

NOISE BUDGET REFERENCE CALCULATION

Beam	Uplink	Downlink
	USA	AOR
1	145.010 MHz	145.010 MHz
2	145.015 MHz	145.015 MHz
3	145.020 MHz	145.020 MHz
4	145.025 MHz	145.025 MHz
5	145.030 MHz	145.030 MHz
6	145.035 MHz	145.035 MHz
7	145.040 MHz	145.040 MHz
8	145.045 MHz	145.045 MHz
9	145.050 MHz	145.050 MHz
10	145.055 MHz	145.055 MHz
11	145.060 MHz	145.060 MHz
12	145.065 MHz	145.065 MHz
13	145.070 MHz	145.070 MHz
14	145.075 MHz	145.075 MHz
15	145.080 MHz	145.080 MHz
16	145.085 MHz	145.085 MHz
17	145.090 MHz	145.090 MHz
18	145.095 MHz	145.095 MHz
19	145.100 MHz	145.100 MHz
20	145.105 MHz	145.105 MHz
21	145.110 MHz	145.110 MHz
22	145.115 MHz	145.115 MHz
23	145.120 MHz	145.120 MHz
24	145.125 MHz	145.125 MHz
25	145.130 MHz	145.130 MHz
26	145.135 MHz	145.135 MHz
27	145.140 MHz	145.140 MHz
28	145.145 MHz	145.145 MHz
29	145.150 MHz	145.150 MHz
30	145.155 MHz	145.155 MHz
31	145.160 MHz	145.160 MHz
32	145.165 MHz	145.165 MHz
33	145.170 MHz	145.170 MHz
34	145.175 MHz	145.175 MHz
35	145.180 MHz	145.180 MHz
36	145.185 MHz	145.185 MHz
37	145.190 MHz	145.190 MHz
38	145.195 MHz	145.195 MHz
39	145.200 MHz	145.200 MHz
40	145.205 MHz	145.205 MHz
41	145.210 MHz	145.210 MHz
42	145.215 MHz	145.215 MHz
43	145.220 MHz	145.220 MHz
44	145.225 MHz	145.225 MHz
45	145.230 MHz	145.230 MHz
46	145.235 MHz	145.235 MHz
47	145.240 MHz	145.240 MHz
48	145.245 MHz	145.245 MHz
49	145.250 MHz	145.250 MHz
50	145.255 MHz	145.255 MHz
51	145.260 MHz	145.260 MHz
52	145.265 MHz	145.265 MHz
53	145.270 MHz	145.270 MHz
54	145.275 MHz	145.275 MHz
55	145.280 MHz	145.280 MHz
56	145.285 MHz	145.285 MHz
57	145.290 MHz	145.290 MHz
58	145.295 MHz	145.295 MHz
59	145.300 MHz	145.300 MHz
60	145.305 MHz	145.305 MHz
61	145.310 MHz	145.310 MHz
62	145.315 MHz	145.315 MHz
63	145.320 MHz	145.320 MHz
64	145.325 MHz	145.325 MHz
65	145.330 MHz	145.330 MHz
66	145.335 MHz	145.335 MHz
67	145.340 MHz	145.340 MHz
68	145.345 MHz	145.345 MHz
69	145.350 MHz	145.350 MHz
70	145.355 MHz	145.355 MHz
71	145.360 MHz	145.360 MHz
72	145.365 MHz	145.365 MHz
73	145.370 MHz	145.370 MHz
74	145.375 MHz	145.375 MHz
75	145.380 MHz	145.380 MHz
76	145.385 MHz	145.385 MHz
77	145.390 MHz	145.390 MHz
78	145.395 MHz	145.395 MHz
79	145.400 MHz	145.400 MHz
80	145.405 MHz	145.405 MHz
81	145.410 MHz	145.410 MHz
82	145.415 MHz	145.415 MHz
83	145.420 MHz	145.420 MHz
84	145.425 MHz	145.425 MHz
85	145.430 MHz	145.430 MHz
86	145.435 MHz	145.435 MHz
87	145.440 MHz	145.440 MHz
88	145.445 MHz	145.445 MHz
89	145.450 MHz	145.450 MHz
90	145.455 MHz	145.455 MHz
91	145.460 MHz	145.460 MHz
92	145.465 MHz	145.465 MHz
93	145.470 MHz	145.470 MHz
94	145.475 MHz	145.475 MHz

Carrier parameters

	D1	D2	D3	D4	D5	D6	D7
Data Rate (Mbps)	0.064	0.384	1.544	2.048	9.216	45	69.64
FEC	0.682	0.682	0.875	0.682	0.75	0.75	0.795
Modulation	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK	QPSK
C/(N+I) - Total Required (dB)	7.4	7.4	10.8	7.4	9.9	5.6	8.7

Uplink

	D1	D2	D3	D4	D5	D6	D7
Uplink Frequency (MHz)	14000	14000	14000	14000	14000	14000	14000
Tx antenna Input power (dBW)	-2.52	5.29	10.25	12.55	18.67	25.56	27.22
Input power density (dBW/Hz)	-50	-50	-50	-50	-50	-50	-50
Tx Antenna Diameter (Metres)	4.50	1.80	1.20	1.80	2.40	4.50	7.00
Tx Antenna Efficiency	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Tx Antenna Gain (dB)	54.5	46.6	43.0	46.6	49.1	54.5	58.4
Mispointing loss (dB)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Atmospheric loss (dB)	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Uplink Path loss (dB)	207.8	207.8	207.8	207.8	207.8	207.8	207.8
Uplink Rain Attenuation (dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max. Satellite antenna G/T (dB/K)	7.0	7.0	7.0	7.0	7.0	7.0	7.0

Edge of coverage USA (dB)	6.0	6.0	3.0	6.0	6.0	6.0	6.0
(C/I) _{Up-Intrasystem} (dB)	30.0	30.0	30.0	30.0	30.0	30.0	30.0
(C/I) _{Up-ASI} (dB)	32.2	24.2	20.7	24.2	26.7	32.2	36.0
(C/N) _{Uplink Thermal} (dB)	25.5	17.6	17.1	17.6	20.1	25.5	29.4
C/(N _{thermal} +N _{ASI} +N _{Intrasystem}) (dB)	23.6	16.5	15.4	16.5	18.9	23.6	26.2

Downlink

	D1	D2	D3	D4	D5	D6	D7
Downlink Frequency (MHz)	11600	11600	11600	11600	11600	11600	11600
Beam peak EIRP density (dBW/Hz)	-23	-23	-23	-23	-23	-23	-23
Downlink EIRP/Carrier (dBW)	24.48	32.29	37.25	39.55	45.67	52.56	54.22
Edge of coverage AOR (dB)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Downlink EIRP/Carrier at EOC (dBW)	20.48	28.29	33.25	35.55	41.67	48.56	50.22
Rx E/S Antenna Diameter (Metres)	0.90	1.80	2.40	1.20	2.40	0.90	1.80
Rx Antenna Efficiency	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Rx Antenna Gain (dB)	38.9	44.9	47.4	41.4	47.4	38.9	44.9
Rx System Noise temp (K)	110.0	110.0	110.0	110.0	110.0	110.0	110.0
Rx E/S G/T (dB/K)	18.5	24.5	27.0	21.0	27.0	18.5	24.5
Antenna mispointing error (dB)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Atmospheric loss (dB)	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Downlink Path loss (dB)	206.1	206.1	206.1	206.1	206.1	206.1	206.1
Downlink Rain Attenuation (dB)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(C/I) _{Dn Intra-system} (dB)	30.0	30.0	30.0	30.0	30.0	30.0	30.0
(C/I) _{Down-ASI} (dB)	16.9	22.9	25.4	19.4	25.4	16.9	22.9
(C/N) _{Downlink Thermal} (dB)	13.1	19.2	21.7	15.6	21.7	13.2	19.2
C/(N _{thermal} +N _{ASI} +N _{Intrasystem}) (dB)	11.5	17.4	19.7	14.0	19.7	11.6	17.4

End-to-End

	D1	D2	D3	D4	D5	D6	D7
(C/N+I) - Total Actual (dB)	11.3	13.9	14.0	12.1	16.3	11.3	16.9
(C/N+I) - Total Required(dB)	7.4	7.4	10.8	7.4	9.9	5.6	8.7
Margin (dB)	3.9	6.5	3.2	4.7	6.4	5.7	8.2