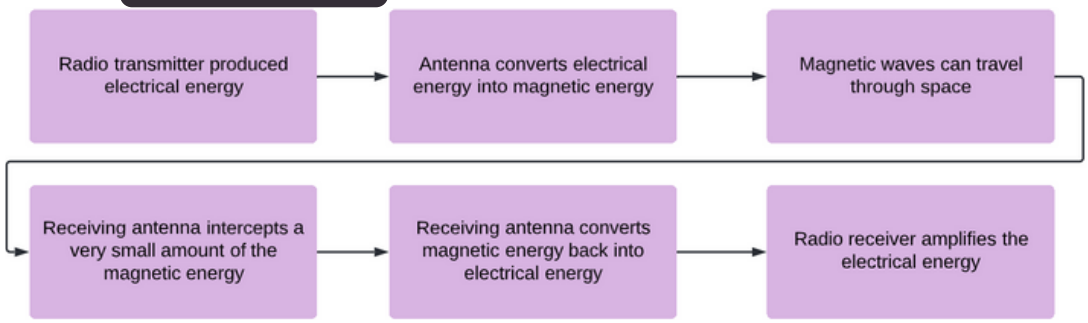
TELEMETRY: RADIO PROPAGATION

SENDING DATA



DATA LOSS IN TRANSMISSION

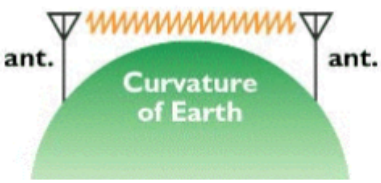
Propagation characteristics of radio waves are subject to many variables that affect the range and performance of a radio system; mainly

Obstacle

the loss in the transmission path between the transmitter and receiver.

Power loss

Line of Sight

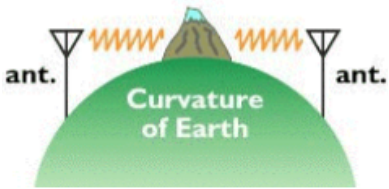


Most reliable system

A "line-of-sight" design where the radio wave travels directly from the transmitting antenna to the receiving antenna without obstructions

However, the curvature of the earth limits the line of-sight distance

Mountain



If the transmitting and receiving antennas are too far apart, the earth will block the radio wave.

The **maximum line-of-sight** transmission distance is determined by **antenna height** and may be limited by other **obstacles**

Signal power **decreases** in proportion to the square of the distance. Eg: if distance doubles, power decreases by four times.

In real life, power drops off much **faster** because of attenuation caused by obstructions, trees, foliage, and other factors. Power typically dropping off at a rate to the **fourth power** of the distance.

FREQUENCY BANDS

VHF (150-174 MHZ)

- Man-made noise from automobile and power lines
- Under certain atmospheric conditions, can cause interference and ducting.

UHF (450-470 MHZ)

- Often use because of the number of channels available.
- Less range but free from man-made noise, interferece and ducting
- Penetrate better into building because shorter wavelength has ability to reflect off conducting objects

900 MHZ (928-960 MHZ)

- Greater foliage absorption that reduces ranges
- Moving object in communication path can cause multipath reception