Ganancia, pérdida y uso de dB

① $P_O = 0{,}5\ W$ y $P_I = 0{,}25\ W$

$G(dB) = 10 \log (P_s/P_e) = 10 \log (P_O/P_I) = 10 \log (0{,}5W/0{,}25\ W) = \boxed{3{,}01\ dB}$

② $V_e = 450\ mV$ y $V_s = 75\ mV$

$G(dB) = 20 \log (V_s/V_e) = 20 \log (75\ mV/450\ mV) = \boxed{-15{,}56\ dB}$

③ $P_i = 1\ W$ (ganancia absoluta → nivel de señal en un punto)

$1\ W = 1000\ mW \Rightarrow dBmW = 10 \log P_i = 10 \log (1000\ mW) = \boxed{30\ dBmW}$

④ $P_e = 0\ dBm$ y $G = -5\ dB$

- $G(dB) = P_{s_{dB}} - P_{e_{dB}}$

$-5\ dB = P_{s_{dB}} - 0\ dBm \Rightarrow P_{s_{dB}} = -5\ dBm$

- $dBm = 10 \log P_s$

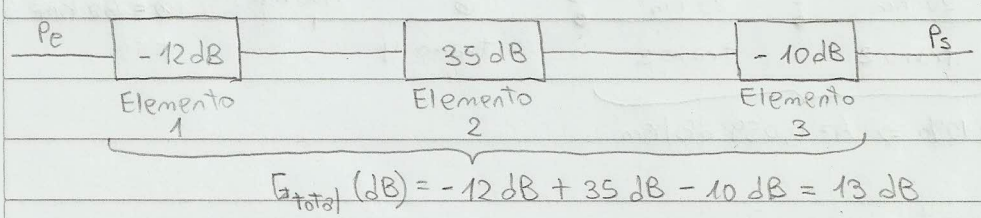
$-5\ dBm = 10 \log P_s$

$\frac{-5\ dBm}{10} = \log P_s \Rightarrow P_s = 10^{-5dBm/10} \Rightarrow \boxed{P_s = 0{,}316\ mW}$

⑤ $P_e = 10\ mW$ y $P_s = 5\ mW$

$G(dB) = 10 \log (P_s/P_e) = 10 \log (5\ mW/10\ mW) = \boxed{-3\ dB}$ → hay una pérdida de 3 dB

⑥ $P_s = ?$, $P_e = 4\ mW$



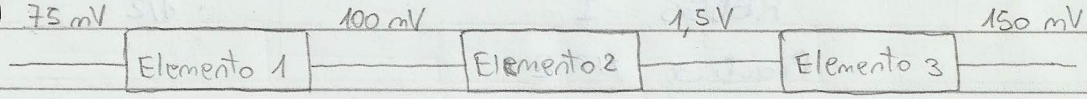
$G_{total}(dB) = -12\ dB + 35\ dB - 10\ dB = 13\ dB$

- $G(dB) = 10 \log (P_s/P_e)$

$G/10 = \log (P_s/P_e)$

$10^{G/10} = P_s/P_e \Rightarrow P_s = P_e \cdot 10^{G/10} = (4\ mW) \cdot 10^{13\ dB/10} = \boxed{79{,}8\ mW}$

⑦

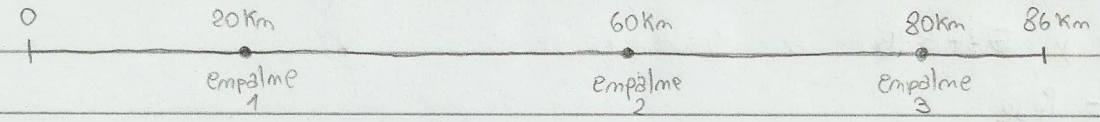


- $E_1 = 20 \log (100\ mV / 75\ mV) = \boxed{2,49\ dB}$
- $1,5\ V = 1500\ mV \Rightarrow E_2 = 20 \log (1500\ mV / 100\ mV) = \boxed{23,52\ dB}$
- $E_3 = 20 \log (150\ mV / 1500\ mV) = \boxed{-20\ dB}$

- Ganancia total:

$G(dB) = E_1 + E_2 + E_3 = 2,49\ dB + 23,52\ dB - 20\ dB = \boxed{6,01\ dB}$

⑧ Atenuación = 0,054 dB/Km , Tendido de 86 Km , atenuación por empalme de 3 dB



a) Atenuación total:

$0,054\ dB/Km \cdot 86\ Km = 4,64\ dB$
$3\ empalmes \cdot 3\ dB/empalme = 9\ dB$

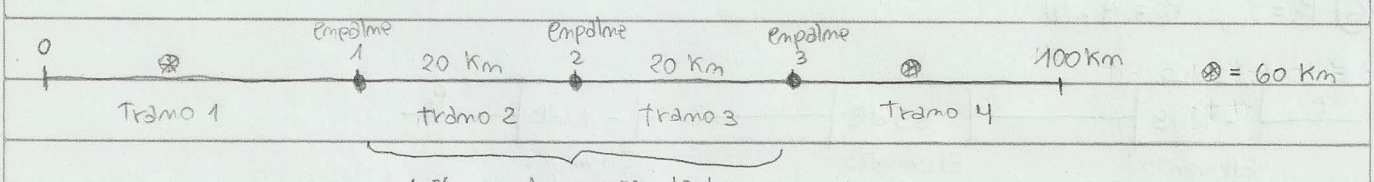
$\Rightarrow A_{Total} = 4,64\ dB + 9\ dB = \boxed{13,64\ dB}$

b) Atenuación a los 62 Km:

$0,054\ dB/Km \cdot 62\ Km = 3,35\ dB$
$2\ empalmes \cdot 3\ dB/empalme = 6\ dB$

$A_{62Km} = 3,35\ dB + 6\ dB = \boxed{9,35\ dB}$

⑨ A = 0,054 dB/Km , tendido de 100 Km , atenuación por empalme de 4dB



$0,054\ dB/Km \cdot 60\ Km = 3,24\ dB$
$0,059\ dB/Km \cdot 40\ Km = 2,36\ dB$
$3\ empalmes \cdot 4\ dB/empalme = 12\ dB$

$A_T = 3,24\ dB + 2,36\ dB + 12\ dB = \boxed{17,6\ dB}$

Práctica Nº 2

(10) $A = 0{,}35\ dB/km$, $P_e = 25\ \mu W$, longitud $= 20\ km$

- $A_T = 0{,}35\ dB/km \cdot 20\ km = 7\ dB \Rightarrow P(dB) = 7\ dB$

- $P(dB) = 10 \log (P_e/P_s)$

  $7\ dB/10 = \log (P_e/P_s)$

  $10^{0{,}7\,dB} = P_e/P_s \Rightarrow P_s = \frac{P_e}{10^{0{,}7\,dB}} = \frac{25\ \mu W}{10^{0{,}7\,dB}} = \boxed{5\ \mu W}$

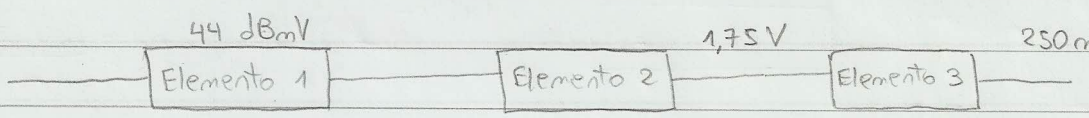
(11) $P_e = -20\ dBm$, longitud $= 1200\ m = 1{,}2\ km$, $P_s = -22{,}5\ dBm$

- $G(dB) = P_s - P_e = -22{,}5\ dBm - (-20\ dBm) = -2{,}5\ dBm$

- $1200\ m$ _____ $-2{,}5\ dB/km$

  $1000\ m$ _____ $?\ dB/km \Rightarrow \boxed{2{,}08\ dB/km}$

(12)



- $E_3 = 20 \log (250\ mV / 1750\ mV) = \boxed{-16{,}9\ dB}$

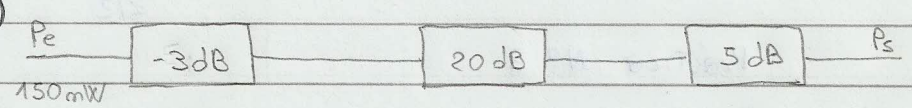
- $dBmV = 20 \log V_{SE1}$

  $E_1/20 = \log V_{SE1}$

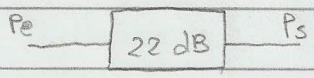
  $10^{E_1/20} = V_{SE1} \Rightarrow V_{SE1} = 10^{44\,dBmV/20} = 158{,}5\ mV$

- $E_2 = 20 \log (1750\ mV / 158{,}5\ mV) = \boxed{20{,}8\ dB}$

(13)



- $G_{total}\,(dB) = -3\,dB + 20\,dB + 5\,dB = 22\,dB$



- $G(dB) = 10 \log (P_s / P_e)$

$22\,dB / 10 = \log (P_s / P_e)$

$10^{2,2\,dB} = P_s / P_e \Rightarrow P_s = P_e \cdot 10^{2,2\,dB} = (150\,mW)\,10^{2,2\,dB} = 23.773,4\,mW$

- $dBmW = 10 \log P_s = 10 \log (23773,4\,mW) = \boxed{43,76\,dBmW}$