Link Budgets

Exercise 1: Which of the quantities above will be in dBm and which will be in dB?

(a) transmitter output <u>power</u>   dBm

(b) transmit antenna gain   dB(i)

(c) path loss   dB

(d) receive antenna gain   dB

(e) receiver noise power   dBm

(f) link margin   16 dBm − 10 dBm = dB

Exercise 2: Classify the likely origin for each of the values. For example, a physical constant, a system specification, a value chosen by the system designer or a value computed from other lines. Write the equation for each of the computed values in terms of the values of other lines.

where from   equation
↓   ↓

a	transmitter power output	43	dBm (20 W)
b	transmit antenna gain	20	dB
c	frequency	4	GHZ
e	wavelength	7.5	cm
f	path distance	42,164	km
g	free-space path loss	197	dB
h	receiver antenna gain	45	dB
i	feedline loss	1	dB
j	received signal power	-90	dBm
k	kT	-174	(dBm/Hz)
l	receiver noise bandwidth	67	dB-Hz (5 MHz)
m	receiver noise figure	1	dB
n	received noise power	-106	dBm
m	IF SNR	16	dB

design

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spec.

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design

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computed → $j = a + b - g + h$
$\qquad\qquad\qquad -i$

physical constant

design /

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computed → $n = k + l + m$

computed → $m = j - n$