

NOISE BUDGET REFERENCE CALCULATION

Beam Uplink Downlink
USA SSA

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

$(C/I)_{\text{Up-Intrasystem}}$ (dB)	30.0	30.0	30.0	30.0	30.0	30.0	30.0
$(C/I)_{\text{Up-ASI}}$ (dB)	32.2	24.2	20.7	24.2	26.7	32.2	36.0
$(C/N)_{\text{Uplink Thermal}}$ (dB)	25.5	17.6	17.1	17.6	20.1	25.5	29.4
$C/(N_{\text{thermal}}+N_{\text{ASI}}+N_{\text{intrasystem}})$ (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)	11500	11500	11500	11500	11500	11500	11500
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 SSA (dB)	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Downlink EIRP/Carrier at EOC (dBW)	18.48	26.29	31.25	33.55	39.67	46.56	48.22
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)	38.8	44.8	47.3	41.3	47.3	38.8	44.8
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)	18.4	24.4	26.9	20.9	26.9	18.4	24.4
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
$(C/I)_{\text{Dn Intra-system}}$ (dB)	30.0	30.0	30.0	30.0	30.0	30.0	30.0
$(C/I)_{\text{Down-ASI}}$ (dB)	16.9	22.9	25.4	19.4	25.4	16.9	22.9
$(C/N)_{\text{Downlink Thermal}}$ (dB)	11.1	17.2	19.7	13.6	19.7	11.2	17.2
$C/(N_{\text{thermal}}+N_{\text{ASI}}+N_{\text{intrasystem}})$ (dB)	10.1	16.0	18.3	12.5	18.3	10.1	16.0

End-to-End

	D1	D2	D3	D4	D5	D6	D7
(C/N+I) - Total Actual (dB)	9.9	13.2	13.6	11.1	15.6	9.9	15.6
(C/N+I) - Total Required(dB)	7.4	7.4	10.8	7.4	9.9	5.6	8.7
Margin (dB)	2.5	5.8	2.8	3.7	5.7	4.3	6.9