

Unguided Media(Wireless communication):- It transport electromagnetic waves without using a physical conductor. The mediums used in wireless communications are air, vacuum and even water.

- **Radio waves** – are used to transmit television and radio programs.
- **Microwaves** – are used to transmit satellite television and for mobile phones.
- **Infrared** – is used to transmit information from remote controls.
- **Visible light** – is used in photography.

**Radiowaves**- Radio waves are normally **omnidirectional** (useful for **multicasting**, in which there is **one sender but many receivers**.).

When an antenna transmits radio waves, they are propagated in all directions. This means that the sending and receiving antennas do not have to be aligned.

**e.g. AM and FM radio stations, cordless phones and televisions**

#### **Disadvantage of Radio waves**

Radio waves transmitted by one antenna are susceptible to interference by another antenna that is sending signals of the same frequency

**Microwaves**- are transmitted from the transmitters placed at very **high towers to the receivers at a long distance**.

Microwaves are transmitted in **line of sight fashion**, and also **propagated through the surfaces**.

#### **Advantages**

- Maintenance easy than cables.
- Suitable when cable can not be used.

#### **Disadvantages**

- Repeaters are required for long distance communication.
- Less Bandwidth available

#### **Satellite**

Geostationary satellites are placed around 36000 KM away from the earth's surface.

In satellite communication transmitting station transmits the signals to the satellite. (It is called **up-linking**). After receiving the signals (microwaves) it amplifies them and transmit back to earth in whole visibility area.

Receiving stations at different places can receive these signals. (It is called **down-linking**).

**Advantage**- Area coverage is too large .

**Disadvantage**- High investment

**INFRARED** – is a type of light that is not visible to the human eye. It cannot be used outside a building for communication purposes as cannot pass through solid objects like walls and can be easily contained in a room. Infrared signals cannot be used for long distance communication.

**e.g.** remote control used for TV, DVD players, stereo system , photographers use film that is sensitive to infrared rays to take pictures, doctors use infrared lamps to treat skin diseases and relieve pain of sore muscles, devices used for communication between keyboards, mouse , printers

**BLUETOOTH**- Bluetooth is a specification for the use of low-power radio communications to wirelessly link phones, computers or other network devices over short distances. Common use on cell phones is to enable communication between mobile phones, laptops, PCs, PDA, printers, digital cameras, mouses, and wireless headsets/earpieces.

It covers short distances up to 10 meters and communicate at low band width at less than 1Mbps