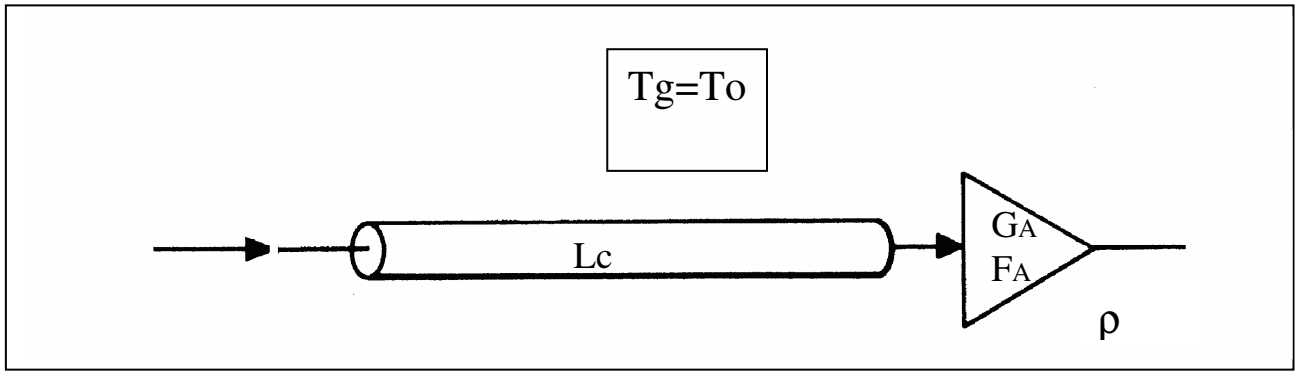
In un collegamento numerico in cavo di lunghezza 2 km con $\alpha = 3$ dB/km

S_T= 0dBm (1 mW) , F_A=5dB, ρ =50 dB ,B=4 kHz



$$F = L_c F_A \qquad G = \frac{G_A}{L_c} \qquad \rho = \frac{S_u}{N_u} = \frac{S_T \frac{G_A}{L_c}}{F_A L_c k T_0 B_p \frac{G_A}{L_c}}$$

$$S_T = \rho F_A k T_o B L_c$$

$$S_{TdBm} = \rho_{dB} + F_{AdB} + 10 \log(k T_o)_{\text{dBm}} + 10 \log B + L_{cdB}$$

$$10 \log Wn = 10 \log (k T_0) = 10 \log (1.38\ 10^{-23}\ \ 290) = -204\ dBW$$
$$= 10 \log (1.38\ 10^{-23}\ \ 290\ \ 10^{3}) = -174\ dBm$$

$$10 \log (4\ 10^{3}) = 6 + 30 = 36$$

$$N_{dBm}(4kHz) = 10 \log Wn + 10 \log B = -138\ dBm$$

Per cui

$$0_{dBm} = 50 + 5 - 174 + 36 + L_{cdB} = \quad -83 + L_{cdB}$$

$$L_{cdB} = 83 \ \text{per cui} \ d = (83 : 3) = 27.6\ km$$