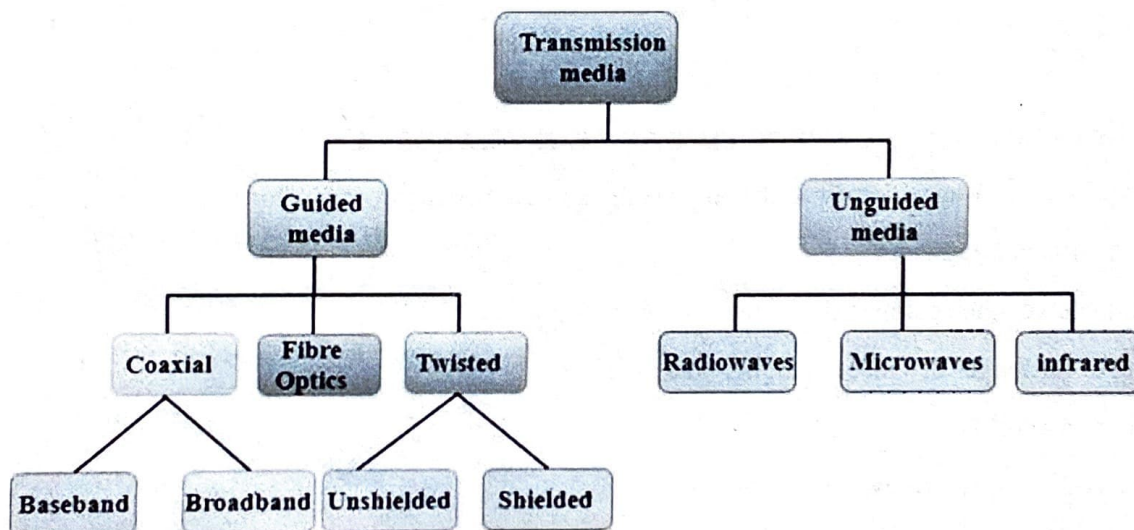


## Program 5

**Aim:-Familiarization with Transmission media and Tools Coaxial cable, UTP Cable, Crimping Tools, Connectors etc.**

### Transmission Medium:

A communication channel that is used to carry the data from one transmitter to the receiver through the electromagnetic signals. The main function of this is to carry the data in the bits form through the Local Area Network(LAN). In data communication, it works like a physical path between the sender & receiver. For instance, in a copper cable network the bits in the form of electrical signals whereas in a fiber network, the bits are available in the form of light pulses. The quality as well as characteristics of data transmission, can be determined from the characteristics of medium & signal. The properties of different transmission media are delay, bandwidth, maintenance, cost and easy installation.



### Bounded/Guided Transmission Media:

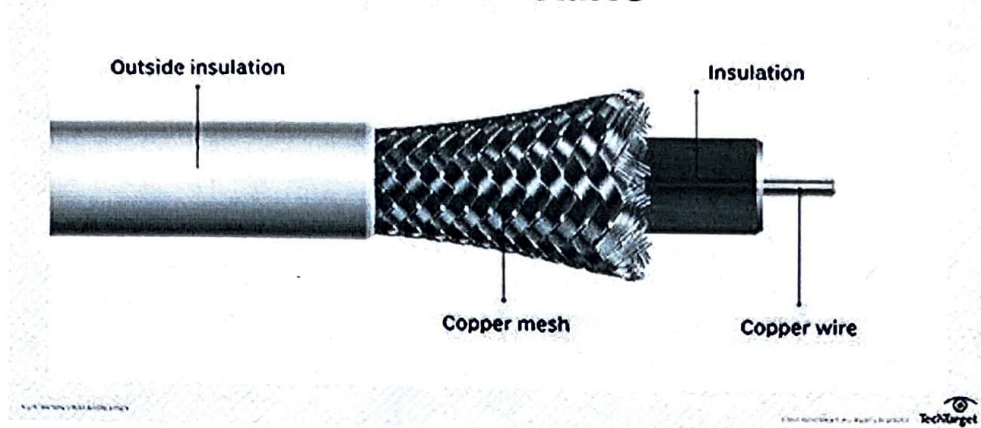
This kind of transmission media is also known as wired otherwise bounded media. In this type, the signals can be transmitted directly & restricted in a thin path through physical links.

The types of Bounded /Guided transmission are discussed below.

#### 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 cable



### Applications:

1. Coaxial cable was widely used for both analog and digital data transmission.
2. It has higher bandwidth.
3. Inexpensive when compared to fiber optical cables.
4. It uses for longer distances at higher data rates.
5. Excellent noise immunity.
6. Used in LAN and Television distribution.

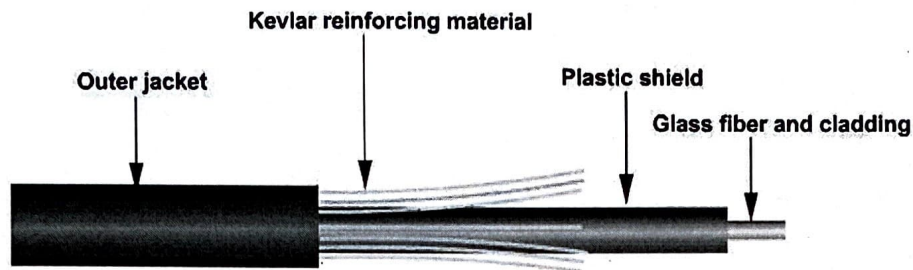
### Disadvantage :

1. Single cable failure can fail the entire network.
2. Difficult to install and expensive when compared with twisted pairs.
3. If the shield is imperfect, it can lead to grounded loop.

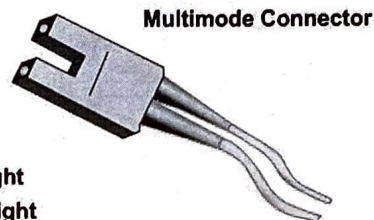
### Fibre Optic Cable:

A fiber optic cable is a network cable that contains strands of glass fibers inside an insulated casing. They're designed for long-distance, high-performance data networking, and telecommunications. Compared to wired cables, fiber optic cables provide higher bandwidth and transmit data over longer distances. Fiber optic cables support much of the world's internet, cable television, and telephone systems.

# Fiber Optic Cable



Speed and throughput:	100+ Mbps
Average \$ per node:	Most Expensive
Media and connector size:	Small
Maximum cable length:	up to 2 Km
Single mode:	One stream of laser-generated light
Multimode:	Multiple streams of LED-generated light



## Advantages of Fiber Optic Cables:

1. The loss of signal in optical fiber is less than that in copper wire.
2. Optical fibers usually have a longer life cycle for over 100 years.

## Disadvantage:

1. It is expensive.
2. Difficult to install.

## Twisted pair cable:

A twisted pair cable is a type of cable made by putting two separate insulated wires together in a twisted pattern and running them parallel to each other. This type of cable is widely used in different kinds of data and voice infrastructures.

## Twisted pair is of two types:

1. Shielded Twisted Pair (STP)
2. Unshielded Twisted Pair (UTP)

## Shielded Twisted Pair:

Shielded Twisted Pair (STP) cables additionally have an overall conducting metallic shield covering four twisted pair wires. There may be another conducting metallic shield covering



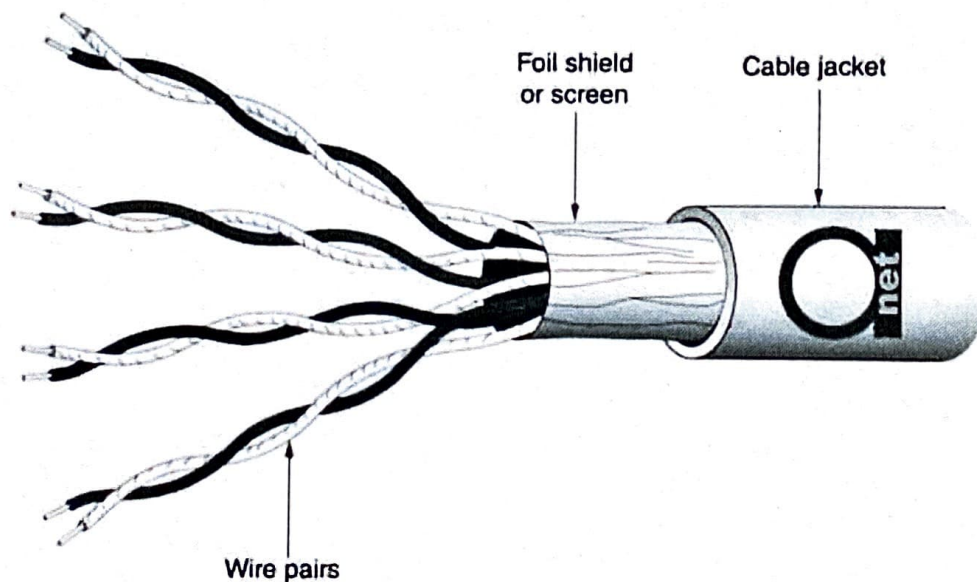
individual twisted pairs also. These metallic shields block out electromagnetic interference to prevent unwanted noise from the communication circuit.

### **Advantage of Shielded Twisted Pair:**

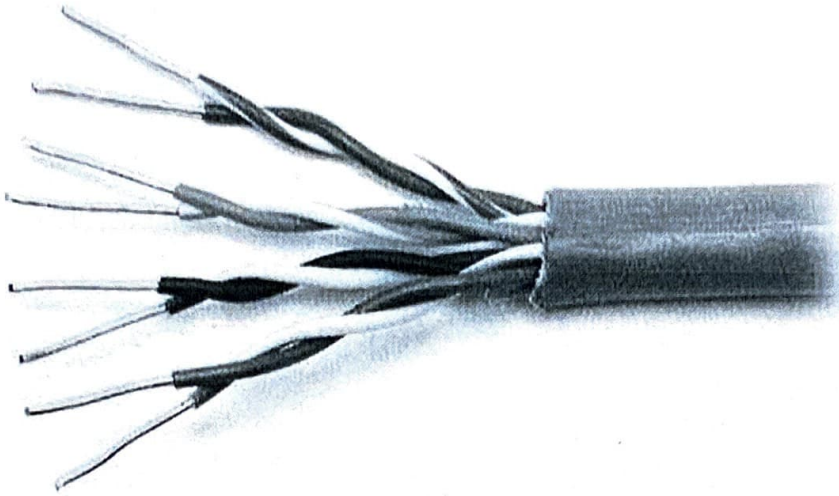
- 1.The cost of the shielded twisted pair cable is not very high and not very low.
- 2.An installation of STP is easy.
- 3.It has higher capacity as compared to unshielded twisted pair cable.
- 4.It has a higher attenuation.
- 5.It is shielded that provides the higher data transmission rate.

### **Disadvantages:**

- 1.It is more expensive as compared to UTP and coaxial cable.
- 2.It has a higher attenuation rate.



### **Unshielded Twisted Pair(UTP):**



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### **Unbounded/Unguided Transmission Media:**

Unguided medium transport electromagnetic waves without using a physical conductor. This type of communication is often referred to as wireless communication. Signals are normally broadcast through free space and thus are available to anyone who has a device capable of receiving them.

#### **Types of unguided Transmission media:**

##### **✓ Radio Transmission:**

Its frequency is between 10Khz to 1Ghz. It is simple to install and has high attenuation. These waves are used for multicast communication.

#### **Types of propagation:**

1. Troposphere
2. Ionosphere

#### **Microwaves:**

It is a line of sight transmission i.e. the sending and receiving antennas need to be properly aligned with each other. The distance covered by the signal is directly proportional to the height of the antenna. Frequency Range: 1GHz – 300GHz. These are majorly used for mobile phone communication and television distribution.

#### **Infrared:**

Infrared waves are used for very short distance communication. They cannot penetrate through

An unshielded twisted pair is widely used in telecommunication. It is most common type when compared with shielded twisted pair cable which consists of two conductors usually copper, each with its own colour plastic insulator.

### **Categories:**

Category 1: Category 1 is used for telephone lines that have low-speed data.

Category 2: It can support up to 4Mbps.

Category 3: It can support up to 16Mbps.

Category 4: It can support up to 20Mbps. Therefore, it can be used for long-distance communication.

Category 5: It can support up to 200Mbps.

*Category 6 1000 Mbps*

### **Advantages Of Unshielded Twisted Pair:**

1. It is cheap.
2. Installation of the unshielded twisted pair is easy.
3. It can be used for high-speed LAN.

### **Disadvantage:**

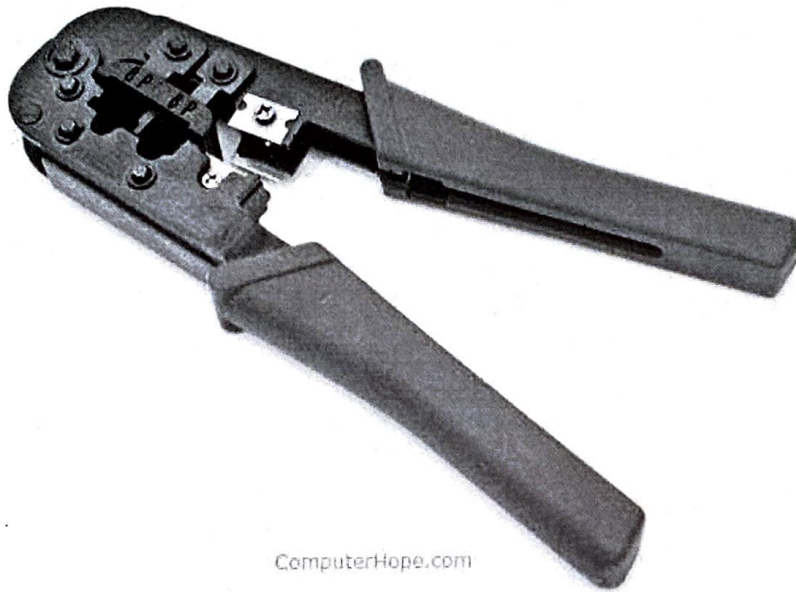
1. This cable can only be used for shorter distances because of attenuation.

obstacles. This prevents interference between systems. Frequency Range:300GHz – 400THz. It is used in TV remotes, wireless mouse, keyboard, printer, etc.

### **Crimping tool:**

A **crimping tool** is a device used to conjoin two pieces of metal by deforming one or both of them to hold each other. The result of the tool's work is called a **crimp**. An example of crimping is affixing a connector to the end of a cable. For instance, network cables and phone cables are created using a crimping tool (shown below) to join RJ-45 and RJ-11 connectors to both ends of phone or Cat 5 cable.

RJ-11 (6-Pin) and RJ-45 (8-Pin) Crimping Tool



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### **Connector:**

A device that terminates a segment of cabling or provides a point of entry for networking devices such as computers, hubs, and routers. Connectors can be distinguished according to their physical appearance and mating properties, such as jacks and plugs (male connectors) or sockets and ports (female connectors).



