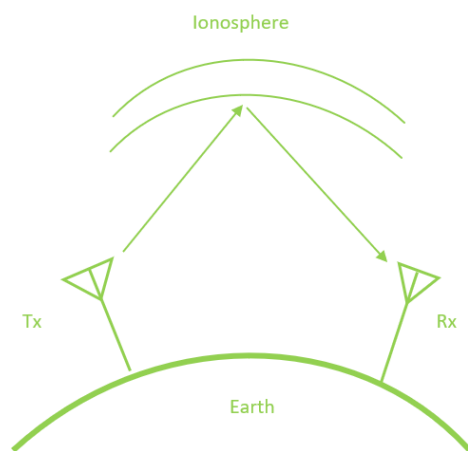


Wireless Propagation

Radio Waves are types of electromagnetic Radiation. they are produced by the acceleration of electromagnetic charges. Radio waves play an important role in communication, navigation, weather forecasting, medical imaging technology, etc.

Main modes of **wireless propagation**: Sky wave propagation, Space wave propagation, Ground wave propagation and Line-of-Sight propagation.

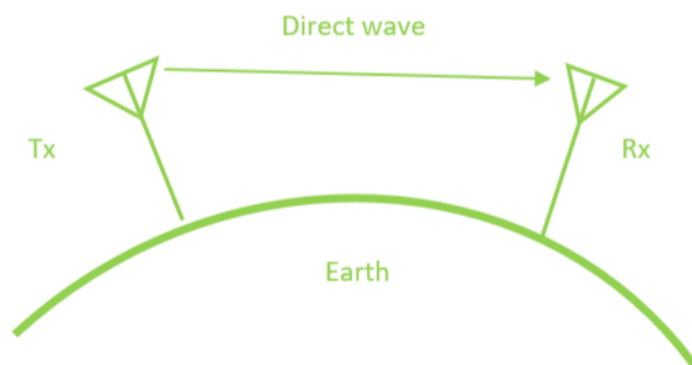
Sky Wave Propagation: This mode of propagation occurs when the signal is transmitted by the transmitting antenna (Tx) is reflected by the ionosphere layer (sky) and received by the receiving antenna (Rx) is known as sky wave propagation. The ionosphere is the layer of the earth's upper atmosphere that contains ionized gases and plasma. It protects the earth from harmful radiation.



1. Sky wave propagation occurs in the ionosphere.
2. The range of frequencies that can be used for sky wave propagation is typically between 3 and 30 MHz.

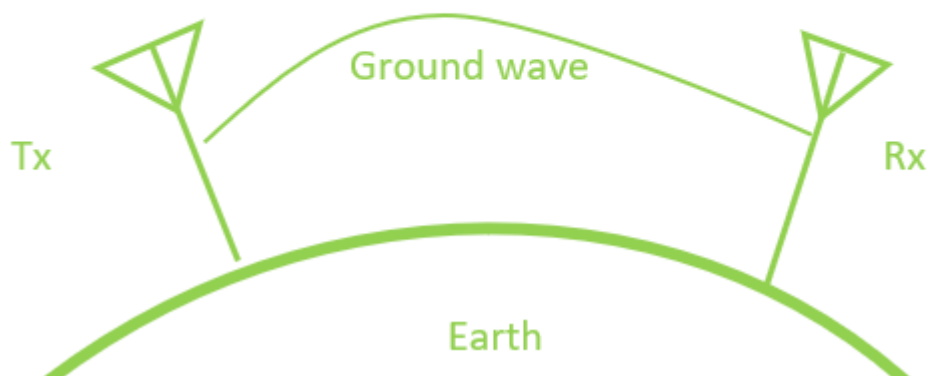
Space Wave Propagation of Radio Waves: This mode of propagation occurs when the transmitting wave travels directly to the receiving antenna directly without any reflection, refraction, and deflection phenomenon. It is also called direct wave propagation or line-of-sight transmission.

1. Space wave propagation is commonly used for short-range radio communication
2. Space wave propagation is also used for satellite communication,
3. The maximum range is approximately 40 kilometers for radio waves at 100 MHz.
4. Space wave propagation is used in a wide variety of applications, including television broadcasting, mobile phones, wireless LANs, and remote sensing.



Ground Wave Propagation: This mode of propagation occurs when the transmitting waves travel along the earth's surface and are received at the receiving antenna is known as the Ground wave propagation. The range of the Ground wave Propagation depends on the frequency of the transmitted wave, the power of the transmitter, and the properties of the earth's surface and the earth's atmosphere.

1. Ground wave propagation requires a lower-power transmitter than other methods of radio wave propagation.
2. It is used for medium-range communication such as 100km to 1000km.
3. mostly the frequency used for the ground wave propagation lies between 3khz to 3Mhz.



Line-of-sight propagation: This mode of propagation is used for short-range communication, typically within a few miles. The radio waves travel in a straight line from the transmitter to the receiver and require an unobstructed line of sight between the two. The advantage of line-of-sight propagation is its ability to provide a strong, reliable signal over short distances. However, the disadvantage is that obstacles such as buildings, trees, or hills can block the signal, limiting its range.

