GPRS (M2M)

$P_E = 2W$ $\quad P_{R\,MIN} = -101\ dBm$

$G_T = 10\ dB$ $\quad G_R = 0\ dB$

$A_E = 3\ dB$ $\quad A_R = 1\ dB$

$\eta_{TD} = 1$ $\quad f_0 = 1.8\ GHz$ $\quad \eta_{RD} = 1$

$c = 10^4$

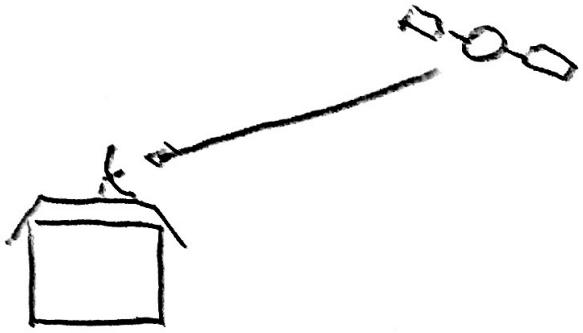
$\beta = 3.5$

$d_{max} = ?$

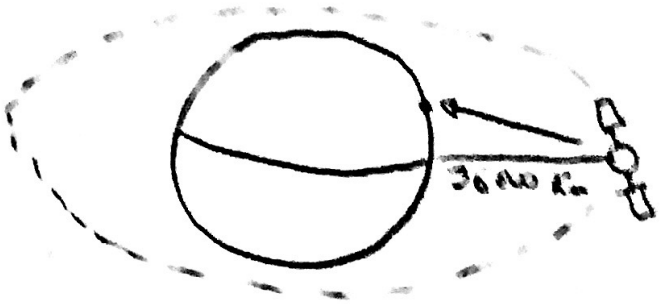
$$P_R = P_E \frac{1}{A_E} \eta_{TD} G_T \frac{1}{A_R} \eta_{RD} G_R / c\, d_{max}^{\beta} > P_{R\,MIN}$$

$$= 2 \frac{1}{2} 1\ 10 \frac{1}{1.26} 1\ 1 / 10^4 d_{max}^{3.5} > 79\ 10^{-15}$$

$$d_{max}^{3.5} < 10^{10} \rightarrow d_{max} \sim 720\ m$$



TV-SAT



$P_E = 10^3$ W

$G_T = 40$ dB

$A_E = 0$ dB

$\eta_{Ra} = 1$

$P_{RMIN} = -160$ dBW

$G_R = ?$ → $D_{min} = ?$

$A_R = 3$ dB

$\eta_{Ra} = 0.7$

$f_0 = 12$ GHz

FREE SPACE

$d = 39000$ Km

$P_R = P_{RMIN}$

$$P_R = P_E \frac{1}{A_E} \eta_{Ra} G_T \frac{1}{A_R} \eta_{Ra} G_R \Big/ \left(\frac{4\pi d}{\lambda}\right)^2$$

$$= 10^3 \, 1 \, 1 \, 10^4 \, \frac{1}{2} \, 0.7 \, G_R \Big/ \left(4\pi \, 39\,10^6 / 3\,10^8 / 12\,10^9\right)^2$$

$G_R > 1.1\,10^3$ → $\pi^2 D^2 / \lambda^2 > 1.1\,10^3$ → $D_{min} = 26$ cm