

EchoStar-16 DBS CONUS Link Budgets

(QPSK Normal Mode)

Link Parameters	New York	Los Angeles	Miami
Link Geometry:			
Tx E/S Range to Satellite (km)	39,023	39,023	39,023
Rx E/S Range to Satellite (km)	37,683	39,663	36,877
Uplink (per carrier):			
Carrier Frequency (MHz)	17,500	17,500	17,500
Tx E/S Antenna Diameter (m)	13.2	13.2	13.2
Tx E/S Power to Antenna (dBW)	8.0	8.0	8.0
Tx E/S Antenna Gain (dB)	65.8	65.8	65.8
Tx E/S EIRP per Carrier (dBW)	73.8	73.8	73.8
Atmospheric and Other Losses (dB)	0.3	0.3	0.3
Free Space Loss (dB)	209.1	209.1	209.1
Satellite:			
G/T towards Tx E/S (dB/K)	11.7	11.7	11.7
Peak EIRP (dBW)	55.1	55.1	55.1
EIRP towards Rx E/S (dBW)	52.5	53.1	54.3
Downlink (per carrier):			
Carrier Frequency (MHz)	12,500	12,500	12,500
Atmospheric Losses (dB)	0.1	0.1	0.1
Free Space Loss (dB)	205.9	206.3	205.7
Rain Attenuation (dB)	4.1	4.4	5.6
Rx E/S Antenna Diameter (m)	0.45	0.45	0.45
Antenna Mis-pointing Error (dB)	0.30	0.30	0.30
Rx E/S Antenna Gain (dB)	34.0	34.0	34.0
Rx E/S G/T (dB/K)	13.2	13.2	13.2
Noise Temperature - Clear Sky (K)	120	120	120
Noise Temperature - Rain (K)	294	301	325
Total Link:			
Noise Bandwidth (dB-Hz)	73.8	73.8	73.8
(C/N) - Thermal Uplink (dB)	30.9	30.9	30.9
(C/N) - Thermal Downlink - Clear Sky (dB)	14.2	14.3	16.2
(C/N) - Thermal Downlink - Rain Down (dB)	6.2	5.9	6.2
(C/I) - Adjacent Satellite Interference (dB)	23.0	23.1	25.0
(C/I) - Other Link Degradations (dB)	27.0	27.0	27.0
(C/N) - Clear Sky (dB)	13.4	13.5	15.2
(C/N) - Rain Down (dB)	6.1	5.8	6.1
(C/N) - Total Required (dB)	5.8	5.8	5.8
Downlink Margin - Clear Sky (dB)	7.6	7.7	9.4
Downlink Margin - Rain Down (dB)	0.3	0.0	0.3
Downlink Availability (%)	99.96	99.98	99.92