Lecture 10

PRINCIPLES OF SATELLITE COMMUNICATION

Single Channel Per Carrier (SCPC)system

- Small earth station
- Few channels
- Independently modulates its own carrier
- Transmitted to the transponder
- Inexpensive multiplexing and demultiplexing equipments
- Cost of earth station is considerably reduced
- Link is active

SCPC

- Transponder power
- More band width
- not economical
- Large traffic over fixed route

$$\left(\frac{S}{N}\right)_O = \left(\frac{C}{N_o}\right)_i - 95.4 + 20\log_{10}(\Delta f_p)dB$$

$$\left(\frac{C}{N}\right) = \left(\frac{C}{N_o}\right) - 10\log_{10}(B)dB$$

SCPC

- COMPANDING
- IMPROVEMENT IN S/N RATIO

$$\left(\frac{S}{N}\right)_O = \left(\frac{C}{N_o}\right)_i - 78.4 + 20\log_{10}(\Delta f_p)dB$$

Companded signal sideband(CSSB) system

- Improves S/N ratio
- Compression
- Variable gain amplifier
- Gain to weak signal than strong signal
- Expander
- Restore the signal level
- Attenuating the low level speech signals
- 36 MHz could accommodate 1100 voice channel
- 2100 voice channel

Intermodulation products and their effects in FM/FDM SYSTEM

- TWTA operates in saturation region –
- Amplitude and phase non linear ties in fm/fdm
- Intermodulation products
- Backoff emf is introduced
- Saturation region

Energy Dispersion

- Full loading
- Minimum spectral power density occurs with the maximum modulating amplitude
- Controlling of radiated spectral density is called energy –dispersal
- Uplink – symmetric triangular waveform before modulation
- Removed at down link
- Dispersal signal

Energy dispersal

- Power density

$$W(f) = \left(\frac{c}{d\sqrt{2\pi}} \right) \exp\left[\frac{(\Delta F)^2}{(2d^2)} \right]$$

- Power c watt, deviation d Hz
- W(f) , power spectral density
- ΔF , difference between unmodulated carrier frequency fc and f

Contt---

Wmin at full load

$$W_{\min}(f) = \left(\frac{c}{d\sqrt{2\pi}}\right)\exp\left[\frac{-(\Delta F)^2}{(2d_m{}^2)}\right]$$

dm is full load rms multichannel deviation