

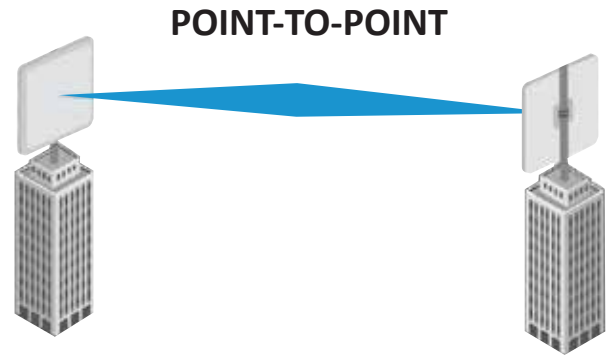
Point to Point Communication

Mobile Communication

Mobile telephones operate typically in the UHF range of frequencies (about 800 - 950 MHz)

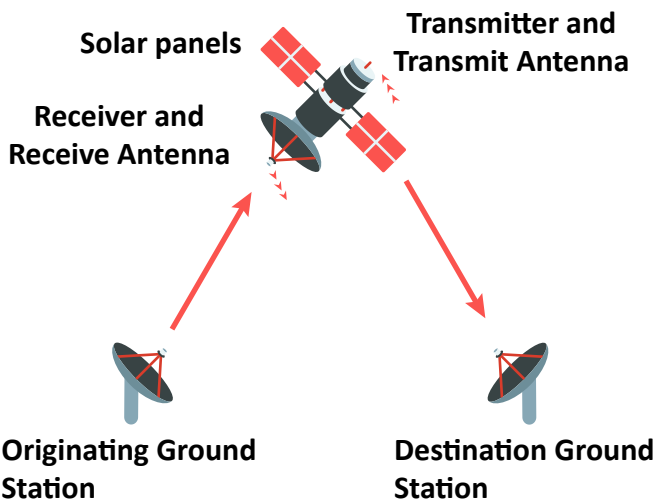
Fax Communication

Fax or facsimile means exact reproduction of the document like a picture, letter, map etc. at a distant place.



Space Communication

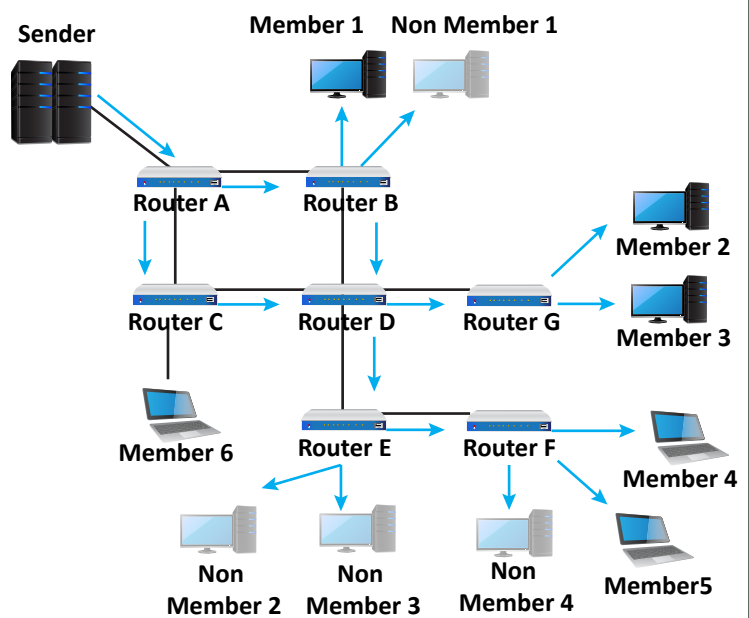
The phenomenon of sending, receiving and processing of information through physical space is termed as space communication. Propagation of EM waves can be done in three ways.



- * Ground Wave Propagation
- * Sky Wave Propagation
- * Space Wave Propagation

Broadcast Communication

Large number of receivers corresponding to a single transmitter.



- * GPS
- * Internet
- * Radio and Television

Ground Wave Propagation

Here EM wave glides over the earth surface along its curvature from transmitter to receiver placed close to the surface of earth. The loss of energy due to absorption of earth increases very rapidly with increasing frequency.

Sky Wave Propagation

Here the radio wave directed towards the sky and reflected by the ionosphere towards the desired location on the earth. Critical frequency upto which the wave undergoes TIR from the ionosphere is (ν_c).

$\nu_c = 9(N_{max})^{1/2}$ where N_{max} = the maximum electron density of the ionosphere.

Space Wave Propagation

Here a radio wave transmitted from an antenna travelling in a straight line, directly reaches the receiving antenna. It is also called line of sight (LOS) propagation. Maximum LOS distance d_m between transmitting and receiving antenna is

$$d_m = \sqrt{2h_T R} + \sqrt{2h_R R}$$

Need for Modulation

- * To reduce the size of antenna, for the transmission of low frequency signal we need a high frequency carrier wave.
- * For a good transmission we need high power and low wavelength as

$$\text{Power radiated} \propto (1/\lambda)^2$$

- * To avoid the mixing up of signals from different transmitters a band of frequency is allotted to each user for different radio channels.

Modulation

Process of variation of some characteristic of a high frequency wave in accordance with the message signal.