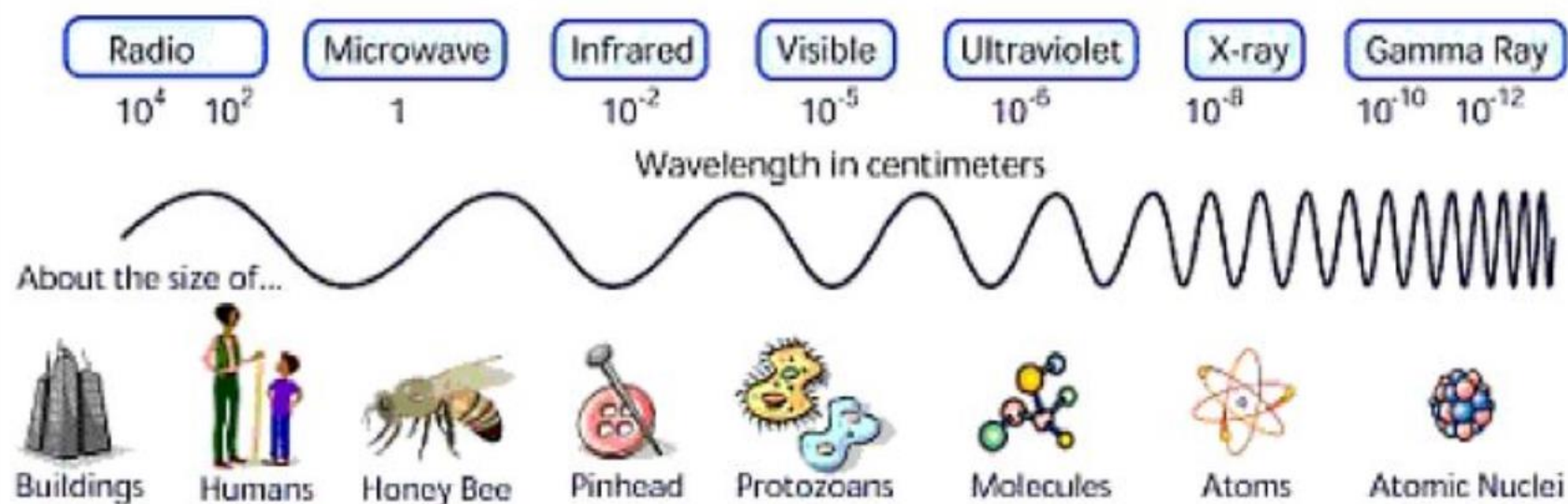


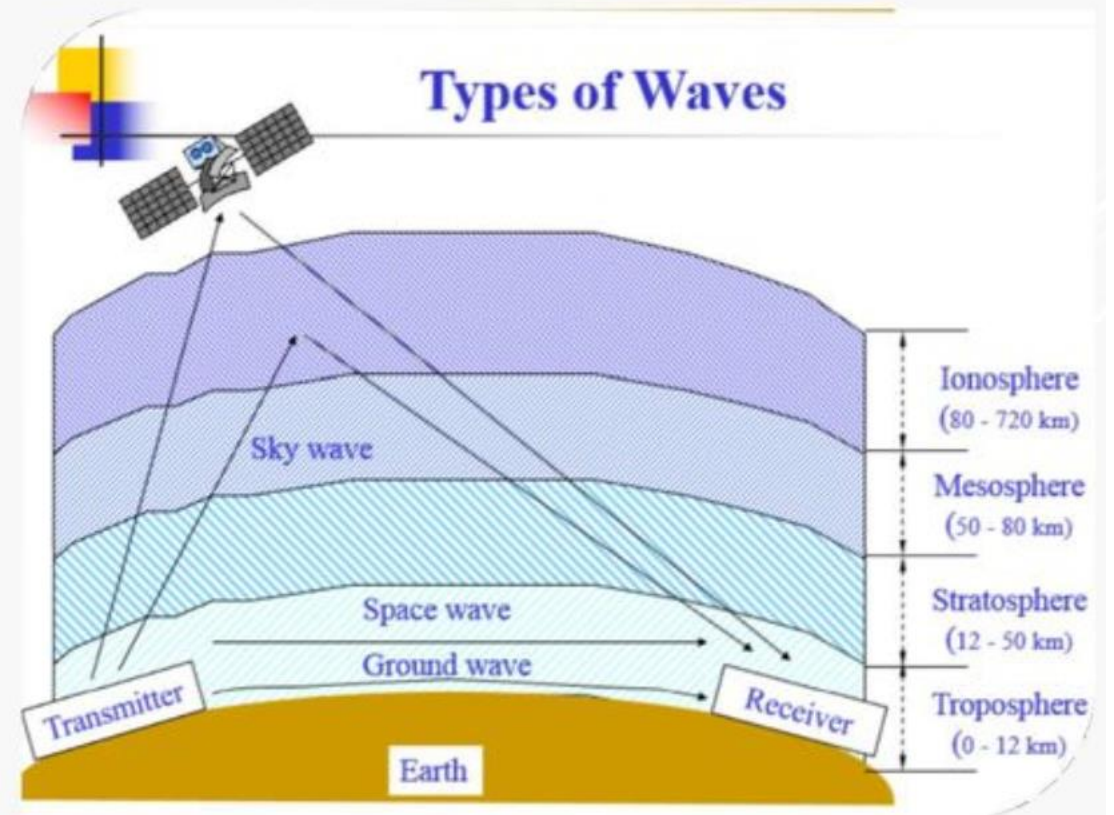
ELECTROMAGNETIC SPECTRUM

- Energy that is given off by electrons that moves in waves.



TYPES OF PROPAGATION

1. GROUND WAVE PROPAGATION
2. SKY WAVE PROPAGATION
3. SPACE WAVE PROPAGATION

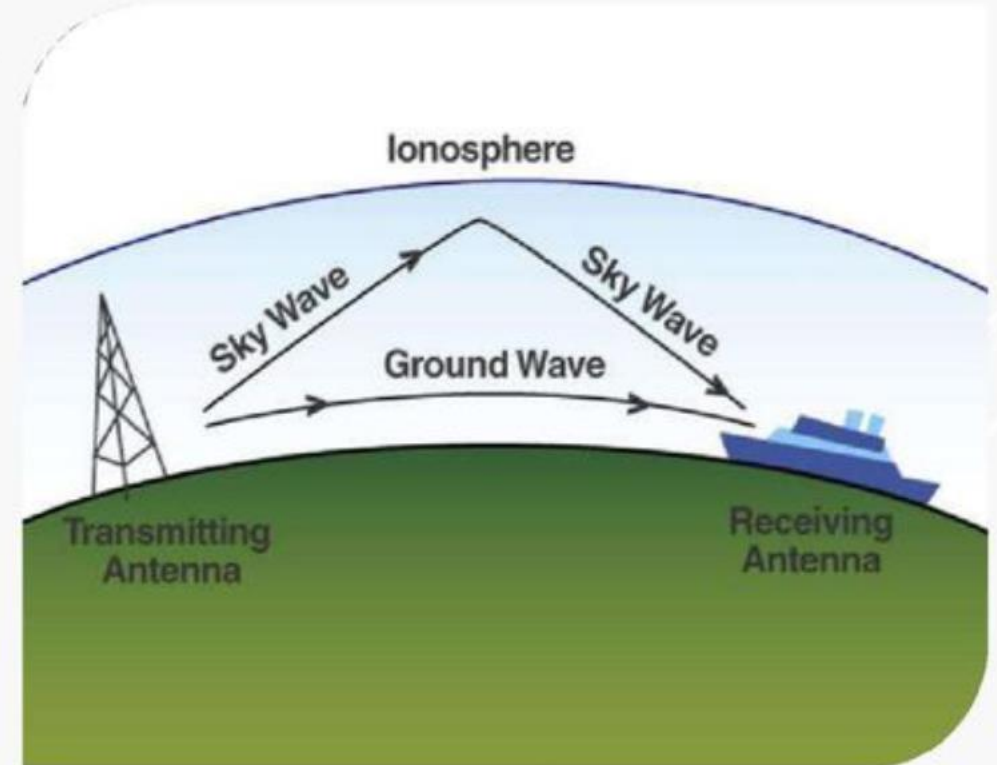


GROUND WAVE PROPAGATION

Ground wave propagation is a type of radio propagation that is also known as a surface wave. These waves propagate over the earth's surface in low and medium frequencies. These are mainly used for transmission between the surface of the earth and the ionosphere.

GROUND WAVE PROPAGATION

- Ground Wave propagation is a method of radio frequency propagation that uses the area between the surface of the earth and the ionosphere for transmission.
- The ground wave can propagate a considerable distance over the earth's surface particularly in the low frequency and medium frequency portion of the radio spectrum.
- Ground wave radio propagation is used to provide relatively local radio communications coverage.



GROUND (SURFACE) WAVE

- ▶ The ground wave is actually composed of two separate component waves. These are known as the SURFACE WAVE and the SPACE WAVE.
- ▶ A surface wave travels along the surface of the Earth. A space wave travels over the surface.

SPACE WAVE PROPAGATION

- The radio waves having high frequencies are basically called as space waves.
- These waves have the ability to propagate through atmosphere, from transmitter antenna to receiver antenna.
- These waves can travel directly or can travel after reflecting from earth's surface to the troposphere surface of earth.
- So, it is also called as Tropospherical Propagation. In the diagram of medium wave propagation, c shows the space wave propagation.

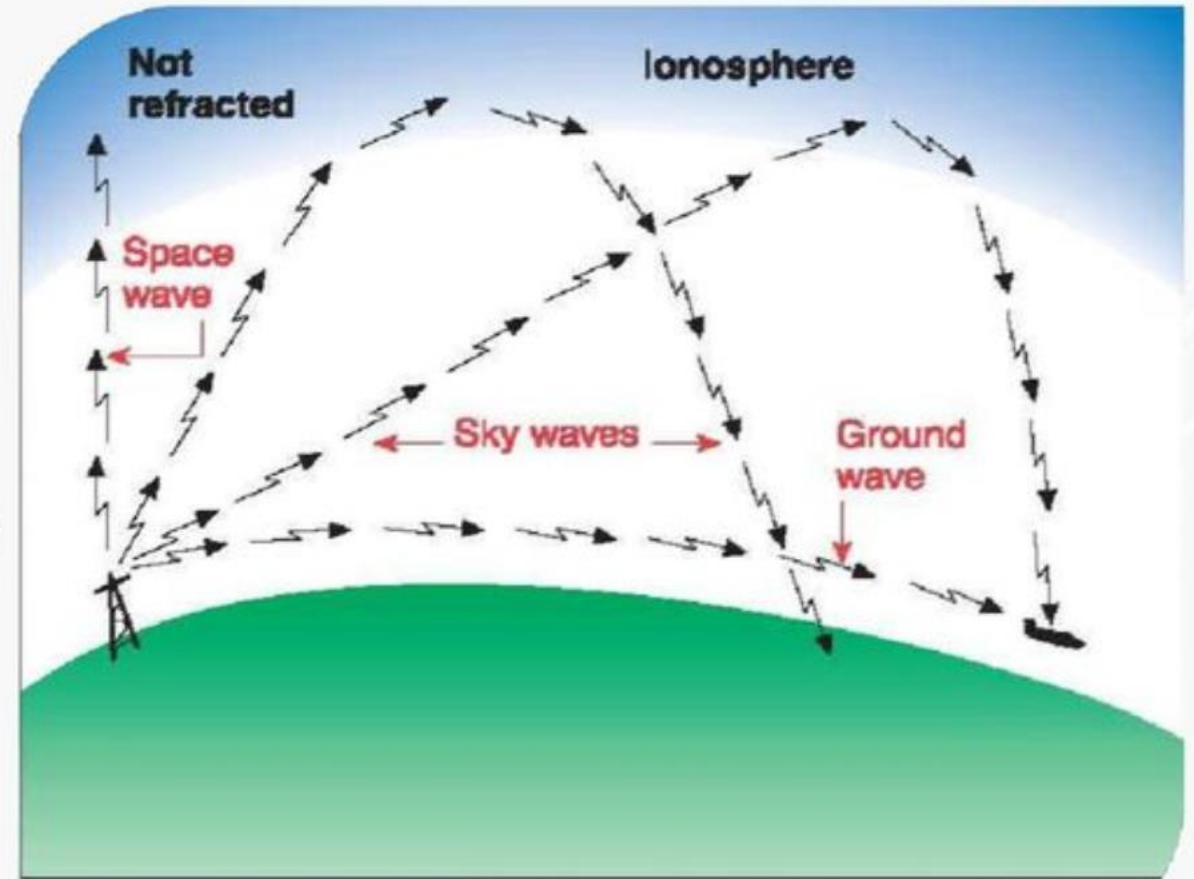
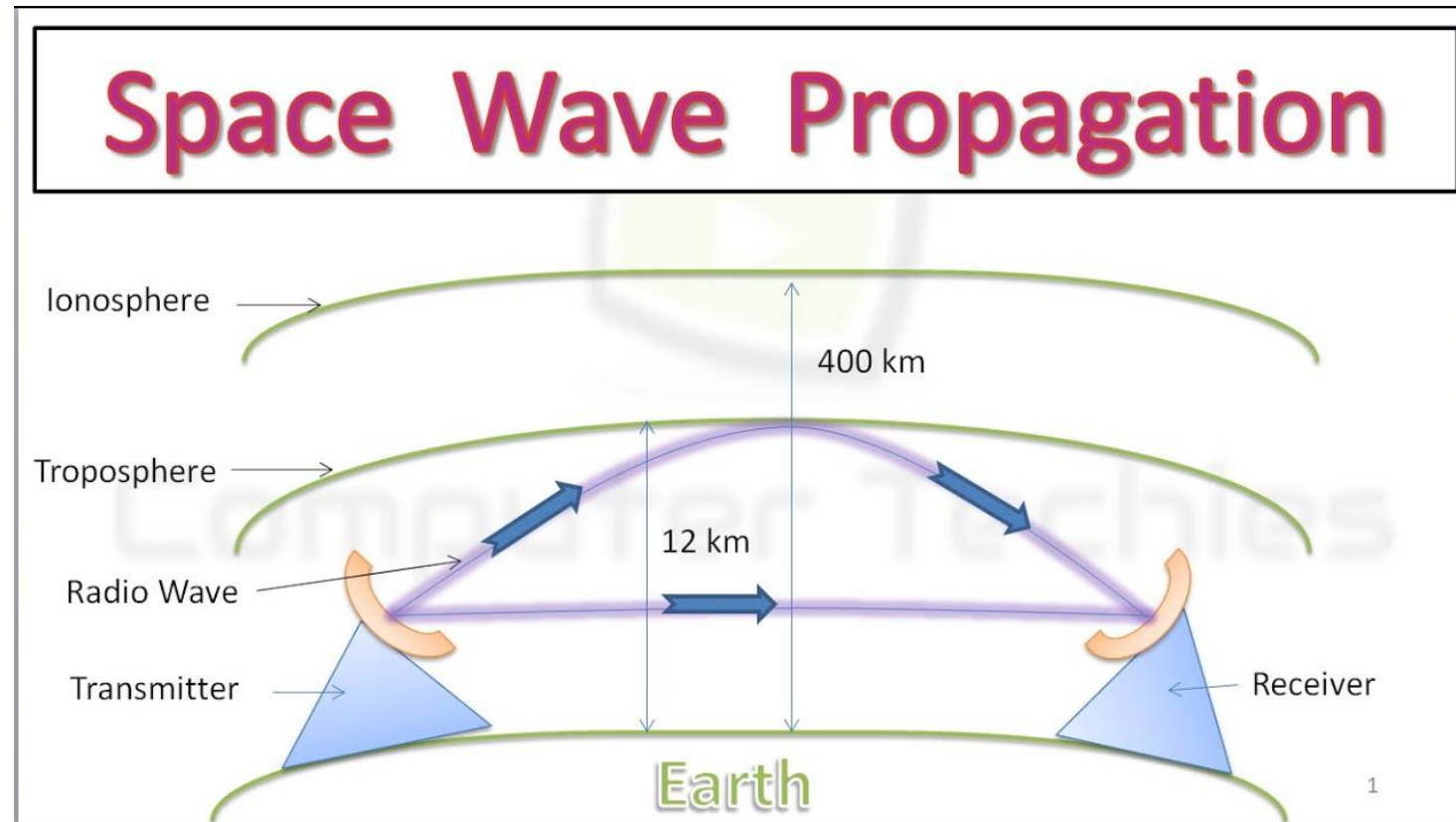


Figure 7-1. Ground, space, and sky wave propagation.

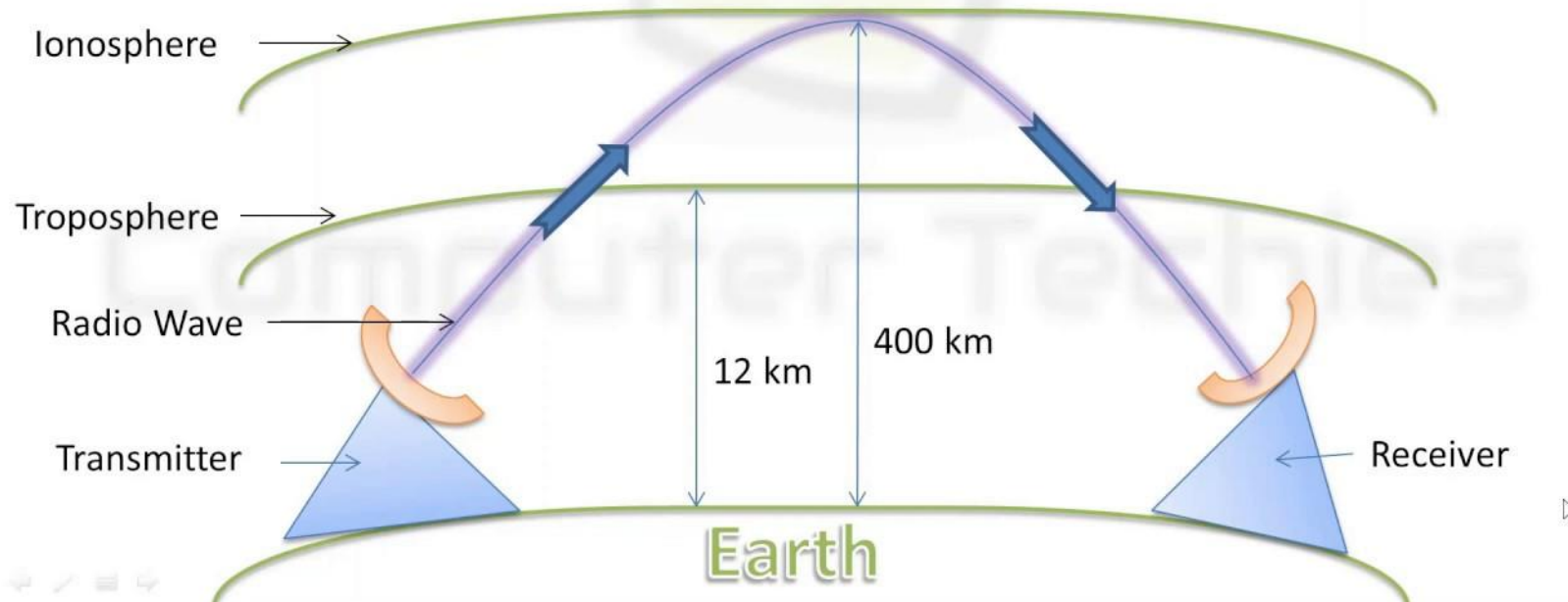
Space wave propagation is defined as the radio waves that occur within 20km of the atmosphere i.e.; troposphere, comprising direct and reflected waves. These waves are also known as tropospheric propagation as they can travel directly from the earth's surface to the troposphere surface of the earth.



SKY WAVE PROPAGATION

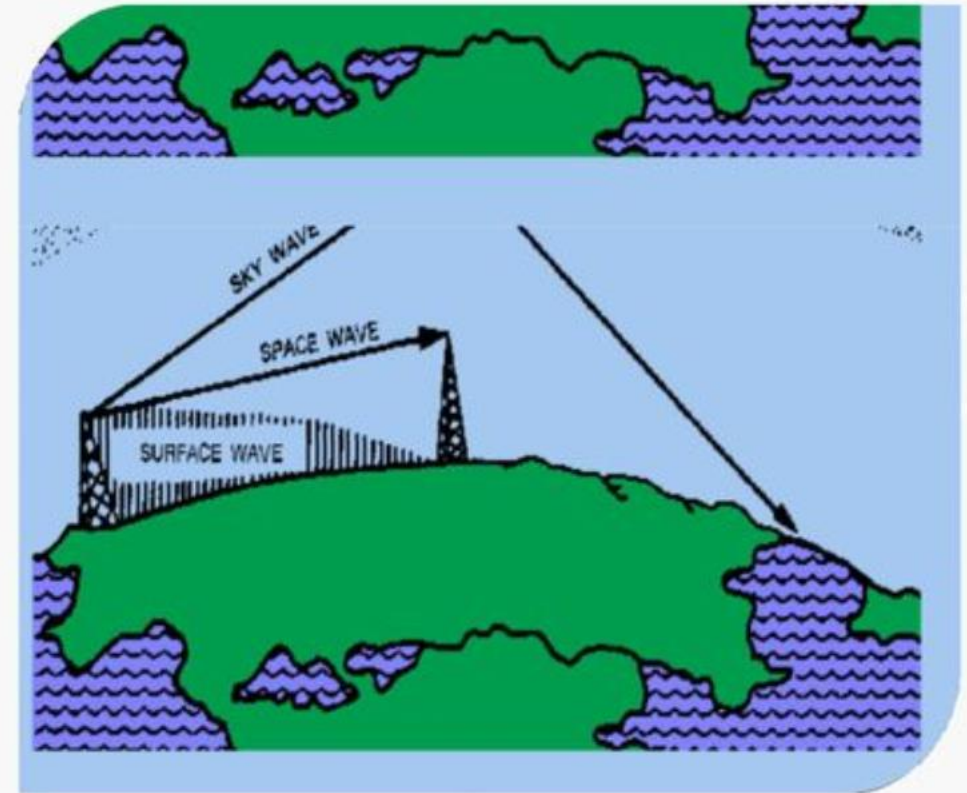
Sky Wave propagation, commonly known as the skip, is a kind of radio wave propagation. It is either the reflected or refracted back waves to the earth from the ionosphere.

SKY Wave Propagation



SKY WAVE PROPAGATION

- Sky-wave propagation refers to radio wave propagation via the ionosphere.
- Each reflection from the ionosphere is a **hop**.
- Reception of sky-wave propagation is called **skip**.
- The higher the region in the ionosphere where the hop occurs, the greater the distance the wave can travel.
- F2 skip can travel up to 2500 miles . E skip can travel up to 1200 miles .
- Sky-wave propagation can include multiple hops between the Earth and the ionosphere



RANGE OF WAVE PROPAGATION

Classification Band	Initials	Frequency Range	Characteristics
Extremely low	ELF	< 300 Hz	Ground wave
Infra low	ILF	300 Hz - 3 kHz	
Very low	VLF	3 kHz - 30 kHz	
Low	LF	30 kHz - 300 kHz	
Medium	MF	300 kHz - 3 MHz	Ground/Sky wave
High	HF	3 MHz - 30 MHz	Sky wave
Very high	VHF	30 MHz - 300 MHz	Space wave
Ultra high	UHF	300 MHz - 3 GHz	
Super high	SHF	3 GHz - 30 GHz	
Extremely high	EHF	30 GHz - 300 GHz	
Tremendously high	THF	300 GHz - 3000 GHz	