

EchoStar 17/24 GHz Link Budget

Link Parameters		Clear Sky (L.A.)	Faded D/L (L.A.)	Clear Sky (New York)	Faded D/L (New York)	Clear Sky (Miami)	Faded D/L (Miami)	Clear Sky (Puerto Rico)	Faded D/L (Puerto Rico)
Link Geometry:									
Tx E/S Range to Satellite	(km)	37,944	37,944	37,891	37,891	37,098	37,098	37,944	37,944
Rx E/S Range to Satellite	(km)	38,362	38,362	37,577	37,577	36,528	36,528	36,319	36,319
Uplink:									
Carrier Frequency	(MHz)	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Tx E/S Antenna Diameter	(m)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Max. Tx E/S Power to Antenna	(W)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Max. Tx E/S Power Density to Antenna	(dBW/MHz)	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1
Tx E/S Antenna Gain	(dB)	68.2	68.2	68.2	68.2	68.2	68.2	68.2	68.2
Tx E/S EIRP per Carrier	(dBW)	79.9	79.9	79.9	79.9	79.9	79.9	79.9	79.9
Atmospheric and Other Losses	(dB)	0.5	0.5	0.7	0.7	0.5	0.5	0.7	0.5
Free Space Loss	(dB)	212.0	212.0	212.0	212.0	211.8	211.8	212.0	212.0
Satellite:									
G/T towards Tx E/S	(dB/K)	18.6	18.6	15.0	15.0	18.7	18.7	18.6	18.6
EIRP per Carrier towards Rx E/S	(dBW)	59.6	59.6	62.5	62.5	65.5	65.5	64.8	64.8
Downlink:									
Carrier Frequency	(MHz)	17,500	17,500	17,500	17,500	17,500	17,500	17,500	17,500
Atmospheric and Other Losses	(dB)	0.3	4.0	0.2	6.7	0.2	9.4	0.2	9.0
Free Space Loss	(dB)	209.0	209.0	208.8	208.8	208.6	208.6	208.5	208.5
Rx E/S Antenna Diameter	(m)	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Rx E/S Antenna Gain	(dB)	36.1	36.1	36.1	36.1	36.1	36.1	36.1	36.1
Pointing Error	(dB)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Rx E/S G/T	(dB/K)	13.1	10.6	13.1	9.9	13.1	9.6	13.1	9.7
System (LNA+Sky) Noise Temperature	(K)	200	359	200	414	200	444	200	441
Total Link:									
Bandwidth	(dB-Hz)	78.9	78.9	78.9	78.9	78.9	78.9	78.9	78.9
C/N - Thermal Uplink	(dB)	35.7	35.7	32.0	32.0	36.0	36.0	35.5	35.7
C/N - Thermal Downlink	(dB)	12.6	6.4	15.8	6.2	19.0	6.4	18.4	6.1
C/I - Aggregate uplink ASI	(dB)	37.2	37.2	37.0	37.0	37.4	37.4	37.0	37.2
C/I - Aggregate downlink ASI	(dB)	20.9	20.9	20.9	20.9	21.2	21.2	20.5	20.5
C/I - Other Link Degradations	(dB)	15.6	15.6	18.0	18.0	15.9	15.9	21.6	21.6
C/(N+I) - Total, Actual	(dB)	10.4	5.8	12.9	5.8	13.4	5.8	15.1	5.8
C/(N+I) - Total, Required	(dB)	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
Excess Margin	(dB)	4.6	0.0	7.1	0.0	7.6	0.0	9.3	0.0
Availability	(%)	N/A	99.94	N/A	99.93	N/A	99.86	N/A	99.81
Aggregate Interference Assessment:									
(C/N) - no ASI	(dB)	10.8	5.9	13.7	5.9	14.2	6.0	16.6	6.0
Degradation due to aggregate ASI	(dB)	0.4	0.1	0.8	0.1	0.8	0.1	1.5	0.2