

# EchoStar 17/24 GHz Link Budget

Link Parameters	Clear Sky (Mexico City)	Faded D/L (Mexico City)
<b>Link Geometry:</b>		
Tx E/S Range to Satellite (Cheyenne) (km)	37,621	37,621
Rx E/S Range to Satellite (km)	36,340	36,340
<b>Uplink:</b>		
Carrier Frequency (MHz)	25,000	25,000
Tx E/S Antenna Diameter (m)	12.0	12.0
Max. Tx E/S Power to Antenna (W)	4.7	4.7
Max. Tx E/S Power Density to Antenna (dBW/MHz)	-6.5	-6.5
Tx E/S Antenna Gain (dB)	68.2	68.2
Tx E/S EIRP per Carrier (dBW)	74.9	74.9
Atmospheric and Other Losses (dB)	0.5	0.5
Free Space Loss (dB)	211.9	211.9
<b>Satellite:</b>		
G/T towards Tx E/S (dB/K)	10.3	10.3
EIRP per Carrier towards Rx E/S (dBW)	55.9	55.9
<b>Downlink:</b>		
Carrier Frequency (MHz)	17,500	17,500
Atmospheric and Other Losses (dB)	0.1	5.6
Free Space Loss (dB)	208.5	208.5
Rx E/S Antenna Diameter (m)	0.45	0.45
Rx E/S Antenna Gain (dB)	36.1	36.1
Pointing Error (dB)	0.5	0.5
Rx E/S G/T (dB/K)	13.1	10.1
System (LNA+Sky) Noise Temperature (K)	200	398
<b>Total Link:</b>		
Bandwidth (dB-Hz)	73.20	73.20
C/N - Thermal Uplink (dB)	28.2	28.2
C/N - Thermal Downlink (dB)	15.3	6.8
C/I - Aggregate uplink ASI (dB)	37.9	37.9
C/I - Aggregate downlink ASI (dB)	17.3	17.3
C/I - Other Link Degradations (dB)	20.0	20.0
C/(N+I) - Total, Actual (dB)	12.2	6.2
C/(N+I) - Total, Required (dB)	4.8	4.8
Excess Margin (dB)	7.4	1.4
Availability (%)	N/A	99.98
<b>Aggregate Interference Assessment:</b>		
(C/N) - no ASI (dB)	13.9	6.6
Degradation due to aggregate ASI (dB)	1.6	0.4