Lecture 9

PRINCIPLES OF SATELLITE COMMUNICATION

C/N Contd.---

- Since the frequency response of the telephone receiver or the human ear is not flat, listener will respond differently to noise in different parts of audio spectrum.
- So some noise will go unnoticed and effective SNR will be higher than that given by above eqn. by a certain factor called ***weighting factor.***
- Value depends upon the frequency of the telephone receiver and of the user ear
- 1-78(25 db) by CCITT

Modified (S/N)wc

$$\left(\frac{S}{N}\right)_{wc} = \left(\frac{C}{N}\right)_i * \left(\frac{B}{b}\right)\left(\frac{\Delta f_{rms}}{f_{\max}}\right)^2 pq$$

$$\left(\frac{S}{N}\right)_{wc} = \left(\frac{C}{N}\right)_i + 10\log_{10}\left(\frac{B}{b}\right) + 20\log_{10}\left(\frac{\Delta f_{rms}}{f_{\max}}\right) + p + q$$

- P is 2.5 db and q is 4db
- P is psophometric weighting factor
- q Pre-emphasis improvement factor

Contt---

- Δfrms and B are usd to calculate no. of channels N carried by a multiplexed telephone signal and to the available transponder bandwidth
- Δfrms is the rms carrier deviation that a single 1KHz odBm sine wave called test tone would produce when supplied to modulator input
- Loading factor-(total rms deviation caused by a multiplexed signal is called loading factor)
- For N voice channel loading factor

$$20\log(\mathrm{l}) = -1 + 4\log_{10}(\mathrm{N}), 12 \le \mathrm{N} \le 240$$

$$= 15 + \log_{10}(N), N > 240$$

Contt---

- l Δfrms – rms multicarrier deviation

$$g = \frac{\Delta f_p}{l \Delta f_{rms}}$$

- Where Δfp is peak frequency deviation
- N>24 g is3.16
- N<24 g 6.5
- 7500pwp (psophometircally weighted power) is the noise allowed for up and down links

Contt---

$$B = 2(\Delta f_p + f_{\max})$$

$$B = 2(gl\Delta f_{rms} + 2 f_{\max})$$

$$\Delta f_{rms} = \frac{\left(\frac{B}{2} - f_{\max}\right)}{gl}$$

$$S/N = \frac{10^{-3}}{7500x10^{-12}} = 1.33x10^{5}$$

$$S/N = 51.25dB$$