

# EchoStar 17/24 GHz Link Budget

Link Parameters		Clear Sky (New York)	Faded D/L (New York)	Clear Sky (Miami)	Faded D/L (Miami)
<b>Link Geometry:</b>					
Tx E/S Range to Satellite (Cheyenne)	(km)	38,983	38,983	38,983	38,983
Rx E/S Range to Satellite	(km)	37,670	37,670	36,853	36,853
<b>Uplink:</b>					
Carrier Frequency	(MHz)	25,000	25,000	25,000	25,000
Tx E/S Antenna Diameter	(m)	12.0	12.0	12.0	12.0
Max. Tx E/S Power to Antenna	(W)	4.7	4.7	4.7	4.7
Max. Tx E/S Power Density to Antenna	(dBW/MHz)	-6.9	-6.9	-6.9	-6.9
Tx E/S Antenna Gain	(dB)	68.2	68.2	68.2	68.2
Tx E/S EIRP per Carrier	(dBW)	74.9	74.9	74.9	74.9
Atmospheric and Other Losses	(dB)	0.5	0.5	0.5	0.5
Free Space Loss	(dB)	212.2	212.2	212.2	212.2
<b>Satellite:</b>					
G/T towards Tx E/S	(dB/K)	10.3	10.3	10.3	10.3
EIRP per Carrier towards Rx E/S	(dBW)	56.5	56.5	58.3	58.3
<b>Downlink:</b>					
Carrier Frequency	(MHz)	17,500	17,500	17,500	17,500
Atmospheric and Other Losses	(dB)	0.2	3.1	0.1	6.2
Free Space Loss	(dB)	208.8	208.8	208.6	208.6
Rx E/S Antenna Diameter	(m)	0.45	0.45	0.45	0.45
Rx E/S Antenna Gain	(dB)	36.1	36.1	36.1	36.1
Pointing Error	(dB)	0.5	0.5	0.5	0.5
Rx E/S G/T	(dB/K)	13.1	10.9	13.1	10.0
System (LNA+Sky) Noise Temperature	(K)	200	335	200	408
<b>Total Link:</b>					
Bandwidth	(dB-Hz)	73.60	73.60	73.60	73.60
C/N - Thermal Uplink	(dB)	27.4	27.4	27.4	27.4
C/N - Thermal Downlink	(dB)	15.1	9.9	17.2	8.0
C/I - Aggregate uplink ASI	(dB)	37.2	37.2	37.2	37.2
C/I - Aggregate downlink ASI	(dB)	20.2	20.2	25.2	25.2
C/I - Other Link Degradations	(dB)	20.0	20.0	20.0	20.0
C/(N+I) - Total, Actual	(dB)	12.8	9.1	14.7	7.6
C/(N+I) - Total, Required	(dB)	7.5	7.5	7.5	7.5
Excess Margin	(dB)	5.3	1.6	7.2	0.1
Availability	(%)	N/A	99.70	N/A	99.70
<b>Aggregate Interference Assessment:</b>					
(C/N) - no ASI	(dB)	13.7	9.5	15.1	7.7
Degradation due to aggregate ASI	(dB)	0.9	0.4	0.4	0.1