

**PART-7***Physical Layer Transmission Media.***CONCEPT OUTLINE**

- Transmission medium is a physical path between transmitter and receiver in a data transmission system.
- Transmission media can be classified as :
  - i. Guided media
  - ii. Unguided media

**Questions-Answers****Long Answer Type and Medium Answer Type Questions**

**Que 1.14.** What do you mean by transmission media ? Discuss the types of transmission media.

**OR**

Discuss the different physical layer transmission media.

**AKTU 2017-18, Marks 10**

**AKTU 2014-15, Marks 05**

**Answer**

Transmission media is a pathway that carries the information from sender to receiver.

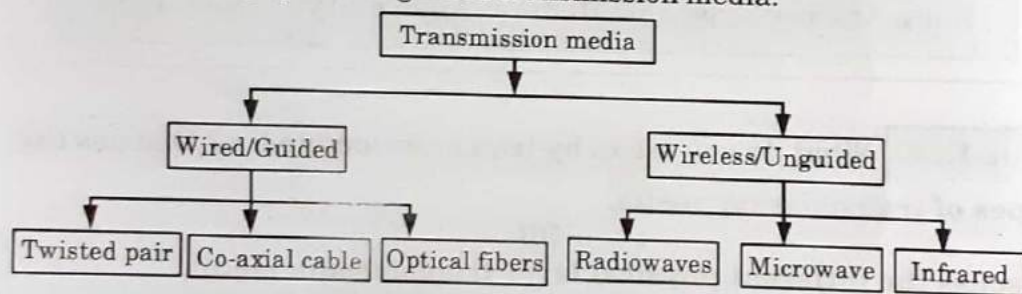
1. We use different types of cables or waves to transmit data.
2. Data is transmitted normally through electrical or electromagnetic signals.
3. An electrical signal is in the form of current.
4. An electromagnetic signal is series of electromagnetic energy pulses at various frequencies.
5. These signals can be transmitted through copper wires, optical fibers, atmosphere, water and vacuum.
6. Different media have different properties like bandwidth, delay, cost and ease of installation and maintenance.
7. Transmission media is also called communication channel.

**Types of transmission media are :****1. Wired or guided media or bound transmission media :**

- a. Guided transmission media are the cables that are tangible or have physical existence and are limited by the physical geography.
- b. Popular guided transmission media in use are twisted pair cable, co-axial cable and optical fiber cable.
- c. Each of them has its own characteristics like transmission speed, effect of noise, physical appearance, cost etc.

**2. Wireless or unguided media or unbound transmission media :**

- a. Unguided transmission media are the ways of transmitting data without using any cables.
- b. These media are not bounded by physical geography.
- c. This type of transmission is called wireless communication.
- d. This transmission uses microwave, radiowave, infrared which are some of popular unguided transmission media.

**Fig. 1.14.1.**

**Que 1.15.** Write a short note on following :

- a. Twisted pair cable
- b. Co-axial cable
- c. Optical fiber cable

OR

What are the different types of guided media ?

**Answer**

- a. Twisted pair cable :

**Fig. 1.15.1. Twisted pair cable**

- i. The wires are twisted together in pairs.
- ii. Each pair would consist of wire used for the positive data signal and a wire used for the negative data signal. Any noise that appears on positive/negative wire of the pair would occur on the other wire.



- iii. Because the wires are opposite polarities, they are 180 degrees out of phase (180 degree phases or definition of opposite polarity) when the noise appears on both wires, it cancels or nulls itself out at the receiving end.
- iv. Twisted pair cables are most effectively used in a system that uses a balanced line method of transmission.



Fig. 1.15.2. Unshielded twisted pair cable.

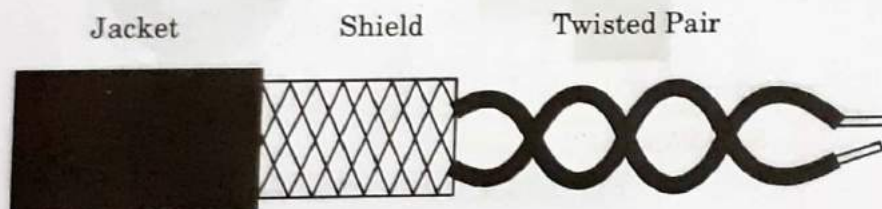


Fig. 1.15.3. Shielded twisted pair cable.

- v. Cables with the shield are called shielded twisted pair and commonly abbreviated STP.
- vi. Cables without a shield are called unshielded twisted pair or UTP.
- vii. Twisting the wires together results in characteristics impedance for the cable.
- viii. UTP or unshielded twisted pair cable is used on Ethernet.
- ix. UTP cables are used for Ethernet cabling where four twisted pair cables (a total of 8 wires are used).

**b. Co-axial cable :**

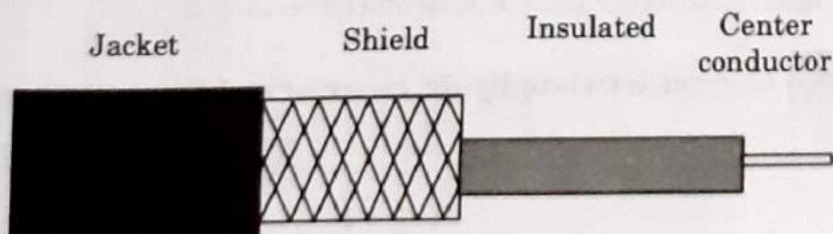
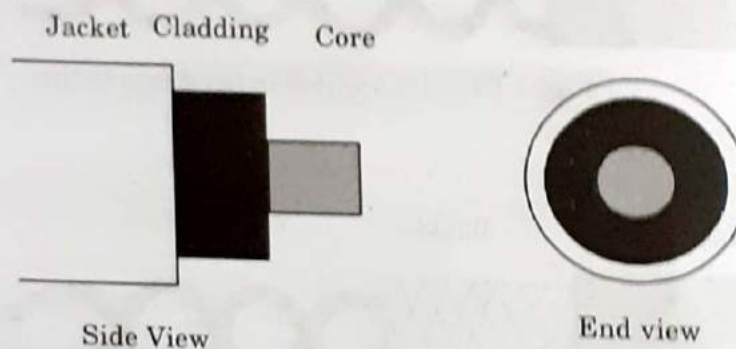


Fig. 1.15.4. Co-axial cable.

- i. Co-axial cable consists of two conductors.

- ii. The inner conductor is contained inside the insulator with the other conductor weaves around it providing a shield.
- iii. An insulating protective coating called a jacket covers the outer conductor.
- iv. The outer shield protects the inner conductor from outside electrical signals.
- v. The distance between the outer conductor (shield) and inner conductor plus the type of material used for insulating the inner conductor determine the cable properties or impedance.

**c. Optical fiber cable :**



**Fig. 1.15.5.** Optical fiber cable.

- i. Optical fiber consists of thin glass fiber that can carry information at frequencies in the visible light spectrum.
- ii. The typical optical fiber consists of a very narrow strand of glass called the cladding.
- iii. A typical core diameter is 62.5 microns.
- iv. Typically cladding has a diameter of 125 microns. Coating the cladding is a protective coating consisting of plastic, it is called the jacket.
- v. The device generating the message has it in electromagnetic form (electrical signal); this has to be converted into light (*i.e.*, optical signal) to send it on optical fiber cable. The process of converting light to electric signal is done on the receiving side.

**Que 1.16.** Compare twisted pair, co-axial and fiber optic cable.

AKTU 2013-14, Marks 05