

# EchoStar-3 Link Budgets

(QPSK1)

Link Parameters		Antofagasta	Santiago	Puerto Montt
<b>Link Geometry:</b>				
Tx E/S Range to Satellite	(km)	37,232	37,232	37,232
Rx E/S Range to Satellite	(km)	36,670	37,232	37,760
<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)	7.8	7.8	7.8
Tx E/S Antenna Gain	(dB)	65.8	65.8	65.8
Tx E/S EIRP per Carrier	(dBW)	73.6	73.6	73.6
Atmospheric and Other Losses	(dB)	0.2	0.2	0.2
Free Space Loss	(dB)	208.7	208.7	208.7
<b>Satellite:</b>				
G/T towards Tx E/S	(dB/K)	4.8	4.8	4.8
Peak EIRP	(dBW)	54.7	54.7	54.7
EIRP towards Rx E/S	(dBW)	47.2	51.7	48.2
<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)	205.7	205.8	205.9
Rain Attenuation	(dB)	1.4	4.0	4.3
Rx E/S Antenna Diameter	(m)	0.45	0.45	0.76
Antenna Mis-pointing Error	(dB)	0.40	0.40	0.40
Rx E/S Antenna Gain	(dB)	34.0	34.0	38.5
Rx E/S G/T	(dB/K)	13.2	13.2	17.7
Noise Temperature - Clear Sky	(K)	120	120	120
Noise Temperature - Rain	(K)	198	286	292
<b>Total Link:</b>				
Noise Bandwidth	(dB-Hz)	73.0	73.0	73.0
(C/N) - Thermal Uplink	(dB)	25.0	25.0	25.0
(C/N) - Thermal Downlink - Clear Sky	(dB)	9.8	14.2	15.1
(C/N) - Thermal Downlink - Rain Down	(dB)	6.2	6.4	7.0
(C/I) - Adjacent Satellite Interference	(dB)	18.6	23.0	23.9
(C/N+I) - Clear Sky	(dB)	9.1	13.2	14.1
(C/N+I) - Rain Down	(dB)	5.9	6.3	6.8
(C/N+I) - Total Required	(dB)	5.7	5.7	5.7
Downlink Margin - Clear Sky	(dB)	3.4	7.5	8.4
Downlink Margin - Rain Down	(dB)	0.2	0.6	1.1
Downlink Availability	(%)	99.99	99.99	99.98