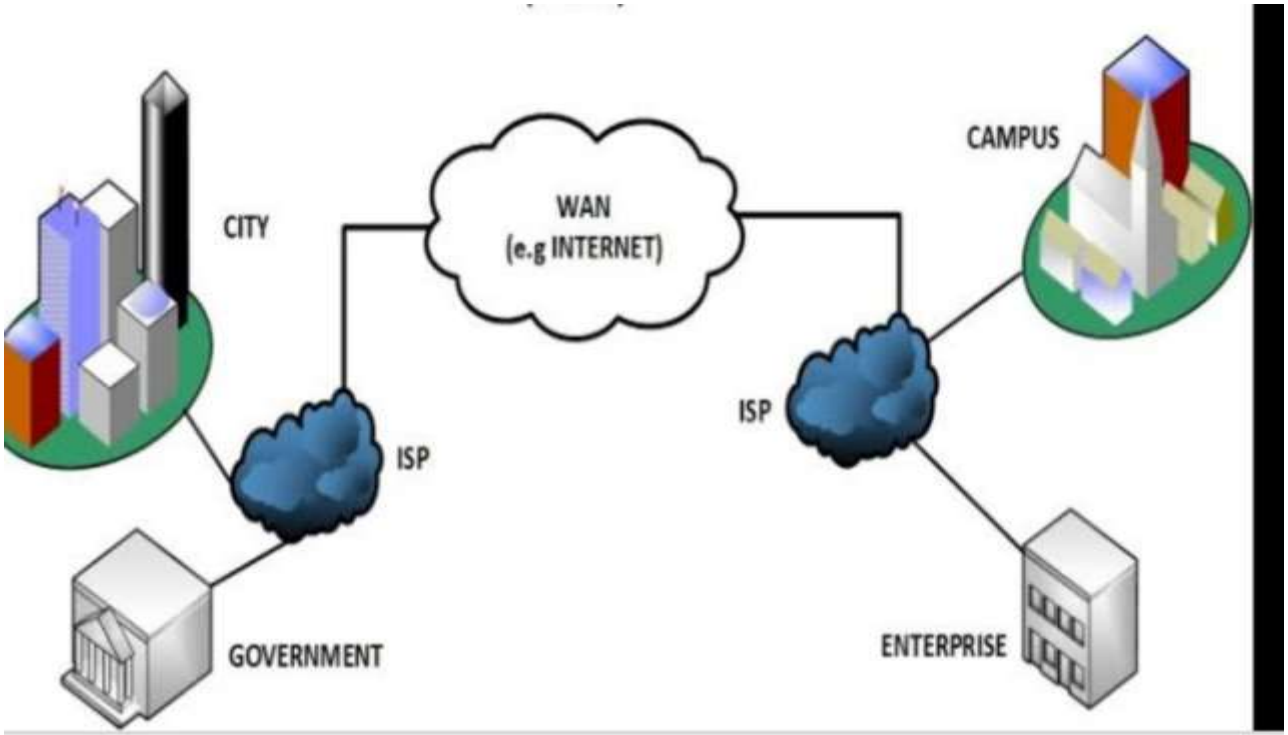
MAN



WAN(Wide Area Network)

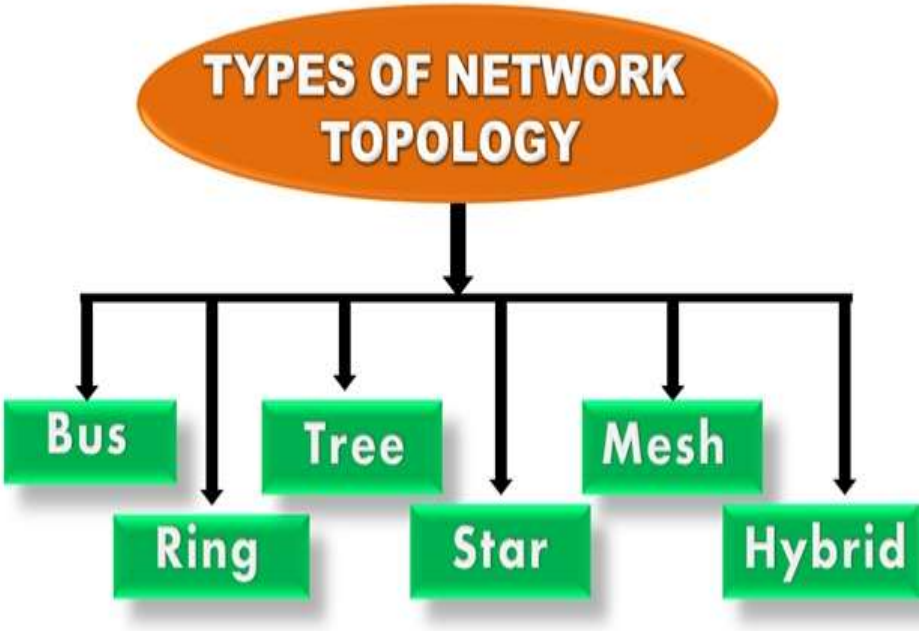
- A Wide Area Network is a network that extends over a large geographical area such as states or countries.
- A Wide Area Network is quite bigger network than the LAN.
- A Wide Area Network is not limited to a single location, but it spans over a large geographical area through a telephone line, fibre optic cable or satellite links.
- The internet is one of the biggest WAN in the world.

WAN



Network Topologies

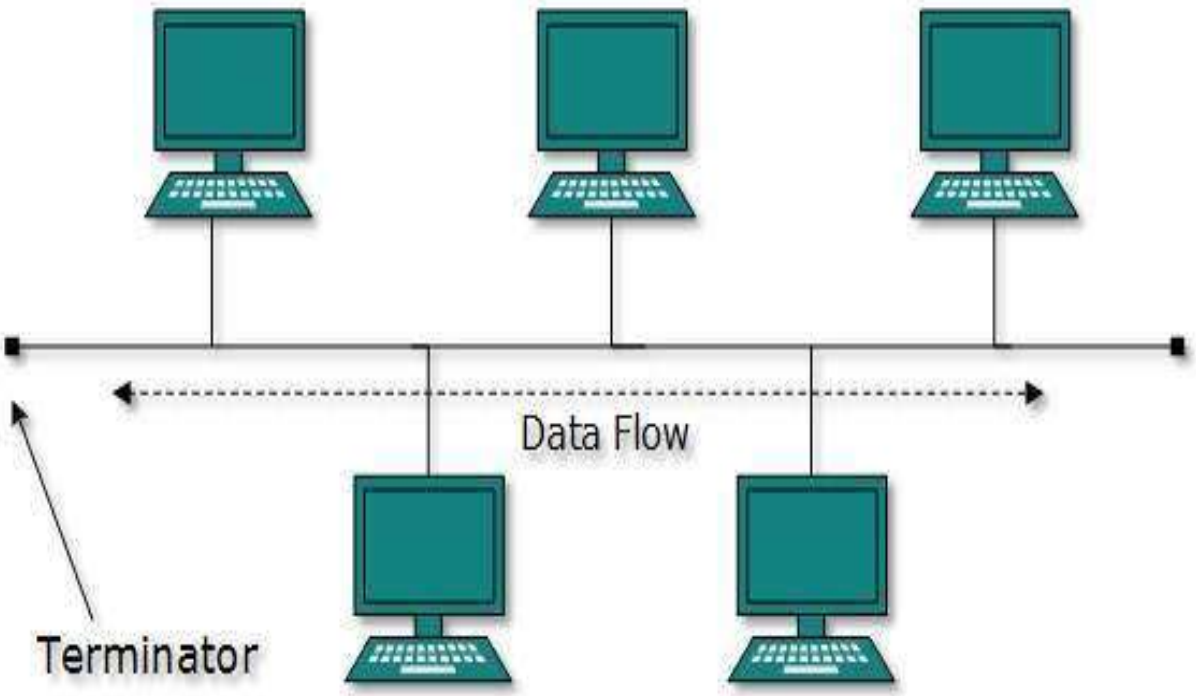
- Topology defines the structure of the network of how all the components are interconnected to each other.



Bus Topology

- In case of Bus topology, all devices share single communication line or cable.
- Bus topology may have problem while multiple hosts sending data at the same time.
- It is one of the simple forms of networking where a failure of a device does not affect the other devices. But failure of the shared communication line can make all other

Bus Topology

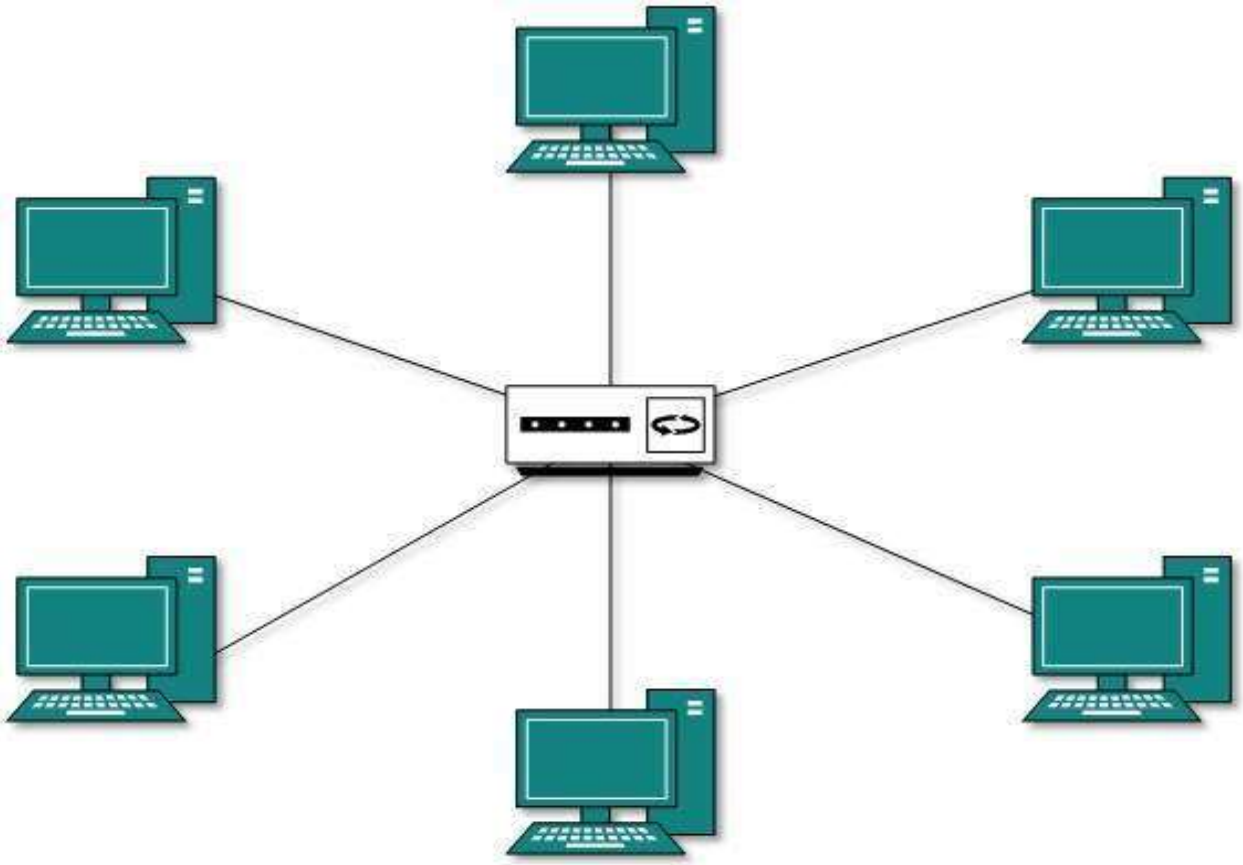


Star Topology

- All hosts in Star topology are connected to a central device, known as hub device, using a point-to-point connection.

- That is, there exists a point to point connection between hosts and hub.

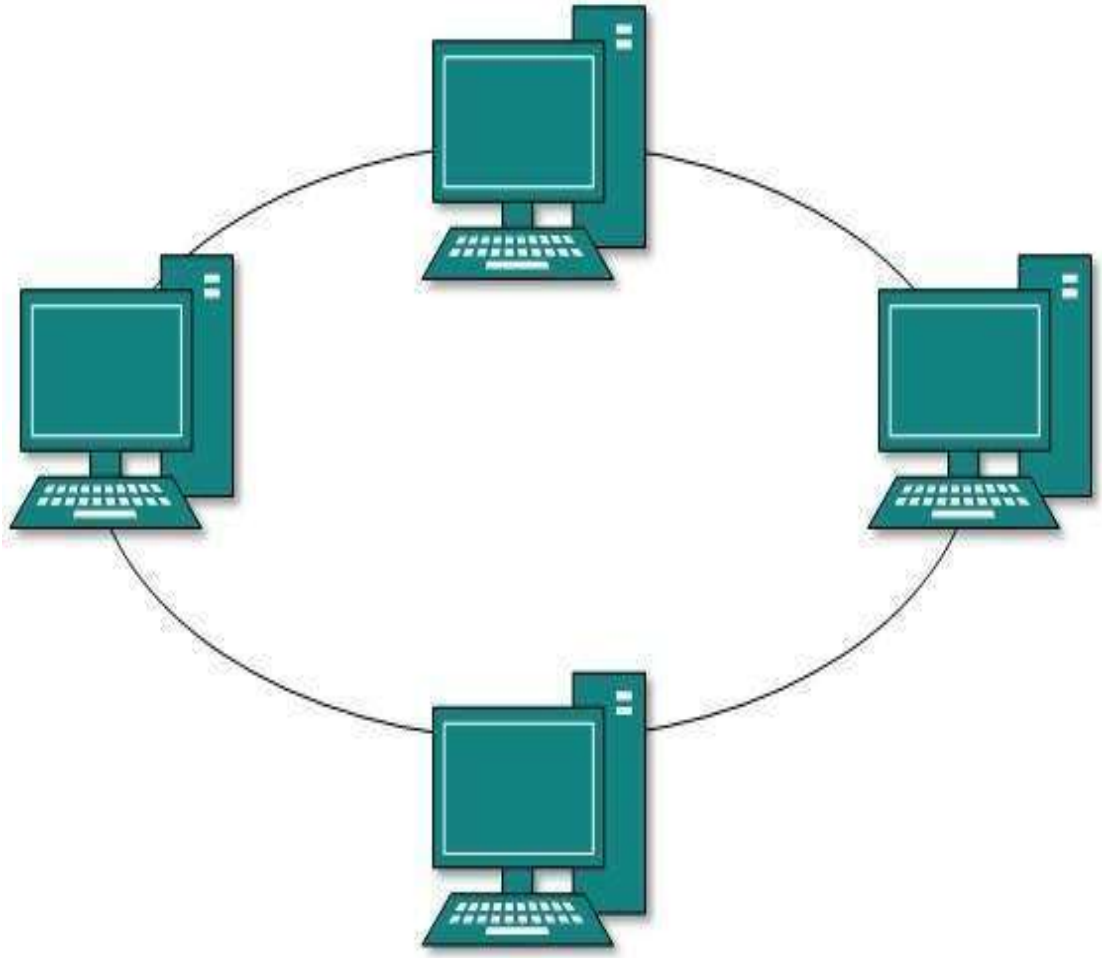
Star Topology



Ring Topology

- In ring topology, each host machine connects to exactly two other machines, creating a circular network structure.
- When one host tries to communicate or send message to a host which is not adjacent to it, the data travels through all intermediate hosts.

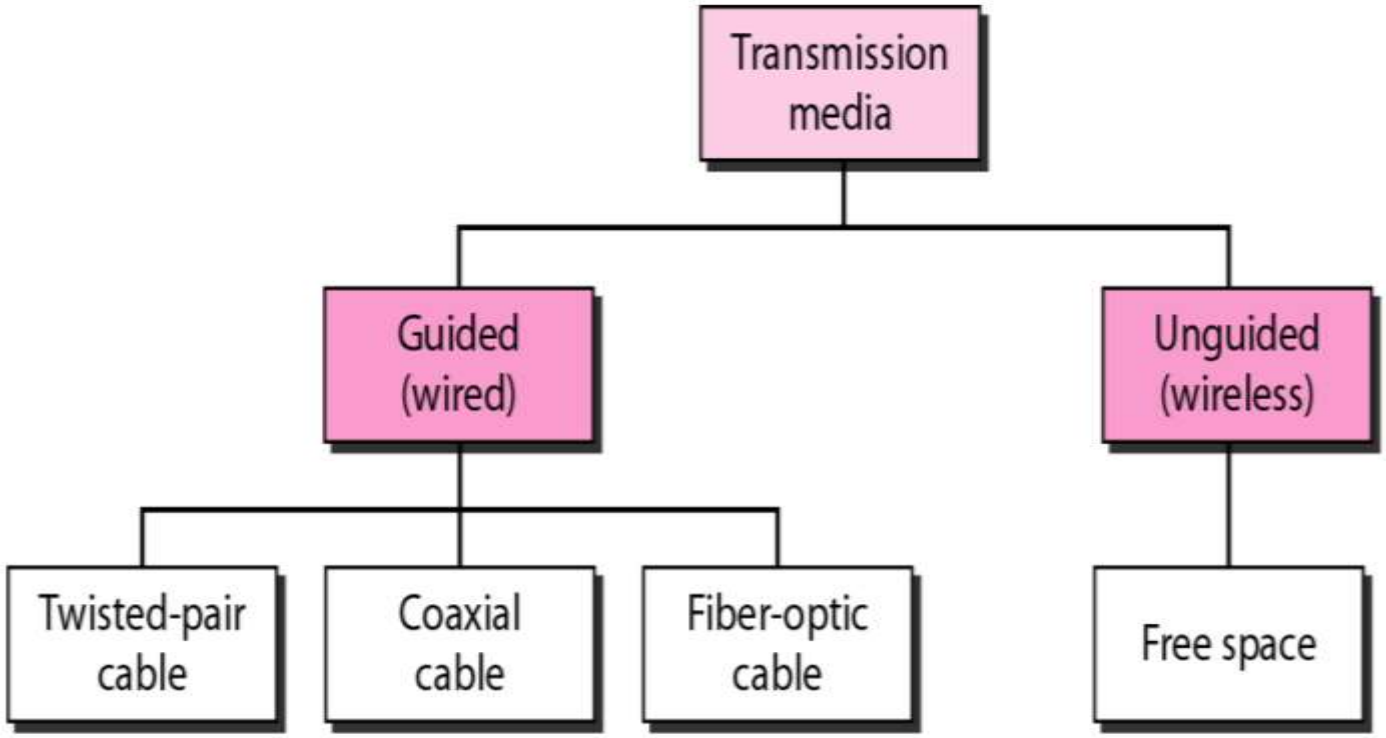
Ring Topology



Transmission Media

- The transmission medium can be defined as a pathway that can transmit information from a sender to a receiver.
- Transmission media are located below the physical layer and are controlled by the physical layer.
- Transmission media are also called communication channels.
- Transmission media are of two types −
  - Guided Transmission Medium

Transmission Media



GUIDED TRANSMISSION MEDIA

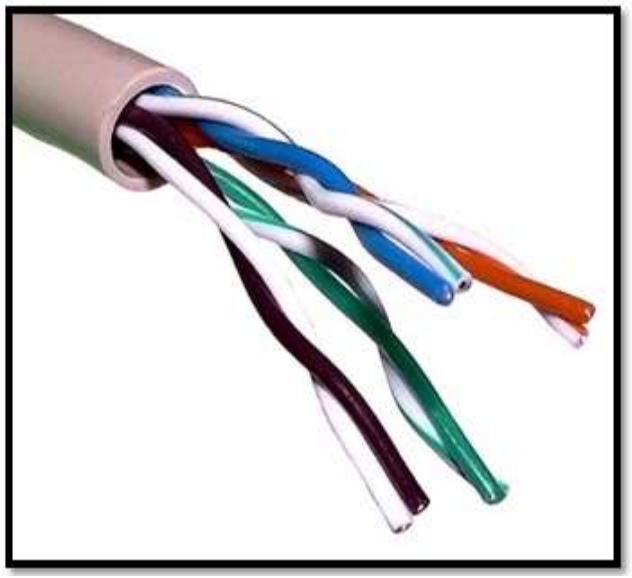
- Guided transmission media are also called **bounded media** or **wired media**.

- They comprise cables or wires through which data is transmitted.

TWISTED PAIR

- One of the earliest guided transmission media is twisted pair cables. A twisted pair cable comprises of two separate insulated copper wires, which are twisted together and run in parallel.
  - In telephone lines
  - In DSL lines
  - In LANs

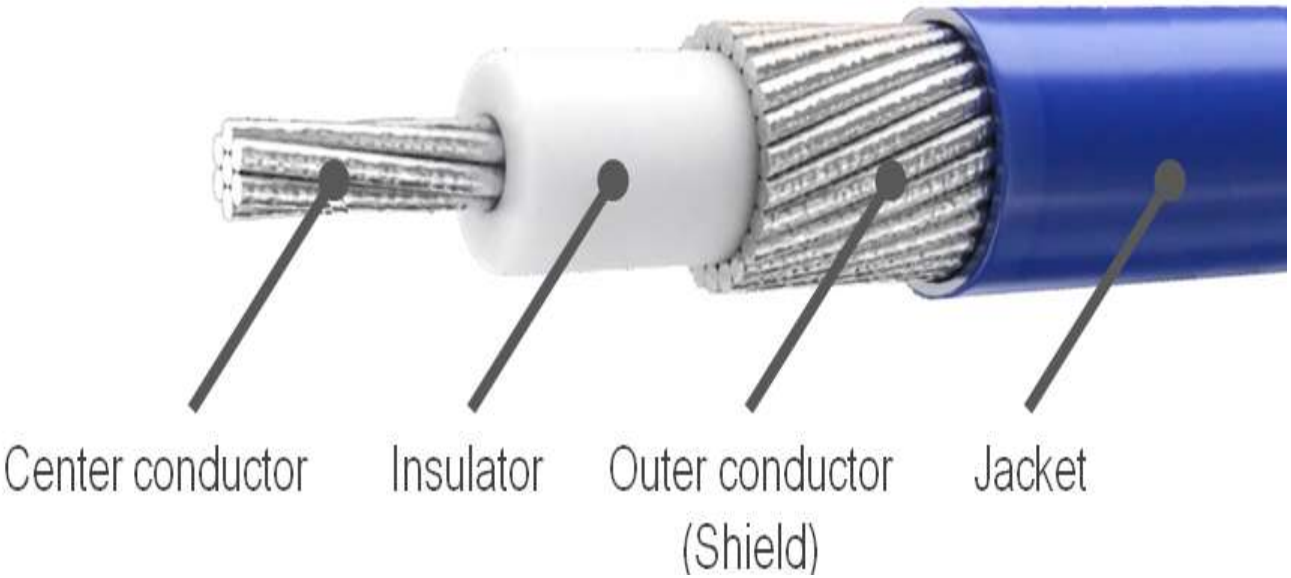
TWISTED PAIR



COAXIAL CABLE

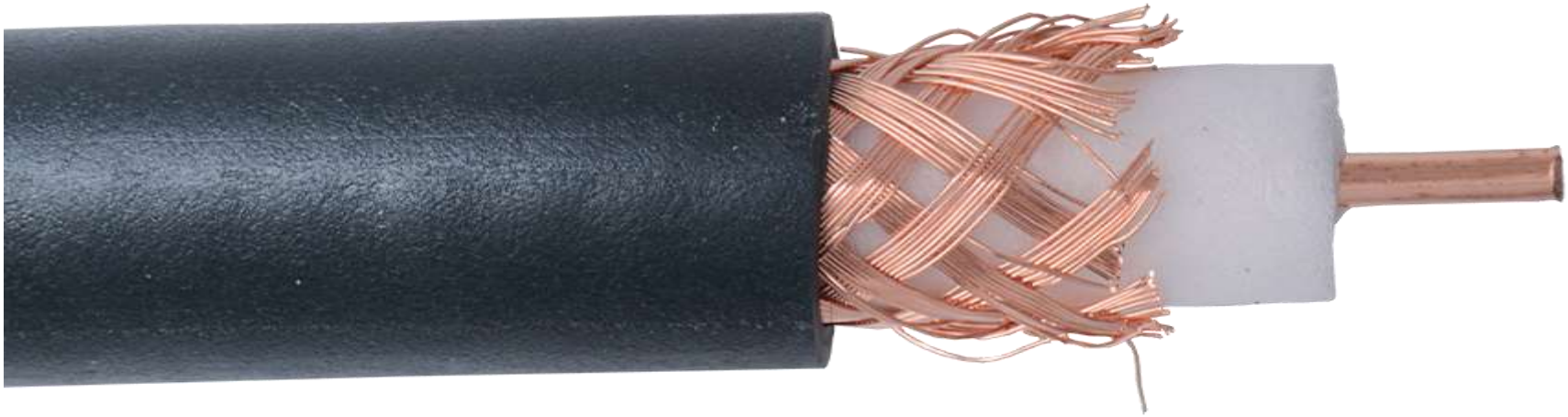
- Coax has a central core of stiff copper conductor for transmitting signals. This is covered by an insulating material.
- The insulator is encased by a closely woven braided metal outer conductor that acts as a shield against noise.
- The outer conductor is again enclosed by a plastic insulating cover

Cross-section image



BASE BAND COAXIAL CABLE

- A baseband coaxial cable transmits a single signal at a time at very high speed.



BROAD BAND COAXIAL CABLE

- A broadband coaxial cable can transmit many simultaneous signals using different frequencies.

SNo	Baseband	Broadband
1	Entire bandwidth of the cable is consumed by a signal	broadband transmission, signals are sent on multiple frequencies, allowing multiple signals to be sent simultaneously.
2	Digital signals	Analog signals
3	bi-directional transmission	unidirectional transmission
4	No Frequency division multiplexing possible	Frequency division multiplexing possible
5	Uses for short distance	Uses for long distance

THANK YOU