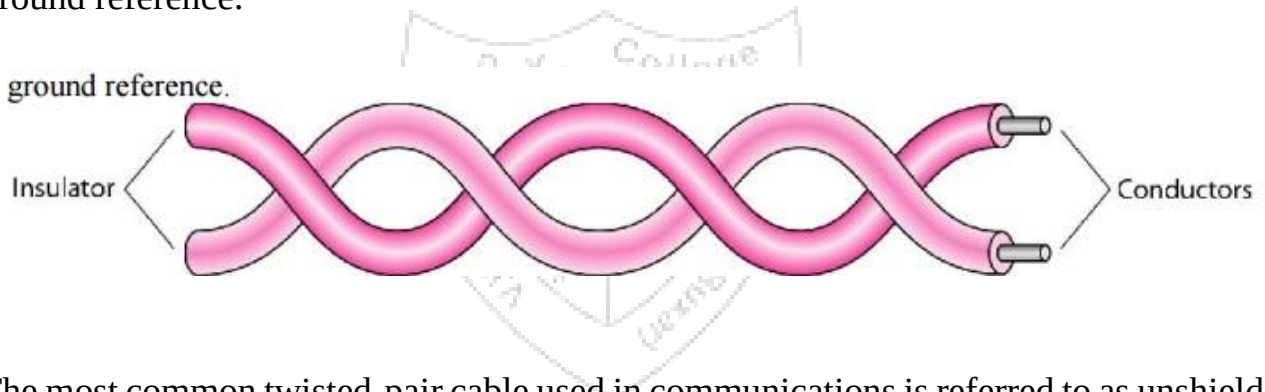
Connection: -

A connection is a term that describes the link between a plug or connector into a port or jack. For example, your monitor, mouse, and keyboard all must connect to the computer before they work.

1. **Guided media: -** Guided Media, which are those that provide a conduit from one device to another, include twisted- pair cable, coaxial cable, and fibre-optic cable. A signal traveling along any of these media is directed and contained by the physical limits of the medium. Twisted-pair and coaxial cable use metallic (copper) conductors that accept and transport signals in the form of electric current. Optical fibre is a cable that accepts and transports signals in the from of light.

A. Twisted- Pair Cable: - A twisted pair consists of two conductors (normally copper), each with its own plastic insulation, twisted together.

One of the wires is used to carry signals to the receiver, and the other is used only as a ground reference.



The most common twisted-pair cable used in communications is referred to as unshielded twisted-pair (UTP). IBM has also produced a version of twisted-pair cable for its use called shielded twisted-pair (STP). STP cable has a metal foil or braided mesh covering that encases each pair of insulated conductors. Although metal casing improves the quality of cable by preventing the penetration of noise or crosstalk, it is bulkier and more expensive.

B. Coaxial Cable: - Coaxial cable (or coax) carries signals of higher frequency ranges than those in twisted pair cable. It has a central core conductor of solid or stranded wire (usually copper) enclosed in an insulating sheath, which is, in turn, encased in an outer conductor of metal foil, braid, or a combination of the two. The outer conductor is also enclosed in an insulating sheath, and the whole cable is protected by a plastic cover.

Coaxial cables are categorized by their radio government (RG) ratings. Each RG number denotes a unique set of physical specifications, including the wire gauge of the inner conductor, the thickness and type of the inner insulator, the construction of the shield, and the size and type of the outer casing. Each cable defined by an RG rating is adapted for a specialized function.

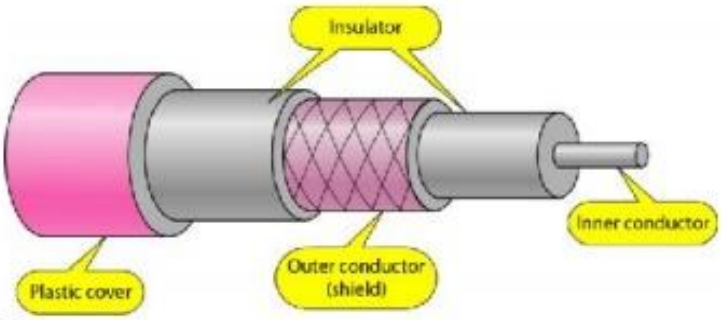


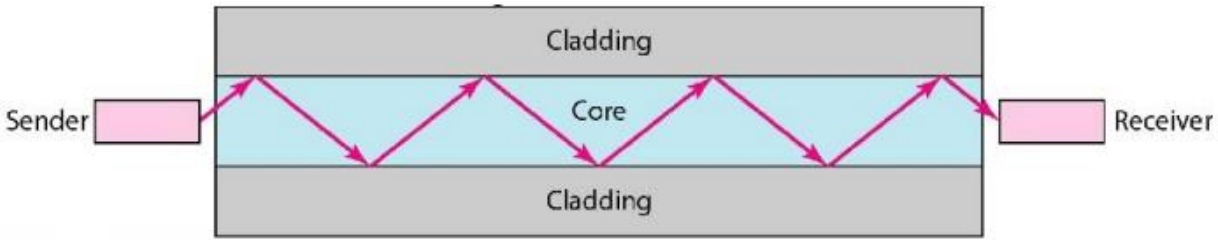
Figure.1.31. Coaxial cable

Table 1.1 Categories of coaxial cables

Category	*Impedance*	*Use*
RG-59	75 Ω	Cable TV
RG-58	50 Ω	Thin Ethernet
RG-11	50 Ω	Thick Ethernet

C. Fibre- Optic Cable: - A fibre-optic cable is made of glass or plastic and transmits signals in the form of light. Light travels in a straight line as long as it is moving through a single uniform substance. If a ray of light traveling through one substance suddenly enters another substance, then the ray changes direction.

Optical fibers use reflection to guide light through a channel. A glass or plastic core is surrounded by a cladding of less dense glass or plastic. The difference in density of the two materials must be such that a beam of light moving through the core is reflected off the cladding instead of being refracted into it



Current technology supports two modes (multimode and single mode) for propagating light along optical channels, each requiring fibre with different physical characteristics. Multimode can be implemented in two forms: step-index or graded-index.

2. **Unguided Media: -** It is also called wireless communication or unbounded transmission; they transmit electromagnetic waves without using a physical conductor. In this medium signals are radiated through the air (or, in a few cases, water) and therefore, are reaching to anyone with a device capable of accepting them.

   We can categorize wireless transmission into the following groups.

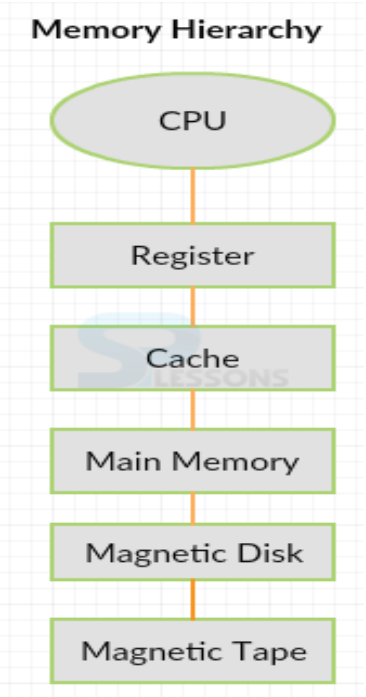
   A. Radio Waves: - Radio waves are electromagnetic waves and are omnidirectional. When an antenna transports radio waves they are propagated in all directions in free space which means the sending and receiving antennas do not have to be aligned that is any receiving antenna can receive that transmitted wave.

   B. Micro Waves: - Micro Waves includes a line of sight transmission that is the sending and receiving antennas that need to be properly aligned with each other. The distance is directly proportional to the height of the antenna which is covered by the signal. In mobile phone communication and television distribution, these are majorly used.

   C. Infrared Waves: - The frequency of Infrared waves is about 300 GHz to 430 THz, which can be used for short-range communication. Infrared waves of high frequencies cannot penetrate walls. This characteristic of Infrared waves prevents interference between one system and another. This means a short-range communication system in a room cannot be affected by another system in the adjacent room.
   If we are using the infrared remote control, we do not interfere with the use of the remote by our neighbours. However, by this characteristic, infrared signals become useless for long-range communication. Also, we cannot use infrared waves outside a building because the sun's rays contain infrared waves that can interfere with communication.

Memory and Storage Device:

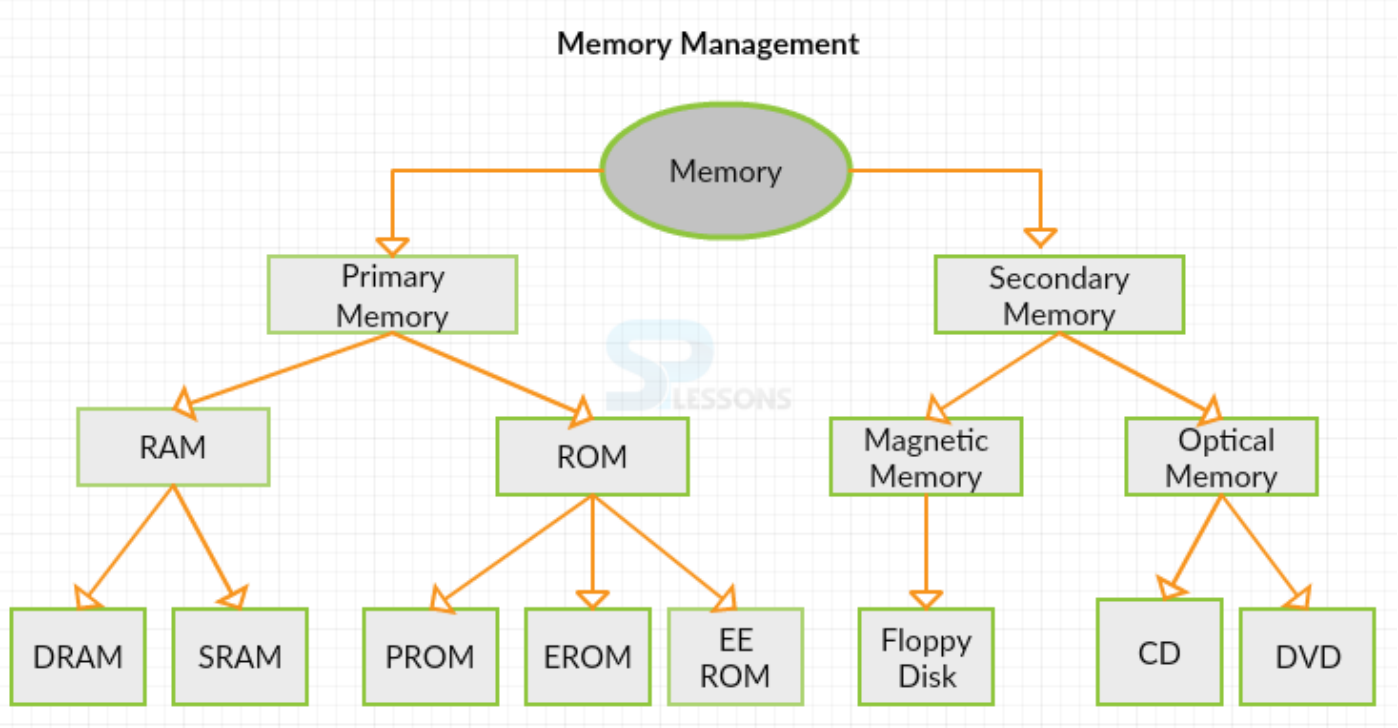
Storage devices are any type of hardware that is capable of storing and retrieving data. Most often these devices come in the form of hard drives or optical discs. There are two main categories of storage devices. Primary storage, such as RAM, is used by computer systems to temporarily store and retrieve data. Secondary storage devices, such as hard drives stores data permanently.



- Register can set flip- flops. These are very close to the CPU. The register is the fastest memory.
- Cache memory can store important data, i.e., highly executed data. It is the fast and smallest memory.
- It stores the data for immediate manipulations.

There are Two types of storage memory:

1) **Primary Memory and**
2) **Secondary Memory**



Primary Memory: - It is also called as the main memory of the computer. It stores the instructions, operating system and data which required to run the computer. There are two types of primary memories.

- **RAM (Random Access Memory)**
- **ROM (Read Only Memory)**

RAM: - RAM Stands for "*Random Access Memory*". It performs both read and writes operations on memory. It stores data for temporally. If power failures happened in systems during memory access then you will lose your data permanently. So, RAM is a volatile memory. RAM categorized into following types.

- DRAM
- SRAM
- RDRAM

- **DRAM: -** DRAM Stands for" Dynamic *RAM"*. Dynamic RAM: Dynamic random-access memory (DRAM) is a type of random-access memory used in computing devices. It is made up of capacitors and transistors. DRAM stores each bit of data in a separate capacitor or transistors and it has two states of value in one bit called 0 and 1.
  - ♦ DRAM is less expensive to produce than other RAMs.
  - ♦ DRAM writes data at the byte-level and reads at the multiple-byte page level.
  - ♦ DRAM requires less power than other RAMs.
  - ♦ Static RAM.

- **SRAM: -** SRAM Stands for *"Static RAM"*. Static RAM: Static random-access memory (SRAM) is a type of RAM that holds data in a static form, that is, as long as the memory has power.as dynamic RAM, it does not need to be refreshed.
    - ♦ Static RAM provides faster access to data and is more expensive than DRAM.
    - ♦ It is an expensive memory in which each cell must contain multiple transistors.
    - ♦ SRAM is also highly recommended for use in PCs, peripheral equipment, printers, LCD screens, hard disk buffers, router buffers and buffers in CDROM / CDRW drives.
    - ♦ Static RAM does not use capacitors. The cache memory is implemented in the cache memory. It is an expensive memory in which each cell must contain multiple transistors.
- **RDRAM: -** RDRAM Stands for *"Rambus Dynamic RAM"*. Rambus Dynamic RAM: Rambus Dynamic Random-Access Memory (RDRAM) is a memory subsystem designed to transfer data at faster rates. RDAM is made up of a random-access memory (RAM), a RAM controller and a bus path that connect RAM to microprocessors and other PC devices. RDRAM is also known as Direct RDRAM or Rambus.
    - ♦ RDRAM densities are 128 Mbit and 256 Mbit.
    - ♦ It is used in Video game consoles because its transfer rate of data is high compared all types of RAMs.

ROM: - ROM Stands for Read-Only Memory, stores information that can only be read. Modifying the data is difficult. ROM is also a type of non-volatile storage, which means that the information is stored even if the component loses power.
There are few basic ROM types:

- PROM
- EPROM
- EEPROM
- Flash EEPROM Memory

- **PROM: -** PROM: Creating ROM chips from scratch is time-consuming and very expensive in small quantities. For this reason, developers created a type of ROM known as programmable read-only memory (PROM). Blank PROM chips can be bought in low cost and coded by the user with a programmer while buffering.
    - ♦ It is used in digital electronic devices to store permanent data.
    - ♦ It is available in low cost as compared to other RAMs.

- **EPROM: -** EPOM (erasable programmable read-only memory) is programmable read-only memory (programmable ROM) that can be erased and re-used and it is a non-volatile memory. We can erase the data in this EPROM by using high voltage Ultraviolet light.
    - ♦ In EPROM we need to erase each and every cell.
    - ♦ We can't erase data in RAM, PROM only we can erase data in EPROM.

- **EEPROM: -** EEPROM (Electrically Erasable Programmable Read Only Memory) this can be erased and reprogrammed using an electrical charge. EEPROM was a replacement for PROM and EPROM chips and later it is used for computer's BIOS.
    - ♦ EEPROM requires data to be written or erased one byte at a time.
    - ♦ EEPROM are used to store configurations parameters and in modern computers, they replaced BIOS CMOS memory.

- **Flash EEPROM Memory: -** Flash memory is a type of non-volatile memory that erases data in units called blocks. A block stored on a flash memory chip must be erased before data can be written or programmed to the microchip.
    - ♦ It is more expensive than other hard drives and RAMSs.
    - ♦ It can be erased only limited number of times.

Secondary Memory Device and their storage method and capacity.

Secondary Memory Device	Storage	Capacity
Floppy Disk (5.25 inches)	Magnetic	1.2MB
Floppy Disk (3.5 inches)	Magnetic	1.44 MB
Floppy Disk (3.55 inches)	Magnetic	80 KB to 242 KB
Hard Disk	Magnetic	Up-to 1 TB
CD- ROM	Optical	640 MB to 680 MB
DVD- ROM	Optical	47 GB to 17 GB
Pen- Drive	Solid State	1 GB to 512 GB
Magnetic Tape	Magnetic	Up-to 1TB

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