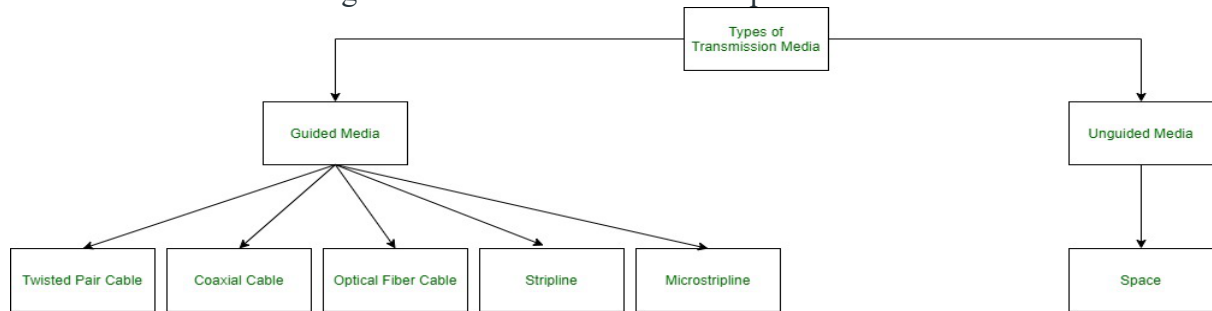


## Transmission Media

A transmission medium is a physical path between the transmitter and the receiver i.e. it is the channel through which data is sent from one place to another.



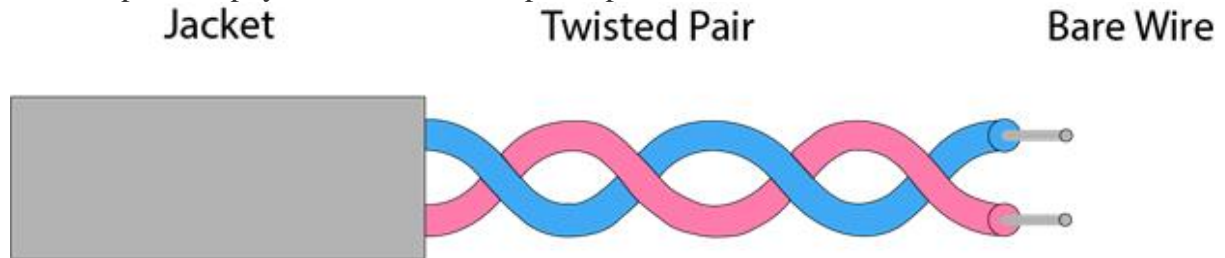
**1. Guided Media:** It is also referred to as Wired transmission media.

Features:

- High Speed
- Secure
- Used for comparatively shorter distances

### Twisted pair:

Twisted pair is a physical media made up of a pair of cables twisted with each other.



### Coaxial Cable

- Coaxial cable is very commonly used transmission media, for example, TV wire is usually a coaxial cable.
- The name of the cable is coaxial as it contains two conductors parallel to each other.

### Fibre Optic

- Fibre optic cable is a cable that uses electrical signals for communication.
- Fibre optic is a cable that holds the optical fibres coated in plastic that are used to send the data by pulses of light.

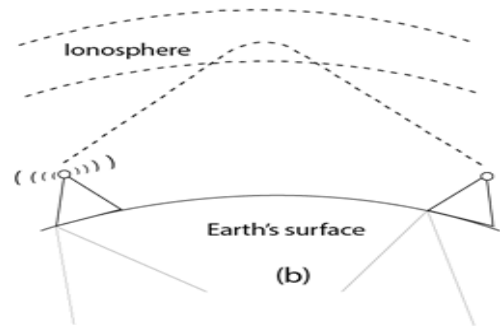
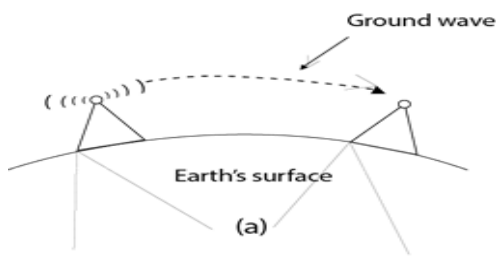


### UnGuided Transmission

- An unguided transmission transmits the electromagnetic waves without using any physical medium. Therefore it is also known as **wireless transmission**.

### Radio waves

- Radio waves are the electromagnetic waves that are transmitted in all the directions of free space.
- Radio waves are omnidirectional, i.e., the signals are propagated in all the directions.
- An example of the radio wave is **FM radio**.



### Applications Of Radio waves:

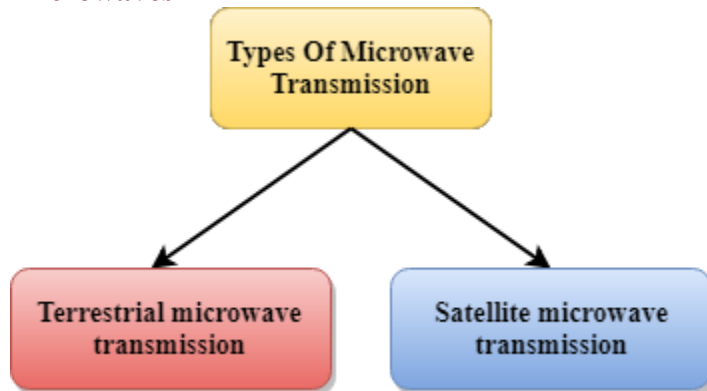
- A Radio wave is useful for multicasting when there is one sender and many receivers.
- An FM radio, television, cordless phones are examples of a radio wave.

### Advantages Of Radio transmission:

- Radio transmission is mainly used for wide area networks and mobile cellular phones.
- Radio waves cover a large area, and they can penetrate the walls.
- Radio transmission provides a higher transmission rate.

### Microwaves are of two types:

#### Microwaves



#### Terrestrial Microwave Transmission

- Terrestrial Microwave transmission is a technology that transmits the focused beam of a radio signal from one ground-based microwave transmission antenna to another.

#### Satellite Microwave Communication

- A satellite is a physical object that revolves around the earth at a known height.
- Satellite communication is more reliable nowadays as it offers more flexibility than cable and fibre optic systems.

#### Infrared

- An infrared transmission is a wireless technology used for communication over short ranges.
- The frequency of the infrared is in the range from 300 GHz to 400 THz.

## Wireless transmission

Wireless transmission is a form of unguided media. Wireless communication involves no physical link established between two or more devices, communicating wirelessly. Wireless signals are spread over in the air and are received

### 1. Infrared Transmission

IR or Infrared radiation is a part of **electromagnetic radiation**. These rays have a **wavelength greater than visible light**, making them invisible to the human eye. We cannot see Infrared light but feel the rays in the form of **heat**. **Frequency range: 300 GHz to 400 THz.**



### Other Applications of Infrared transmissions:

1. Laptops to printers
2. Development of high-speed LANs
3. Cordless microphones, headsets
4. LASER communications
5. Modems, robot control systems, etc.

### Advantages of Infrared communication:

1. Large bandwidth
2. Simple and inexpensive to implement
3. The best medium for short-range communication
4. Secure transmission
5. Risks of interception and interference are low
6. Power usage is efficient

### Disadvantages of Infrared communication:

1. Due to its Line of sight propagation, the transmitter needs to be aligned with the receiver to transmit the data.
2. Only short-range communication is supported.
3. It can't propagate through obstructions like walls, wood, and other opaque objects.
4. Some receivers might respond to other transmitters breaking the security policy.
5. High interference rate due to sunlight and other large Infrared sources.

### 2. Radio waves

Like Infrared radiation, Radio waves are also a part of **electromagnetic radiation**. These waves have **the longest wavelengths**, from 1mm to 100km in the spectrum. The name itself has Radio. A Radio is one of the thousands of wireless technologies that use Radio waves for communication.

**A Radio is the simplest example of Radio wave communication.** Other examples include RADAR, Satellite communications, Bluetooth headsets, TV Broadcasts, GPS Signals, etc. Frequency range: 300GHz to 3kHz.

**Advantages:**

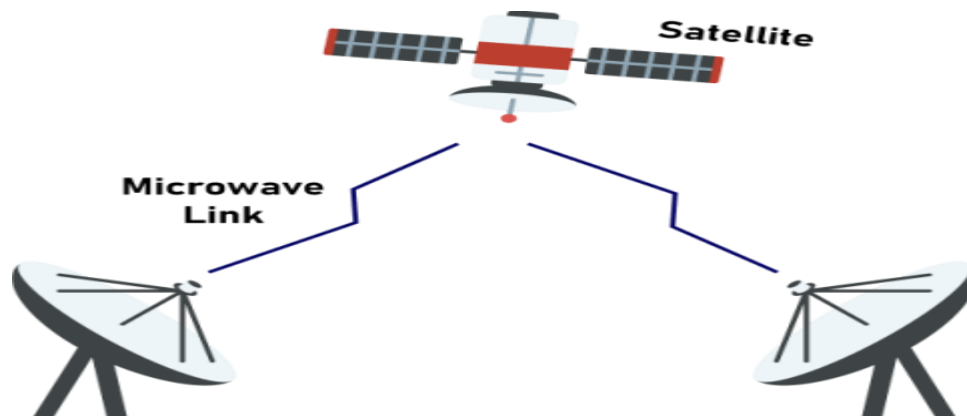
1. Radio waves are the best choice for large-distance communications.
2. These waves can also penetrate through obstacles.
3. These waves are Omnidirectional which means they can be transmitted in all directions.
4. Low cost.

**Disadvantages:**

1. Not very secure due to the large distances
2. Interference with other Radio signals
3. Not very effective in bad weather conditions.

**3. Microwaves**

These waves are also a part of **electromagnetic radiation**. The micro indicates that these waves have short wavelengths from 1 meter to 1 millimeter. These are **high-frequency waves**- > **Frequency range: 300MHz to 300GHz**. These waves fall between Radio waves and Infrared waves.



Communication using Microwaves can be done only if the transmitting and receiving antennas are properly aligned- Line of sight transmission.

**Applications:**

1. Cooking food in Microwave ovens, Popcorn machines.
2. TV distributions
3. Capturing the speed of the vehicle
4. Phone channels to a mobile phone
5. RADAR, Satellite communications

**Advantages:**

1. The speed of transmission is very fast
2. We can reduce antenna size due to high frequency
3. Lower power consumption
4. Supports larger bandwidth
5. Can easily pass through the Ionosphere.

**Disadvantages:**

1. Expensive
2. Not effective in bad weather conditions
3. Occupies more space
4. Interference
5. Harmful radiation