TX #3: Antenna System Design

- The **design of the transmit & receive antenna system** is important because it determines how well energy transferred from one antenna to another.
- What are the factors? Some of it are gain, directivity, polarization and height above the ground.
- Radio waves are like light waves because they tend to travel in straight line. But they tend to refract or bend as they follow the curvature of the earth.

This will extend the radio horizon beyond the optical horizon

This bending is caused by the tendency of a radio wave to travel slower as the density of the air increases. Since part of the radio wave travels near the earth where the air is denser, this bending occurs.

- In studying the behavior of radio waves in space, it is more convenient to use a path that is straight line instead of a curve.
- As the **distance** between the transmitting and the receiving antennas **increases**, the **energy concentration** for a given area **decreases**. This type of signal loss is known as path attenuation, expressed in decibels (dB).
- The **amount of power available at the receiving antenna is dependent on the amount of energy** the antenna intercepts. An electrically large antenna will intercept more energy than an electrically small antenna.
- The dimensions of an antenna are related to the wavelength. The higher the frequency, the smaller the antenna for a given wavelength

Smaller antenna intercepts less energy, hence there is a **decrease in usable ranges** as **frequency increases**

We can increase the size (in terms of wavelength) of higher frequency antennas – so that they can intercept more power. These are what called as 'gain' antennas