

# EchoStar-16 DBS CONUS Link Budgets

## (8PSK Normal Mode)

Link Parameters	New York	Los Angeles	Miami
<b>Link Geometry:</b>			
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
<b>Uplink (per carrier):</b>			
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
<b>Satellite:</b>			
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
<b>Downlink (per carrier):</b>			
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)	3.1	3.2	4.5
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)	265	271	305
<b>Total Link:</b>			
Noise Bandwidth (dB-Hz)	73.6	73.6	73.6
(C/N) - Thermal Uplink (dB)	31.1	31.1	31.1
(C/N) - Thermal Downlink - Clear Sky (dB)	14.4	14.5	16.4
(C/N) - Thermal Downlink - Rain Down (dB)	7.9	7.8	7.8
(C/I) - Adjacent Satellite Interference (dB)	23.2	23.3	25.2
(C/I) - Other Link Degradations (dB)	27.0	27.0	27.0
(C/N) - Clear Sky (dB)	13.6	13.7	15.4
(C/N) - Rain Down (dB)	7.7	7.6	7.6
(C/N) - Total Required (dB)	7.5	7.5	7.5
Downlink Margin - Clear Sky (dB)	6.1	6.2	7.9
Downlink Margin - Rain Down (dB)	0.2	0.1	0.1
Downlink Availability (%)	99.93	99.96	99.88