

Link Budgets

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

- transmitter output power dBm
- transmit antenna gain dB
- path loss dB
- receive antenna gain dB
- receiver noise power dBm
- link margin dB ← difference between two values in dBm

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.

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

where from
equation
↓
↓

design
 "
 spec.
 "
 spec (geostationary orbit).
 computed (Friis)
 design
 "
 computed $\rightarrow j = a + b - g + h$
 $-i$
 physical constant
 design
 "
 computed $\rightarrow n = k + l + m$
 computed $\rightarrow m = j - n$