

# EchoStar-18 Link Budgets

(8PSK1)

Link Parameters		NYC	Charlotte	Miami	Detroit	Birmingham	Fargo	Houston	Seattle	San Diego
<b>Link Geometry:</b>										
Tx E/S Range to Satellite	(km)	38,202	38,202	38,202	38,004	38,202	38,004	36,888	38,191	36,988
Rx E/S Range to Satellite	(km)	38,573	37,866	37,384	38,249	37,484	38,212	36,966	38,255	37,009
<b>Uplink (per carrier):</b>										
Carrier Frequency	(MHz)	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500
Tx E/S Antenna Diameter	(m)	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2
Tx E/S Power to Antenna	(dBW)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Tx E/S Antenna Gain	(dB)	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8	65.8
Tx E/S EIRP per Carrier	(dBW)	73.8	73.8	73.8	73.8	73.8	73.8	73.8	73.8	73.8
Atmospheric and Other Losses	(dB)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Free Space Loss	(dB)	208.9	208.9	208.9	208.9	208.9	208.9	208.6	208.9	208.7
<b>Satellite:</b>										
G/T towards Tx E/S	(dB/K)	12.3	12.3	12.2	11.8	12.2	11.9	10.7	12.1	12.0
Peak EIRP	(dBW)	56.4	57.1	57.9	56.7	58.2	56.2	58.2	53.2	54.0
EIRP towards Rx E/S	(dBW)	56.2	55.8	56.7	56.0	57.6	55.3	58.0	52.9	53.6
<b>Downlink (per carrier):</b>										
Carrier Frequency	(MHz)	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500	12,500
Atmospheric Losses	(dB)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Free Space Loss	(dB)	206.1	205.9	205.8	206.0	205.9	206.0	205.7	206.0	205.7
Rain Attenuation	(dB)	4.7	4.7	5.8	4.7	6.2	4.3	7.1	2.6	2.4
Rx E/S Antenna Diameter	(m)	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Antenna Mis-pointing Error	(dB)	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Rx E/S Antenna Gain	(dB)	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0	34.0
Rx E/S G/T	(dB/K)	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2
Noise Temperature - Clear Sky	(K)	120	120	120	120	120	120	120	120	120
Noise Temperature - Rain	(K)	303	301	323	302	329	299	341	243	237
<b>Total Link:</b>										
Noise Bandwidth	(dB-Hz)	73.6	73.6	73.6	73.6	73.6	73.6	73.6	73.6	73.6
(C/N) - Thermal Uplink	(dB)	31.9	31.9	31.8	31.4	31.8	31.5	30.6	31.7	31.8
(C/N) - Thermal Downlink - Clear Sky	(dB)	17.9	17.6	18.7	17.8	19.5	17.1	20.0	14.7	15.6
(C/N) - Thermal Downlink - Rain Down	(dB)	9.1	9.0	8.5	9.0	9.0	8.8	8.5	9.0	10.3
(C/I) - Adjacent Satellite Interference	(dB)	26.7	26.4	27.4	26.5	28.3	25.9	28.8	23.4	24.4
(C/I) - Other Link Degradations	(dB)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
(C/N) - Clear Sky	(dB)	12.9	12.9	13.2	12.9	13.5	12.6	13.6	11.5	12.0
(C/N) - Rain Down	(dB)	8.0	7.9	7.6	8.0	7.9	7.8	7.5	7.9	8.9
(C/N) - Total Required	(dB)	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Downlink Margin - Clear Sky	(dB)	5.4	5.4	5.7	5.4	6.0	5.1	6.1	4.0	4.5
Downlink Margin - Rain Down	(dB)	0.5	0.4	0.1	0.5	0.4	0.3	0.0	0.4	1.4
Downlink Availability	(%)	99.96	99.94	99.92	99.97	99.96	99.97	99.97	99.95	99.99