

EchoStar-4 DBS Link Budget

(Normal Mode)

Link Parameters		Clear Sky (Los Angeles)	Faded D/L (Los Angeles)	Faded D/L (Miami)
Link Geometry:				
Tx E/S Range to Satellite (Gilbert)	(km)	38,073	38,073	38,073
Rx E/S Range to Satellite	(km)	38,447	38,447	36,681
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)	15.3	15.3	15.3
Tx E/S Antenna Gain	(dB)	65.5	65.5	65.5
Tx E/S EIRP per Carrier	(dBW)	80.8	80.8	80.8
Atmospheric and Other Losses	(dB)	0.4	0.4	0.4
Free Space Loss	(dB)	208.9	208.9	208.9
Satellite:				
G/T towards Tx E/S	(dB/K)	3.2	3.2	3.2
Sat'd EIRP	(dBW)	54.9	54.9	54.9
EIRP towards Rx E/S	(dBW)	49.9	49.9	53.4
Downlink (per carrier):				
Carrier Frequency	(MHz)	12,500	12,500	12,500
Atmospheric and Rain Losses	(dB)	0.1	2.4	5.2
Free Space Loss	(dB)	206.1	206.1	205.7
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)	12.7	10.0	8.9
System (LNA+Sky) Noise Temp.	(K)	133	249	323
Total Link:				
Noise Bandwidth	(dB-Hz)	73.2	73.2	73.2
(C/N) - Thermal Uplink	(dB)	30.0	30.0	30.0
(C/N) - Thermal Downlink	(dB)	11.6	6.5	6.6
(C/I) - Adjacent Satellite Interference	(dB)	18.0	18.0	19.0
(C/I) - Other Link Degradations	(dB)	22.9	22.9	22.9
(C/N) - Total Actual	(dB)	10.4	6.1	6.2
(C/N) - Total Required	(dB)	6.1	6.1	6.1
Excess Margin	(dB)	4.3	0.0	0.1
Availability	(%)	N/A	99.97	99.92