

## Data Communication System Components

There are 5(five) main component of data communication system

1. **Messages**
2. **Sender**
3. **Receiver**
4. **Transmission medium**
5. **Protocols**

**Messages:**--Messages are the information's or data which are transmitted between sender and receiver through a medium this messages can be a file, doc, picture, streams of bits etc. this messages transmit in the forms of streams of 1's and 0's or +ve and -ve electric signals

**Sender:** -- senders are the source of the information

**Receiver:** -- receivers are the destination of the messages

**Transmission medium:**--Transmission medium act as a bridge or path between sender and receiver. It is the physical medium such as coaxial cable, fibre optic cable Wi-Fi etc.

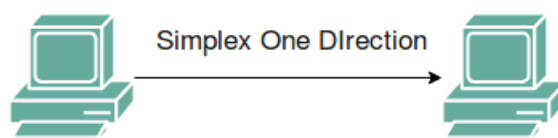
**Protocols:** -- protocols are the sets of rules that need to satisfy by both the end (sender and receiver) to transmit data. Such as SMTP (simple mail transfer protocol), FTP (file transfer protocol). HTTP (Hypertext transfer protocols).

## Transmission Modes in Computer Networks

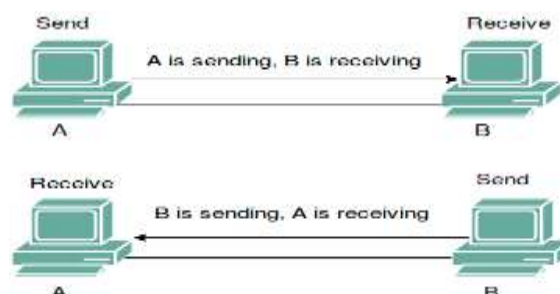
There are three 3 kind of transmission mode used by networks to communicate

1. Simplex Mode
2. Half-Duplex Mode
3. Full-Duplex Mode

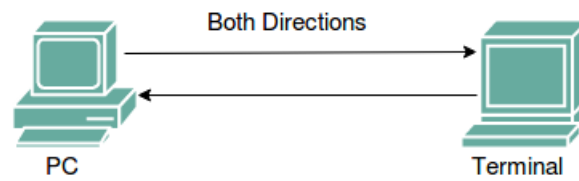
**Simplex Mode:** -- in simplex mode only one way communication is possible. I.e only one of the device can only send messages the other must always receive that messages. Ex—Keyboard which is use only give the input and monitors which only give output.



**Half-Duplex Mode:** -- in Half-Duplex messages can be sending in both direction but not at the same time. If one device sending messages other must receive that messages and if 2<sup>nd</sup> device sending messages the 1<sup>st</sup> device must receive that data. Ex—walkie- talkie.



**Full-Duplex Mode:** -- in full-Duplex Mode both way transmission is possible at the same time. Its like both way traffic roads. Both the end can send and receive data at the same time. For example Telephone communication.



## Analog and Digital Signals

Analog signals are electric signal represent as a wave and these signals are continuous.

On the other hand digital signal are discrete it is the representations of 0's and 1's

## Bandwidth & latency & Throughput & Speed

Bandwidth is the capacity and speed is the rete of transfer. Bandwidth tell us maximum amount of data that can transmit by our network and speed tell us the rate at which that data transmit trough medium.

Latency refers as delay or ping or lag rate in communication. Bandwidth is the amount of data and latency is the amount of time needed to get that information from source to destination.

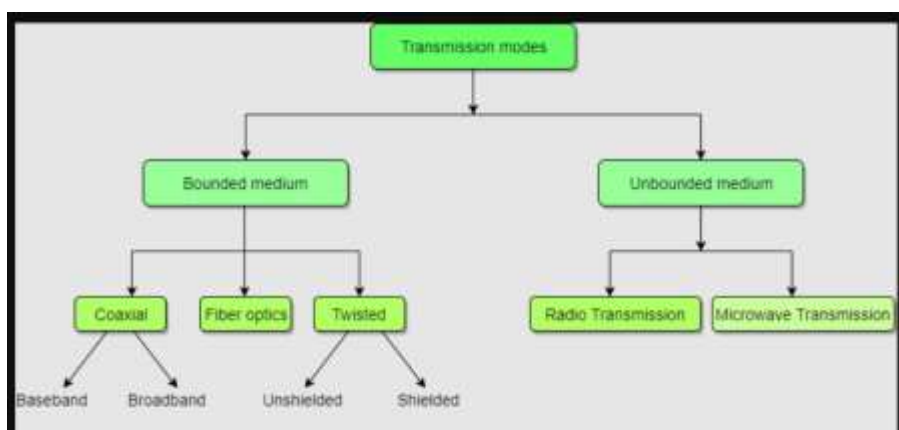
Through put is the average rate of successful data transmission through the medium. Because sometimes delay and packet loose happen.so it measure actual amount of data transfer through the medium

Speed is how quick those bits can pass through the channel. Speed is the combination of bandwidth and latency. 1Mbps (one megabits per second)

## Transmission medium

There are mainly two transmissions medium:--

1. Guided media(bounded media)
2. Unguided media(unbounded media)



### **Guided media:--**

1. Coaxial cable
2. Twisted pair cable
3. Fibre optic cable

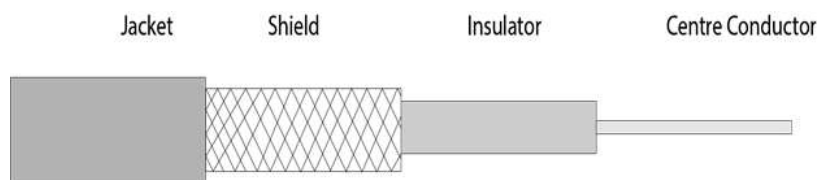
### **Unguided media:--**

1. Radio Wave
2. Micro wave

**Coaxial cable:**--Coaxial cable contains two parallel conductors one is outer conductor and one is inner conductor. Both this conductors have protected layer and conductors made up with copper.

Basically used for cable TV connection (RG-59 : used with cable television)

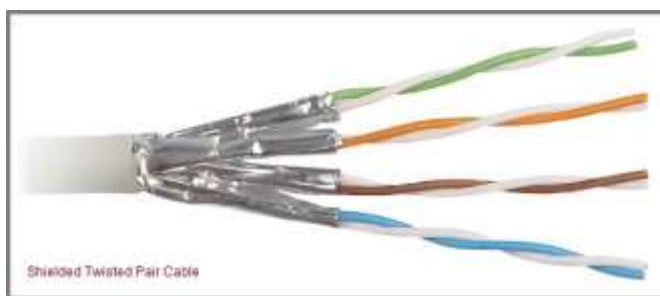
Types of coaxial cable: -- Broadband and baseband



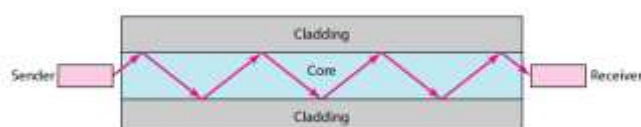
**Twisted pair cable:** -- twisted pair cable basically has two copper conductors with own insulating plastic layer and twisted with each other.

RJ 45 is a sunshield twisted pair cable

Local Area Network, such as 10Base-T and 100Base-T are shield twisted-pair cables



**Fibre optic cable:**-- fibre optic cable is made of glass or plastic and transmit signal in the form of light



**Micro Wave:**--micro wave are electromagnetic wave which have range between 1 to 300GHz.microwave are undirected so to send and receive microwave the sending and receiving antenna need to be aligned.

Use for tele communications.

**Radio Wave:** -- Radio wave is also electromagnetic wave range between 3 KHz to 1 KHz.

Radio wave is distributed which means when a radio wave is send it can move to all directions.

## Broadband and Baseband

Broadband and baseband use coaxial cable for transmission the data. These are the physical medium of any network.

Broadband can transmit multiple data/Strems/signal at a time. It is like a highway where multiple types of vehicle can come and go. Similarly multiple types of data can transmit using broadband. Broadband technology use analog signal for data transmission. But broadband is unidirectional it means nodes connect at the both end can send and receive data but cannot perform both at the same time.

Baseband can transmit signal data at a time. Baseband is like railway track. It use digital signal to transmit data. Baseband support bidirectional communication where sender and receiver can act simultaneously. For this baseband use two different separate electric circuit one for sending and other for receiving

