

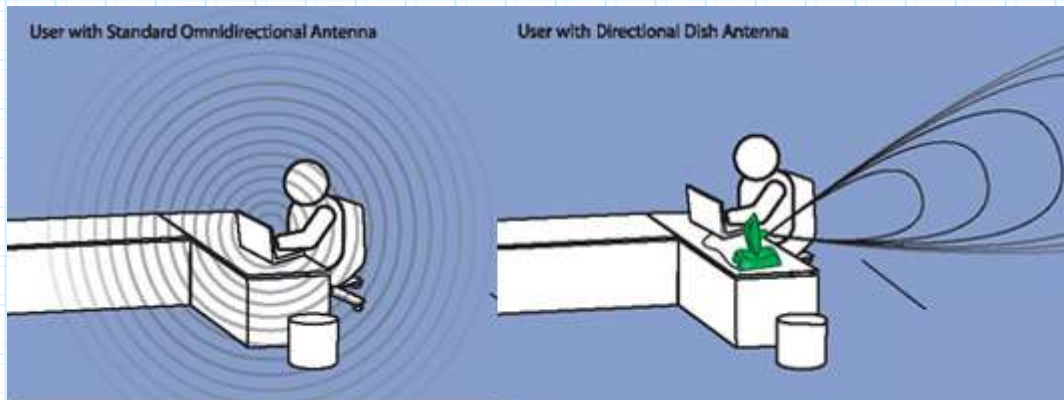
UNGUIDED MEDIUM

Unguided medium are those medium in which we cannot guide our signal over a particular bounded path. Unbounded / Unguided media or wireless media doesn't use any physical connectors between the two devices communicating. Usually the transmission is send through the atmosphere but sometime it can be just across the rule. Wireless media is used when a physical obstruction or distance blocks are used with normal cable media.



For Guided medium we used Connectors for transmitting Data, what about For Unguided Mediums ?

Normally signals are transmitted in to unguided medium via Antenna. Antenna in its simplest form is metal wire, which is capable of emitting EM radiations. There are two types of antennas



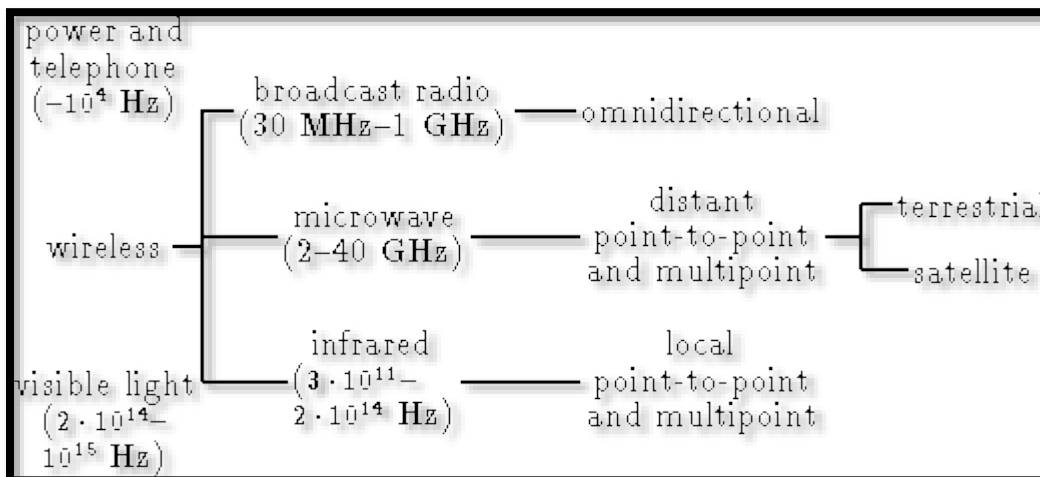
Omnidirectional means to propagate signal in all directions, whereas **Unidirectional** means to propagate signal in aligned form, it will focus only the one particular direction to propagate the signal

Unguided Media Types

Unguided media transport electromagnetic waves without using a physical conductor.

There are three types of Unguided Media

- (i) Radio waves
- (ii) Micro waves
- (iii) Infrared.



Radio waves: Electromagnetic wave ranging in frequencies between 3 KHz and 1GHz are normally called radio waves.

Radio waves particularly those of low and medium frequencies can penetrate walls. And hence can easily be received inside a building.

Radio wave can be further divided into

- LOW POWER, SINGLE FREQUENCY.
- HIGH POWER, SINGLE FREQUENCY

LOW POWER , SINGLE FREQUENCY:-

As the name shows this system transmits from one frequency and has low power output. The normal operating ranges on these devices are 20 to 25 meter.

CHARACTERISTICS LOW POWER , SINGLE FREQUENCY:-

- Low cost
- Simple installation
- 1 M bps to 10 M bps capacity
- High attenuation
- Low immunity to EMI

2. HIGH POWER, SINGLE FREQUENCY:-

This is similar to low power single frequency. These devices can communicate over greater distances.

CHARACTERISTICS HIGH POWER, SINGLE FREQUENCY:-

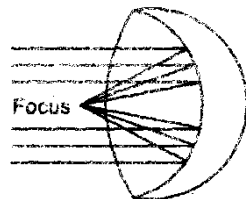
- Moderate cost
- Easier to install than low power single frequency
- 1 Mbps to 10 Mbps of capacity

- Low attenuation for long distances
- Low immunity to EMI

Microwaves: Electromagnetic waves having frequencies between 1 and 300 GHz are called microwaves.

Microwaves are unidirectional, when an antenna transmits microwaves they can be narrowly focused. This means that the sending and receiving antennas need to be aligned..

Parabolic dish antenna and horn antenna are used for this means of transmission



(a) Dish Antenna



Do you know the Equipment used for heating food at home is called microwave , because it emits radiations in spectrum of Microwave frequency .

Microwaves are also used in Data communication for example Wimax like Wateen and Infinity

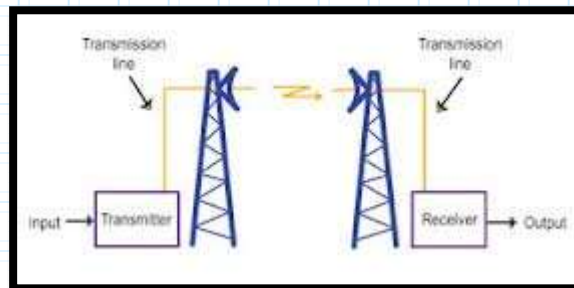
Have you ever wonder, that if both above mentioned technology works on same Frequency than, why does Wimax technology do not have the effect of heating

Microwave Communication is Further divided into two parts

- Terrestrial Micro waves
- Satellite Micro waves

1. Terrestrial Micro waves:-

Terrestrial Micro waves are used are used to transmit wireless signals across a few miles. Terrestrial system requires that direct parabolic antennas can be pointed to each other. These systems operate in a low Giga Hertz range.



CHARACTERISTICS of Terrestrial Micro waves:-

1. Moderate to high cost.
2. Moderately difficult installation
3. 1 M bps to 10 M bps capacity
4. Variable attenuation
5. Low immunity to EMI

The main problem with such type communication is the curvature of the earth, mountains & other structure often block the line of side. Due to this reason,

many repeats are required for long distance which increases the cost of data transmission between the two points. This problem is removed by using satellites.

2. Satellite micro wave transmission

Satellite micro wave transmission is used to transmit signals using satellites in orbit about 50,000 Km above the earth. Satellite dishes are used to send the signals to the satellite where it is again send back down to the receiver satellite. These transmissions also use directional parabolic antenna' with in line of side.

In satellite communication micro wave signals typically at 6 GHz and is transmitted from a transmitter on the earth through the satellite position in space. By the time signal reaches the satellites becomes weaker due to 50,000 Km distance. The satellite amplifies weak signals and transmits it back to the earth at the frequency less than 6 GHz.

Characteristics Satellite Micro waves:

1. High cost
2. Extremely difficult and hare installation.
3. Variable attenuation.
4. Low immunity to EMI
5. High security needed because a signal send to satellite is broadcasts through all receivers with in satellite.

Infrared

Infrared signals with frequencies ranges from 300 GHz to 400 GHz and can be used for short range communication. Infrared signals, having high frequencies, cannot penetrate walls. This helps to prevent interference between one system and another

Infrared transmission can be affected by objects obstructing sender or receiver. These transmissions fall into two categories.

1. Point to point
2. Broadcast

(i) Point to Point: - Point to point infrared transmission signal directly between two systems. Many lap top system use point to pint transmission. These systems require direct alignment between many devices.

Characteristics of Point to point:-

1. Wide range of cost
2. Moderately easy installation.
3. 100 k bps to 16 Mb of capacity.
4. Variable attenuation.
5. High immunity to EMI

(i) Broad Cast: - These infrared transmission use sprayed signal, one broad cast in all directions instead of direct beam. This help to reduce the problems of proper alignment and abstraction. It also allows multiple receiver of signal

Characteristics of Broad Cast:-

1. In expensive.
2. Single installation.
3. 1M bps capacity.
4. Variable attenuation

A Comparison of Radio Waves With Infra RED

Radio	
Advantages	Disadvantages
<ol style="list-style-type: none"> 1. Transmission not line of sight 2. Inexpensive products 3. Direct point-to-point linking to receiving station 4. Ideal for portable devices 	<ol style="list-style-type: none"> 1. Limited bandwidth means less data throughput 2. Some frequencies subject to FCC regulation 3. Highly susceptible to interference
Infrared	
Advantages	Disadvantages
<ol style="list-style-type: none"> 1. Higher bandwidth means superior throughput to radio 2. Inexpensive to produce 3. No longer limited to tight interroom line-of-sight restrictions 	<ol style="list-style-type: none"> 1. Limited in distance 2. Cannot penetrate physical barriers like walls, ceilings, floors, etc.

- Can you make a same table for Microwave communication