## SYSTEM NOISE TEMPERATURE ,C/N AND G/T RATIO

- Thermal noise in its pre amplifier
- PN=KTsB
- SYSTEM NOISE TEMPERATURE IS ALSO CALLED EFFECTIVE INPUT NOISE TEMPERATURE OF THE RECEIVER.
- IT IS DEFINED AS THE NOISE TEMPERATURE OF A NOISE SOURCE LOCATED AT THE INPUT OF A NOISELESS RECEIVER WHICH WILL PRODUCE THE SAME CONTRIBUTION TO THE RECIEVER OUT PUT NOISE AS THE INTERNAL NOISE OF THE ACTUAL SYSTEM ITSELF

## SYSTEM NOISE TEMPERATURE ,C/N AND G/T RATIO

- Ts is located at the input to the receiver.
- RF amplifier
- IF amplifier
- Demodulator
- Over all gain at the receiver G
- Narrowest bandwidth is B
- Noise power at the demodulator input is

# $P_n = KT_S BG$

### Noise temp contt---

Pr is the signal power at the input of the RF section of the receiver signal power at the demodulator input will be PrG

$$\frac{C}{N} = \frac{P_r G}{KT_S BG} = \frac{P_r}{KT_s B}$$

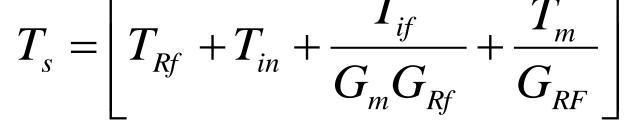
$$P_n = G_{lf} KT_{lf} B + G_{lf} G_m KT_m B + G_{lf} G_m G_{RF} KB(T_{RF} + T_{in})$$

$$P_n = G_{lf} G_M G_{Rf} \left[ \frac{KT_{lf} B}{G_{lf} G_m} + \frac{KT_m B}{G_{Rf}} + KB(T_{RF} + T_{in}) \right]$$

$$P_{n} = G_{lf}G_{M}G_{Rf}KB\left[T_{Rf} + T_{in} + \frac{T_{if}}{G_{m}G_{Rf}} + \frac{T_{m}}{G_{RF}}\right]$$

$$P_{n} = G_{lf}G_{M}G_{Rf}KBT_{s}$$
from above equation
$$KT_{s}B = KB\left[T_{Rf} + T_{in} + \frac{T_{if}}{G_{m}G_{Rf}} + \frac{T_{m}}{G_{RF}}\right]$$

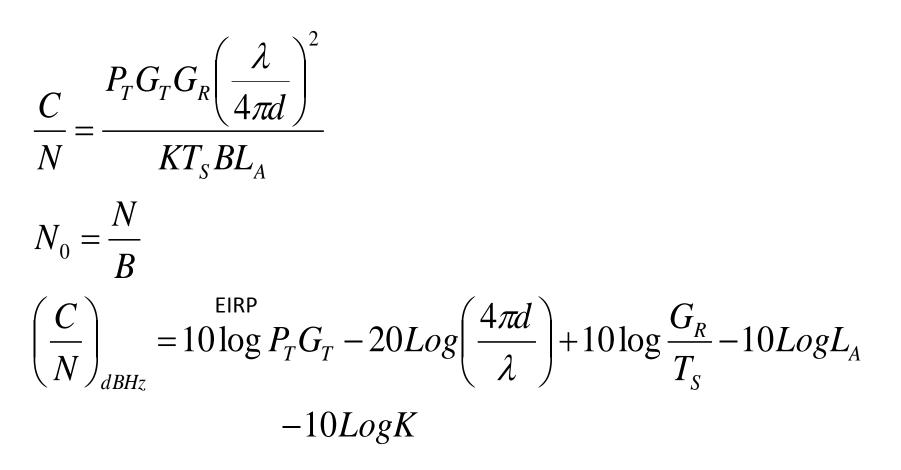
$$\left[T_{Rf} - T_{II} - T_{II}\right]$$



### Noise temp cont---

- G/T ratio is 40.7 db k<sup>-1</sup> at 4 GHz and 5<sup>0</sup> elevation
- Gr varies with frequency f^2
- Ts depends upon the sky noise temperature

#### Noise temp cont---



Gr/Ts -- ratio is called figure of merit

Atmospheric and ionospheric effect on link design

- Absorption
- refraction
- Diffusion(diffraction)
- Rotation of polarization of plane

depend on path length more pronounced at small elevation angles

Absorption and diffusion--- lower layers

---- increase in noise power at receiving antenna