CALCULATE MINIMUM ANTENNA GAIN.

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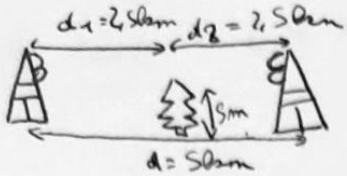
LAB 2



Fresnel zone:

60% should be free so $N = 0,6$.

$d_1 = d_2 = 2,5\,km$

$f = 2400\,MHz$

$d = 5\,km$

$$r = 17,31 \sqrt{\frac{N(d_1 \times d_2)}{f d}}$$

$$r \simeq 9,68$$

Earth bulb:

The distance in inferior to 7 miles, therefore we do not need to ~~calculate~~ consideration the earth bulb.

Free-space path loss:

$d = 5\,km$

$f = 2400\,MHz$

$$FSPL(dB) = 20\log_{10}(d) + 20\log_{10}(f) + 32,44$$

$$\simeq 114\ dB$$

Loss due to obstacle:

Using the first fresnel zone, we can compute for different N values.

For $N = 0,2$ (which is 20%) we have $r > 5m$.

Since we need 60% to be ~~free~~ clear, we can consider FSPL as propagation loss.

Rain loss: $10 * 5dB = 50dB$

Connectors loss: 2 connector on antenna: 0,02 dB

Cable loss: We need the height of the antenna:

it is = h + obstacle height

= 9, 68 + 5 m

= 14,68 m

Cable loss = $0,075 * 14,68 = 1,1 dB$.

Average noise level = $-90 / 5000 = -0,018$

Total loss = rain loss + connectors loss + cable loss + FSPL + average noise level

= 50 + 0,02 + 1,1 + 114 − 0,018

= 165,1 dB

tx_output_power + gains + loss ≥ min_Rx_power.

gains ≥ output power + loss + SNR (= min_rx_power)

gains ≥ − 100 + 15 + 165,1

gains ≥ 80,1 dB