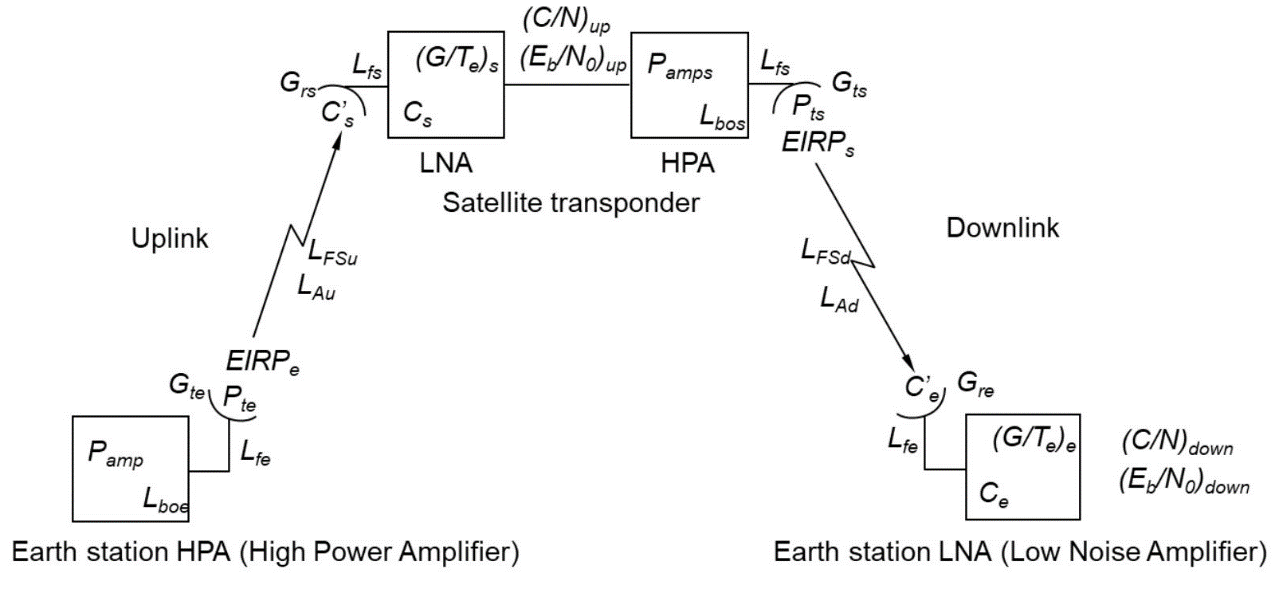
# Link Budget Equations



Transmitter EIRP (EIRP) [dB] – *EIRP* = – – +

– Transmitter Power (dBW)

– Back-off Loss (earth station only – for this assignment assume to be 0)

– feeder Loss (dB)

– Transmitter antenna Gain (dB)

Free Space Loss () [dB] – = -92.44-20\*log(.)

= slant range (kms)

= frequency (GHz)

Carrier Power Density (C’) [dBW] – C’ = *EIRP* – –

*EIRP* – Effective Isotropic Radiated Power (dB)

– Free space Loss (dB)

– Atmospheric Loss (dB)

Equivalent Noise Temperature (Te) [K] – = T\*(NF-1)

T – Receiver Environmental temperature (K)

NF – Receiver Noise Figure

Equivalent Noise Temperature (Te) [dBK] – [dBK] = 10\*log(

Receiver G/ (G/) [dB] – G/ = / = - \*is minus as values are in dB\*

– Receiver Antenna Gain (dB)

– Equivalent Noise Temperature (dBK)

C/N0 ratio [dB] – C/No =

C’ – Carrier Power Density (dBW)

– Receiver feeder Loss (dB)

*k* – Boltzmann’s constant (1.36\* )

Eb/No Ratio [dB] – Eb/No = C/No – 10log()

– maximum bit rate (bit/s)

# From Edwins method

Noise Density [dBW/Hz] –

– Receiver Antenna Gain (dB)

– Equivalent Noise Temperature (dBK)

– Receiver feeder Loss (dB)

*k* – Boltzmann’s constant (1.36\* )

Raw bit rate [bit/s] –

SF – Spreading factor

BW – Bandwidth (Hz)

Effective bit rate [bit/s] –

– Raw bit rate (bit/s)

FEC – Forward error correction code rate

Bandwidth efficiency [bit/Hz] –

– Raw bit rate (bit/s)

BW – Bandwidth (Hz)

Total Noise Power [dBw] –

- Noise density (dBw/Hz)

BW – Bandwidth (Hz)

Carrier to Noise [dB] –

C’ - Carrier Power Density (dBw)

N – Total noise power (dBw)

Eb/No ratio [dB] –

– Carrier to Noise (dB)

BW – Bandwidth (Hz)

- Effective Bit Rate (bit/s)