

Link Budget Calculation

	unit	u1	d1	d2
modulation method		FM	FM	CW
purpose		command	mission data	beacon
transmitter power	W	50	0.8	0.1
transmit feeder loss	dB	1	0.5	0.5
reception feeder loss	dB	0.5	1	1
antenna noise temperature	K	100	300	300
feeder noise temperature	K	313	313	313
receiver noise temperature	K	359	172	172
distance between R&T antenna	km	739	739	739
wavelength	km	0.00208	0.00069	0.00069
frequency	MHz	144	435	435
absorption coefficient of oxygen	dB/km	0.005	0.005	0.005
absorption coefficient of vapor	dB/km	0	0	0
length of equivalent path of oxygen	km	45.9	45.9	45.9
length of equivalent path of vapor	km	22.9	22.9	22.9
angle of elevation	deg	30	30	30
ground temperature	K	300	300	300
Tm(clear weather)	K	286	286	286
Tm(rain)	K	286.5	286.5	286.5
required Eb/NO	dB	23.2	21	9.6
required S/N	dB	23.2	21	10
hardware deterioration	dB	3.5	3.5	3.5
coding gain	dB	3.1	3.1	0
bit rate	dBHz	30.79	30.79	6.99
modulation loss	dB	3.5	3.5	3.5
antilogarithm of feeder loss		1.12	1.26	1.26
center frequency	MHz			
transmitter power	dBW	17.0	-1.0	-10.0
transmit antenna gain	dB _i	11.6	2.15	2.15
transmit EIRP	dBW	26.6	-0.3	-9.4
transmit antenna pointing loss	dB	1	1	1
path loss	dB	133.0	142.6	142.6
polarization coupling loss	dB	3	3	3
air absorption loss	dB	0.229	0.229	0.229
rain loss	dB	0	0	0
reception antenna pointing loss	dB	1	1	1
reception G/T	dB/K	-30.2	-16.9	-16.9
reception antenna gain	dB _i	0	13.1	13.1
feeder loss	dB	0.5	0.5	0.5
noise figure of receiver	dB	3.5	1	1
system noise temperature	dBK	28.7	28.5	28.5
Boltzmann's constant	dBW/Hz·K	228.6	228.6	228.6
reception C/No	dBHz	88.8	65.6	56.6
required C/No	dBHz	57.9	55.7	23.6
margin	dB	30.9	9.9	33.0