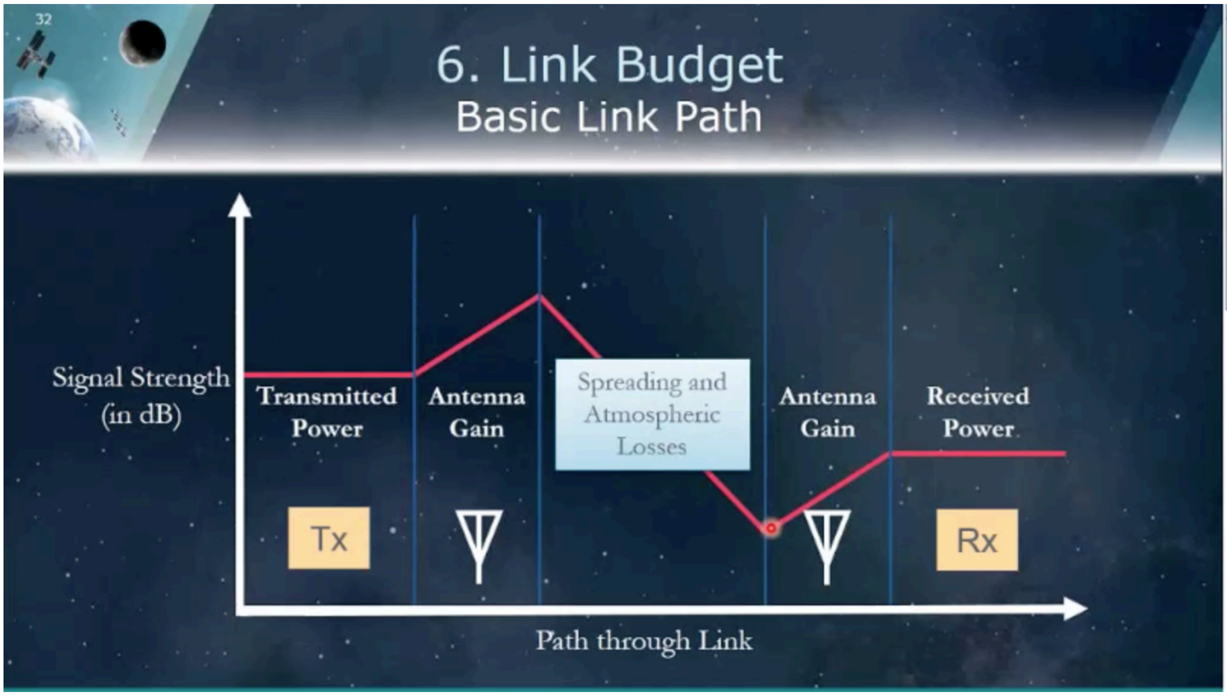
SAT COMM 101 VIDEO

-Link Budget=accounting for all signal gains and losses to ensure the signal intended for a given receiver is strong enough to get the job done.

~what you receive at antenna is a fraction of what you sent.



-Polarization=refers to orientation of the Electric Field with respect to the horizon.

~Maximum energy transfer when TX and RX polarization are the same.

~Antenna polarization is either Linear or Circular.

-Frequency Spectrum: Antennas need high frequencies!

-Typical 200-300MHz or above!

-Wave Generation:

~Dipole Antenna=Wavelength/2

~Using Ground Plane Platform:Wavelength/4

-Radiation Patterns & Gain:

~Antenna has main lobe in direction you want to send the energy.

~Side lobes & backlobes undesirable becuz they are wasted energy.

~want a directional antenna so energy reaches receiver!

~type of antenna used will determine the directivity!

-Antenna Gain: G=n*pi^2*D^2/wavelength^2

~Gain proportional to diameter of antenna

~Gain inversely proportional to wavelength

~Gain proportional to frequency

-Modulation = process used to insert information onto a carrier wave.

~Takes baseband signal and shifts it on the spectrum to the proper location.

~Demodulate to recover data at other end of system.

-Power Received at Antenna:

Received Power

$$P_r = \frac{P_t G_t G_r}{L_s} = \frac{P_t G_t G_r \lambda^2}{(4\pi R)^2} \; [W]$$

$$P_r = P_t + G_t - L_s + G_r \quad [dB]$$

-Free Space Path Loss: need to consider slant angle because satellite is not always directly overhead.

Free-Space Path Loss (Spreading)

$$L_s = \frac{(4\pi)^2 S^2}{\lambda^2}$$

in meters

Slant Range

in km

$$S = R_e\left(\sqrt{\left(\frac{(R_e + h)^2}{R_e{}^2} - \cos^2\theta\right)} - \sin\theta\right)$$