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Taller Comunicaciones:

$X = 6$

$Y = 46$

Datos Problema:

$F_c = 1X\ GHz$ → Frecuencia de Portadora

$Eb/No = 13\ dB$

$G_{A_{TX}} = 7\ dB$ Ganancia Antena TX

$G_{A_{RX}} = 10\ dB$ Ganancia Antera RX

$d = 46\ Km$

$PIRE = 5\ W$

$V_{TX} = 20\ Mbps$

$d_{-m} = 46000\ m$

¿Calcular la potencia de transmisión (P_{TX}) necesaria para tener una cobertura en el enlace de Y Km, para un sistema 16-QAM

$$\lambda = \frac{3\times10^8}{F_c} = \frac{3\times10^8}{16\times10^9} = \frac{3}{160} = 0{,}01875$$

$$\frac{B}{V_{TX}} = \frac{1}{4} \qquad B = \frac{1}{4} V_{TX} \qquad B = 5\ Mbps$$

$$\left(\frac{B}{V_{TX}}\right)_{dB} = 10\ Log_{10}\left(\frac{1}{4}\right) = -6{,}0205\ dB$$

$$\left(\frac{Eb}{No}\right)_{dB} = \left(\frac{C}{N}\right)_{dB} + \left(\frac{B}{V_{TX}}\right)_{dB}$$

$$\left(\frac{C}{N}\right)_{dB} = 13\ dB - (-6{,}0205\ dB) = 19{,}0205\ dB$$

$$\frac{C}{N} = C - N \qquad \left(\frac{C}{N}\right) + N = C$$

$$N = KTB$$

$$N = K_T(5\times10^6)$$

$$N = 2{,}07\times10^{-14}$$

$$N_{dBm} = -106{,}8402\ dBm$$

$K = 1{,}38\times10^{-23}$

$T = 300\ K$

$$N_{dBm} = 10\ Log_{10}\left(1000 * 2{,}07\times10^{-14}\right)$$

$$N = 10\ Log_{10}$$

$$C = 19{,}0205\ dB + (-106{,}8402\ dBm)$$

$$C = -87{,}81\ dBm$$

$C = PIRE + G_{ARx} - L_o$

$PIRE = C - G_{ARx}$

$L_o(dB) = 20 \log_{10}\left(\frac{4\pi \cdot 46000}{0,0187 \cdot 5}\right)$

$L_o(dB) = 149,7793\ dB$

$PIRE = P_{TX} + G_{ATX}$

$P_{TX}(dBm) = PIRE - G_{ATX}$

$P_{TX}(dBm) = 51,96\ dBm - 7\ dB$

$PIRE(dBm) = -87,81\ dBm - 10\ dB + 149,77\ dB$

$PIRE(dBm) = 51,96\ dBm$

$P_{TX}(dBm) = 44,96\ dBm$

$P_{TX}(W) = \frac{1W * 10^{(44,96\ dBm/10)}}{1000}$

$P_{TX}(W) = 31,33\ W$