Intermodulation product :- :- Intermodulation products are generated whenever more than one signal is carried by a nonlinear device. Sometimes filtering can be used to remove the IM product's but if they are within the bandwidth of the transponder they can not be filtered out. The overall $\left(\frac{C}{N}\right)$ ratio is given as bellow-

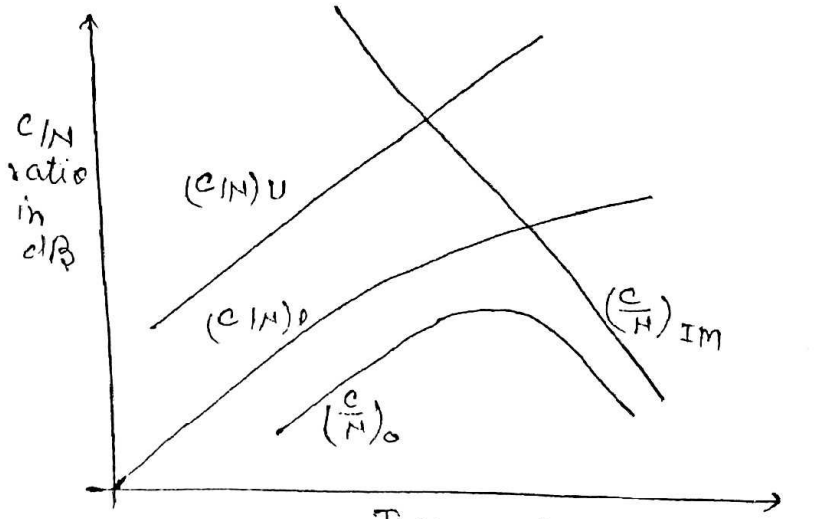
$$\left(\frac{C}{N}\right)_o = \frac{1}{\frac{1}{(C/N)_U} + \frac{1}{(C/N)_D} + \frac{1}{(C/N)_{IM}}}$$

where

$\left(\frac{C}{N}\right)_o$ = overall (C/N) ratio at reciering station.

$\left(\frac{C}{N}\right)_U$ increases linearly but

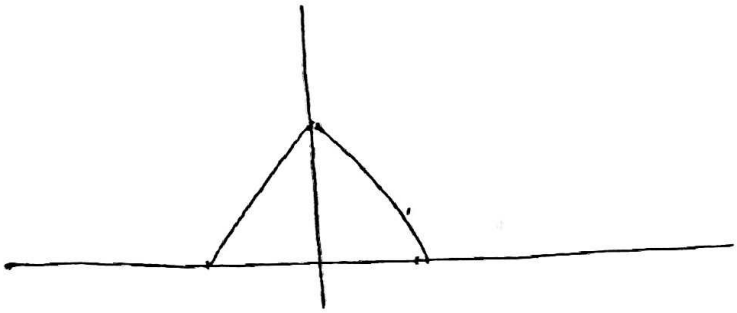
$\left(\frac{C}{N}\right)_D$ increases less rapidly as transponder saturates



→ $\frac{C}{N}$ ratio for a link using nonlinear Transponder ←

Energy Dispersion :- :- Maximum spectral power density is restricted to avoid the interference with other link's operating at the same frequency. The process of controlling the radiated spectral density is called energy dispersion.

the radiated power 4kHz of Bandwidth must not rise more than 2 dB above its value for full loading.



Dispersion signal or
. Symmetrical triangular voltage Signal.

**Problem:- Three identical Large earth stations with 500 watt saturated output power transmits excess a 36 MHz BW, transponder using FDMA. The transponder saturated output power is 40 W and it's operated with 3dB↓ output back off with FDMA. The gain of the transponders is 105 dB in a linear range. The band width of earth station signals are -

(a)» 15 MHz
(b)» 10 MHz
(c)» 5 MHz

Find out power level at the output of transmitter and at the input of transponder in dB for each earth station signal. Assuming that the transponder is operating in it's linear region with 3 dB backoff. Each earth station must transmitt 250 W to achieve an output power of 20 W from the transponder. Find the transmitt power for each station when the transponder is operated with FDMA by three earth stations.

Solution:-