

**ANNEX B**

**Link Budgets**

**Table B-1  
Ku-Band Link Budgets**

Link Parameters	Units	Ku-band				
		6M95G7W	5M04G1W	100KG1W	1M40G7W	36M0G7W
Uplink Frequency	GHz	14.240	14.240	14.240	14.240	14.240
Downlink Frequency	GHz	11.940	11.940	11.940	11.940	11.940
Carrier Allocated Bandwidth	kHz	6950.0	5040.0	55.0	1400.0	36000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
<b>Uplink:</b>						
Nominal E/S e.i.r.p. per carrier	dBW	61.6	60.2	40.1	54.7	74.8
Earth Station Diameter	m	2.4	2.4	2.4	3.8	6.1
Earth Station Gain	dBi	49.1	49.1	49.1	53.1	57.3
Uplink Input Power per Carrier	dBW	12.5	11.1	-9.0	1.5	17.5
Free Space Loss	dB	206.9	206.9	206.9	206.9	206.9
G/T Satellite	dB/K	0.0	0.0	0.0	0.0	3.0
C/N Thermal Uplink	dB	15.6	15.6	15.6	16.2	24.7
C/I XPOL, ACI, IM, ASI	dB	20.0	20.0	20.0	20.6	26.1
C/(N+I) uplink	dB	14.3	14.3	14.3	14.9	22.3
<b>Downlink:</b>						
Satellite e.i.r.p. per carrier	dBW	35.6	34.2	14.0	28.7	48.5
Maximum e.i.r.p. density	dBW/4kHz	6.9	6.9	6.9	7.4	9.7
Free Space Loss	dB	205.5	205.5	205.5	205.5	205.5
Earth Station Diameter	m	2.4	2.4	2.4	3.8	1.2
Earth Station Gain	dBi	47.7	47.7	47.7	51.7	41.7
Noise Temperature	K	120.0	120.0	120.0	120.0	120.0
Earth Station G/T	dB/K	26.9	26.9	26.9	30.9	20.9
C/N Thermal Downlink	dB	18.0	18.0	18.0	22.6	17.7
C/I XPOL, ACI, IM, ASI	dB	17.7	17.7	17.7	22.2	17.4
C/(N+I) downlink	dB	14.8	14.8	14.8	19.4	14.6
<b>Adjacent Satellite Interference:</b>						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	23.0	23.0	23.0	23.6	29.1
C/I dn (single satellite)	dB	20.7	20.7	20.7	25.2	20.4
Aggregate C/I up	dB	20.0	20.0	20.0	20.6	26.1
Aggregate C/I down	dB	17.7	17.7	17.7	22.2	17.4
<b>Overall:</b>						
C/(N+I) overall	dB	11.5	11.5	11.5	13.5	13.9
C/(N+I) required	dB	6.9	6.9	6.9	9.3	6.9
System Margin	dB	4.6	4.6	4.6	4.3	7.0

**Table B-2  
C-Band Link Budgets**

Link Parameters	Units	C-band				
		9M00G7W	1M51G7W	100KG1D	4M05G7W	36M0G7W
Uplink Frequency	GHz	6.185	6.185	6.185	6.185	6.250
Downlink Frequency	GHz	3.960	3.960	3.960	3.960	3.950
Carrier Allocated Bandwidth	kHz	9000.0	1510.0	55.0	4050.0	36000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a
<b>Uplink:</b>						
Nominal E/S e.i.r.p. per carrier	dBW	57.1	52.3	38.7	53.4	76.1
Earth Station Diameter	m	3.8	3.8	3.8	3.8	9.0
Earth Station Gain	dBi	45.9	45.9	45.9	45.9	53.5
Uplink Input Power per Carrier	dBW	11.3	6.4	-7.2	7.5	22.6
Free Space Loss	dB	199.7	199.7	199.7	199.7	199.7
G/T Satellite	dB/K	0.0	0.0	-2.9	2.1	1.3
C/N Thermal Uplink	dB	17.8	20.7	18.6	19.6	31.6
C/I XPOL, ACI, IM, ASI	dB	12.0	14.8	15.7	14.6	24.4
C/(N+I) uplink	dB	11.0	13.8	13.9	13.4	23.7
<b>Downlink:</b>						
Satellite e.i.r.p. per carrier	dBW	25.3	20.5	4.0	17.6	37.0
Maximum e.i.r.p. density	dBW/4kHz	-4.8	-1.9	-4.0	-9.0	-1.8
Free Space Loss	dB	195.9	195.9	195.9	195.9	195.9
Earth Station Diameter	m	3.8	3.8	3.8	3.8	3.8
Earth Station Gain	dBi	42.1	42.1	42.1	42.1	42.1
Noise Temperature	K	100.0	100.0	100.0	100.0	100.0
Earth Station G/T	dB/K	22.1	22.1	22.1	22.1	22.1
C/N Thermal Downlink	dB	11.9	14.8	12.7	7.7	17.0
C/I XPOL, ACI, IM, ASI	dB	12.2	15.1	13.0	9.0	17.3
C/(N+I) downlink	dB	9.1	11.9	9.9	5.3	14.2
<b>Adjacent Satellite Interference:</b>						
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-47	-47	-47	-50	-47
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-37	-37	-37	-38	-37
C/I up (single satellite)	dB	15.0	17.8	18.7	17.6	27.4
C/I dn (single satellite)	dB	15.2	18.1	16.0	12.0	20.3
Aggregate C/I up	dB	12.0	14.8	15.7	14.6	24.4
Aggregate C/I down	dB	12.2	15.1	13.0	9.0	17.3
<b>Overall:</b>						
C/(N+I) overall	dB	6.9	9.8	8.4	4.7	13.7
C/(N+I) required	dB	4.1	6.9	6.9	4.1	6.9
System Margin	dB	2.7	2.9	1.5	0.5	6.8

**Table B-3  
TT&C Link Budgets**

Link Parameters	Units	TT&C			
		800KF9D	300KF9D	300KF9D	300KF9D
Uplink Frequency	GHz	6.4235			
Downlink Frequency	GHz		3.7005	4.1995	12.198
Carrier Allocated Bandwidth	kHz	800.0	300.0	300.0	300.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a
<b>Uplink:</b>					
Nominal E/S e.i.r.p. per carrier	dBW	72.0			
Earth Station Diameter	m	9.0			
Earth Station Gain	dBi	53.0			
Uplink Input Power per Carrier	dBW	19.0			
Free Space Loss	dB	199.7			
G/T Satellite	dB/K	-17.5			
C/N Thermal Uplink	dB	24.4			
C/I XPOL, ACI, IM, ASI	dB	36.0			
C/(N+I) uplink	dB	24.1			
<b>Downlink:</b>					
Satellite e.i.r.p. per carrier	dBW		11.8	11.8	12.4
Maximum e.i.r.p. density	dBW/4kHz		-7.0	-7.0	-6.4
Free Space Loss	dB		195.9	195.9	205.5
Earth Station Diameter	m		9.0	9.0	9.0
Earth Station Gain	dBi		49.0	50.1	59.3
Noise Temperature	K		100.0	100.0	120.0
Earth Station G/T	dB/K		29.0	30.1	38.5
C/N Thermal Downlink	dB		18.7	19.8	19.3
C/I XPOL, ACI, IM, ASI	dB		19.0	20.1	19.0
C/(N+I) downlink	dB		15.8	16.9	16.2
<b>Adjacent Satellite Interference:</b>					
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-47	-47	-47	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-37	-37	-37	-26
C/I up (single satellite)	dB	39.0	999.0	999.0	999.0
C/I dn (single satellite)	dB	999.0	22.0	23.1	22.0
Aggregate C/I up	dB	36.0	999.0	999.0	999.0
Aggregate C/I down	dB	999.0	19.0	20.1	19.0
<b>Overall:</b>					
C/(N+I) overall	dB	24.1	15.8	16.9	16.2
C/(N+I) required	dB	10.0	9.0	9.0	9.0
System Margin	dB	14.1	6.8	7.9	7.2