NSS-806 Link Budgets

Transponder ID 1	Transponder ID 2	Channel ID	Noise budget reference
1	28	D7	Table B-6
1	28	D8	Table B-6
1	28	D9	Table B-6
29	31	D1	Table B-5
29	31	D2	Table B-5
29	31	D3	Table B-5
29	31	D4	Table B-5
29	31	D6	Table B-5
29	31	A1	Table B-5
32	32	D1	Table B-2
32	32	D2	Table B-2
32	32	D3	Table B-2
32	32	D4	Table B-2
32	32	D6	Table B-2
32	32	A1	Table B-2
33	34	D1	Table B-1
33	34	D2	Table B-1
33	34	D3	Table B-1
33	34	D4	Table B-1
33	34	D5	Table B-1
33	34	A1	Table B-1
35	35	D1	Table B-4
35	35	D2	Table B-4
35	35	D3	Table B-4
35	35	D4	Table B-4
35	35	D6	Table B-4
35	35	A1	Table B-4
36	37	D1	Table B-3
36	37	D2	Table B-3
36	37	D3	Table B-3
36	37	D4	Table B-3
36	37	D5	Table B-3
36	37	A1	Table B-3
45	45	TTC3	Table B-7
42	43	TTC1	Table B-8
38	41	TTC2	Table B-8

TABLE B-1. SPOT/HEMI (36 MHZ TRANSPONDER)

		SPOT/HEMI 36 MHz Transponder					
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**36M0G7W**	**36M0F3F**
Uplink Frequency	GHz	14.125	14.125	14.125	14.125	14.125	14.125
Downlink Frequency	GHz	3.843	3.843	3.843	3.843	3.843	3.843
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	36000.0	36000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a	2.0
Uplink:							
Nominal E/S e.i.r.p. per carrier	dBW	54.5	56.3	62.3	68.2	76.9	77.6
Earth Station Diameter	m	3.0	3.7	3.7	3.0	3.7	7.6
Earth Station Gain	dBi	51.0	52.8	52.8	51.0	52.8	59.1
Uplink Input Power per Carrier	dBW	3.5	3.4	9.5	17.2	24.1	18.4
Free Space Loss	dB	207.1	207.1	207.1	207.1	207.1	207.1
G/T Satellite (EOC)	dB/K	1.0	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	22.9	23.4	23.4	22.8	24.6	24.5
C/I XPOL, ACI, IM, ASI	dB	26.4	27.0	27.0	26.4	28.2	28.1
C/(N+I) uplink	dB	21.3	21.8	21.8	21.3	23.0	22.9
Downlink:							
Satellite e.i.r.p. per carrier (-3.9dB contour)	dBW	14.3	16.1	22.1	28.0	35.7	33.9
Maximum e.i.r.p. density	dBW/4kHz	0.1	0.7	0.7	0.1	0.9	10.8
Free Space Loss	dB	196.3	196.3	196.3	196.3	196.3	196.3
Earth Station Diameter	m	3.0	3.8	3.8	3.0	3.0	3.8
Earth Station Gain	dBi	39.8	41.8	41.8	39.8	39.8	41.8
Noise Temperature	K	95.0	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	20.0	22.0	22.0	20.0	20.0	22.0
C/N Thermal Downlink	dB	12.6	15.1	15.1	12.5	13.3	12.7
C/I XPOL, ACI, IM, ASI	dB	13.0	15.6	15.6	13.0	13.8	16.2
C/(N+I) downlink	dB	9.8	12.4	12.4	9.7	10.5	11.1
Adjacent Satellite Interference:							
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34	-37
C/I up (single satellite)	dB	29.4	30.0	30.0	29.4	31.2	31.1
C/I dn (single satellite)	dB	16.0	18.6	18.6	16.0	16.8	19.2
Aggregate C/I up	dB	26.4	27.0	27.0	26.4	28.2	28.1
Aggregate C/I down	dB	13.0	15.6	15.6	13.0	13.8	16.2
Overall:							
C/(N+I) overall	dB	9.5	11.9	11.9	9.5	10.3	10.8
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9	10.0
System Margin	dB	3.5	2.6	2.6	2.5	3.4	0.8

TABLE B-2. SPOT/HEMI (72 MHZ TRANSPONDER)

		SPOT/HEMI 72 MHz Transponder					
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**72M0G7W**	**36M0F3F**
Uplink Frequency	GHz	14.043	14.043	14.043	14.043	14.043	14.043
Downlink Frequency	GHz	3.743	3.743	3.743	3.743	3.743	3.743
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	72000.0	36000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a	2.0
Uplink:							
Nominal E/S e.i.r.p. per carrier	dBW	53.3	55.9	61.9	67.2	80.7	77.6
Earth Station Diameter	m	3.0	3.7	3.7	3.0	5.6	7.6
Earth Station Gain	dBi	50.9	52.8	52.8	50.9	56.4	59.1
Uplink Input Power per Carrier	dBW	2.4	3.1	9.2	16.3	24.3	18.4
Free Space Loss	dB	207.1	207.1	207.1	207.1	207.1	207.1
G/T Satellite (EOC)	dB/K	1.0	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	21.8	23.1	23.1	21.9	25.2	24.5
C/I XPOL, ACI, IM, ASI	dB	25.3	26.6	26.6	25.4	28.7	28.1
C/(N+I) uplink	dB	20.2	21.5	21.5	20.3	23.6	22.9
Downlink:							
Satellite e.i.r.p. per carrier (-3.9dB contour)	dBW	11.2	13.7	19.8	25.1	37.5	33.9
Maximum e.i.r.p. density	dBW/4kHz	-3.0	-1.7	-1.7	-2.9	-0.6	10.8
Free Space Loss	dB	196.0	196.0	196.0	196.0	196.0	196.3
Earth Station Diameter	m	3.8	5.6	5.6	4.5	7.0	3.8
Earth Station Gain	dBi	41.6	45.0	45.0	43.1	46.9	41.6
Noise Temperature	K	95.0	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	21.8	25.2	25.2	23.3	27.1	21.8
C/N Thermal Downlink	dB	11.5	16.2	16.2	13.1	19.2	12.5
C/I XPOL, ACI, IM, ASI	dB	11.7	16.4	16.4	13.3	19.5	16.0
C/(N+I) downlink	dB	8.6	13.3	13.3	10.2	16.3	10.9
Adjacent Satellite Interference:							
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-34	-34	-34	-34	-34	-37
C/I up (single satellite)	dB	28.3	29.6	29.6	28.4	31.7	31.1
C/I dn (single satellite)	dB	14.7	19.4	19.4	16.3	22.5	19.0
Aggregate C/I up	dB	25.3	26.6	26.6	25.4	28.7	28.1
Aggregate C/I down	dB	11.7	16.4	16.4	13.3	19.5	16.0
Overall:							
C/(N+I) overall	dB	8.3	12.7	12.7	9.8	15.6	10.6
C/(N+I) required	dB	6.0	9.3	9.3	6.9	12.7	10.0
System Margin	dB	2.3	3.4	3.4	2.9	2.9	0.6

TABLE B-3. HEMI/SPOT (36 MHZ TRANSPONDER)

		HEMI/SPOT 36 MHz Transponder					
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**36M0G7W**	**36M0F3F**
Uplink Frequency	GHz	6.068	6.068	6.068	6.068	6.068	6.068
Downlink Frequency	GHz	11.830	11.830	11.830	11.830	11.830	11.830
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	36000.0	36000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a	2.0
Uplink:							
Nominal E/S e.i.r.p. per carrier	dBW	53.2	54.6	60.4	67.0	75.9	72.9
Earth Station Diameter	m	3.7	4.5	4.5	3.7	5.6	7.6
Earth Station Gain	dBi	45.5	47.2	47.2	45.5	49.1	51.8
Uplink Input Power per Carrier	dBW	7.7	7.4	13.2	21.5	26.8	21.1
Free Space Loss	dB	200.2	200.2	200.2	200.2	200.2	200.2
G/T Satellite (EOC)	dB/K	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
C/N Thermal Uplink	dB	19.5	19.6	19.4	19.5	21.6	17.7
C/I XPOL, ACI, IM, ASI	dB	17.2	17.3	17.1	17.2	19.2	15.4
C/(N+I) uplink	dB	15.2	15.3	15.1	15.2	17.2	13.4
Downlink:							
Satellite e.i.r.p. per carrier (-3.9dB contour)	dBW	24.1	25.5	31.3	37.9	44.8	41.3
Maximum e.i.r.p. density	dBW/4kHz	10.0	10.0	9.8	10.0	10.0	18.2
Free Space Loss	dB	205.6	205.6	205.6	205.6	205.6	205.6
Earth Station Diameter	m	1.8	2.4	3.0	1.8	1.8	3.0
Earth Station Gain	dBi	45.1	47.6	49.5	45.1	45.1	49.5
Noise Temperature	K	95.0	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	25.3	27.8	29.8	25.3	25.3	29.8
C/N Thermal Downlink	dB	18.4	20.9	22.7	18.4	18.4	18.5
C/I XPOL, ACI, IM, ASI	dB	20.2	22.8	24.5	20.2	20.2	20.3
C/(N+I) downlink	dB	16.2	18.8	20.5	16.2	16.2	16.3
Adjacent Satellite Interference:							
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	20.2	20.3	20.1	20.2	22.2	18.4
C/I dn (single satellite)	dB	23.2	25.8	27.5	23.2	23.2	23.3
Aggregate C/I up	dB	17.2	17.3	17.1	17.2	19.2	15.4
Aggregate C/I down	dB	20.2	22.8	24.5	20.2	20.2	20.3
Overall:							
C/(N+I) overall	dB	12.6	13.7	14.0	12.7	13.7	11.6
C/(N+I) required	dB	6.0	9.3	9.3	6.9	6.9	10.0
System Margin	dB	6.6	4.4	4.7	5.8	6.8	1.6

TABLE B-4. HEMI/SPOT (72 MHZ TRANSPONDER)

		HEMI/SPOT 72 MHz Transponder					
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**72M0G7W**	**36M0F3F**
Uplink Frequency	GHz	5.968	5.968	5.968	5.968	5.968	5.968
Downlink Frequency	GHz	11.748	11.748	11.748	11.748	11.748	11.748
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	72000.0	36000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a	2.0
Uplink:							
Nominal E/S e.i.r.p. per carrier	dBW	51.8	53.1	58.1	65.1	80.1	72.9
Earth Station Diameter	m	3.7	4.5	4.5	3.7	11.0	7.6
Earth Station Gain	dBi	45.3	47.1	47.1	45.3	54.9	51.8
Uplink Input Power per Carrier	dBW	6.5	6.1	11.1	19.8	25.2	21.1
Free Space Loss	dB	200.1	200.1	200.1	200.1	200.1	200.2
G/T Satellite (EOC)	dB/K	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
C/N Thermal Uplink	dB	18.3	18.3	17.3	17.8	22.6	17.7
C/I XPOL, ACI, IM, ASI	dB	15.8	15.8	14.8	15.3	20.1	15.4
C/(N+I) uplink	dB	13.8	13.9	12.9	13.4	18.2	13.4
Downlink:							
Satellite e.i.r.p. per carrier (-3.9dB contour)	dBW	22.7	24.0	29.0	36.0	48.0	41.3
Maximum e.i.r.p. density	dBW/4kHz	8.6	8.6	7.6	8.1	9.9	18.2
Free Space Loss	dB	205.5	205.5	205.5	205.5	205.5	205.6
Earth Station Diameter	m	1.8	3.0	3.8	2.4	7.0	3.0
Earth Station Gain	dBi	45.0	49.5	51.5	47.5	56.8	49.5
Noise Temperature	K	95.0	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	25.3	29.7	31.7	27.8	37.1	29.7
C/N Thermal Downlink	dB	17.0	21.4	22.5	19.0	30.1	18.4
C/I XPOL, ACI, IM, ASI	dB	18.7	23.2	24.3	20.7	31.9	20.2
C/(N+I) downlink	dB	14.7	19.2	20.3	16.7	27.9	16.2
Adjacent Satellite Interference:							
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-42	-42	-42	-42	-42	-42
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	18.8	18.8	17.8	18.3	23.1	18.4
C/I dn (single satellite)	dB	21.7	26.2	27.3	23.7	34.9	23.2
Aggregate C/I up	dB	15.8	15.8	14.8	15.3	20.1	15.4
Aggregate C/I down	dB	18.7	23.2	24.3	20.7	31.9	20.2
Overall:							
C/(N+I) overall	dB	11.3	12.8	12.2	11.7	17.8	11.6
C/(N+I) required	dB	6.0	9.3	9.3	6.9	12.7	10.0
System Margin	dB	5.3	3.5	2.9	4.8	5.1	1.6

TABLE B-5. SPOT/SPOT (72 MHZ TRANSPONDER)

		SPOT/SPOT 72 MHz Transponder					
Link Parameters	**Units**	**346KG7W**	**461KG7W**	**1M84G7W**	**8M25G7W**	**72M0G7W**	**36M0F3F**
Uplink Frequency	GHz	14.125	14.125	14.125	14.125	14.125	14.125
Downlink Frequency	GHz	11.830	11.830	11.830	11.830	11.830	11.830
Carrier Allocated Bandwidth	kHz	346.0	461.0	1840.0	8250.0	72000.0	36000.0
Energy Dispersal	MHz	n/a	n/a	n/a	n/a	n/a	2.0
Uplink:							
Nominal E/S e.i.r.p. per carrier	dBW	52.1	54.4	59.0	66.5	79.6	72.8
Earth Station Diameter	m	3.0	3.7	3.7	3.0	3.7	7.6
Earth Station Gain	dBi	51.0	52.8	52.8	51.0	52.8	59.1
Uplink Input Power per Carrier	dBW	1.1	1.6	6.2	15.5	26.8	13.7
Free Space Loss	dB	207.1	207.1	207.1	207.1	207.1	207.1
G/T Satellite (EOC)	dB/K	1.0	1.0	1.0	1.0	1.0	1.0
C/N Thermal Uplink	dB	20.5	21.6	20.1	21.1	24.1	19.7
C/I XPOL, ACI, IM, ASI	dB	24.0	25.1	23.7	24.7	27.7	23.3
C/(N+I) uplink	dB	18.9	20.0	18.5	19.5	22.5	18.2
Downlink:							
Satellite e.i.r.p. per carrier (-3.9dB contour)	dBW	22.4	24.8	29.3	36.8	48.0	40.6
Maximum e.i.r.p. density	dBW/4kHz	8.2	9.3	7.9	8.9	9.9	17.6
Free Space Loss	dB	205.6	205.6	205.6	205.6	205.6	205.6
Earth Station Diameter	m	1.8	2.4	3.0	1.8	3.7	2.4
Earth Station Gain	dBi	45.1	47.6	49.5	45.1	51.4	47.6
Noise Temperature	K	95.0	95.0	95.0	95.0	95.0	95.0
Earth Station G/T	dB/K	25.3	27.8	29.8	25.3	31.6	27.8
C/N Thermal Downlink	dB	16.6	20.2	20.7	17.3	24.5	15.9
C/I XPOL, ACI, IM, ASI	dB	18.5	22.1	22.6	19.1	26.4	17.7
C/(N+I) downlink	dB	14.4	18.1	18.5	15.1	22.3	13.7
Adjacent Satellite Interference:							
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-50	-50	-50	-50	-50	-50
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-26	-26	-26	-26	-26	-26
C/I up (single satellite)	dB	27.0	28.1	26.7	27.7	30.7	26.3
C/I dn (single satellite)	dB	21.5	25.1	25.6	22.1	29.4	20.7
Aggregate C/I up	dB	24.0	25.1	23.7	24.7	27.7	23.3
Aggregate C/I down	dB	18.5	22.1	22.6	19.1	26.4	17.7
Overall:							
C/(N+I) overall	dB	13.1	15.9	15.5	13.8	19.4	12.4
C/(N+I) required	dB	6.0	9.3	9.3	6.9	12.7	10.0
System Margin	dB	7.1	6.6	6.3	6.9	6.7	2.4

TABLE B-6. HEMI/HEMI (36 MHZ TRANSPONDER)

	HEMI/HEMI 36 MHz Transponder		
Parameter	Digital Broadcast 38 Mbps, QPSK 3/	1.365 Mbps, QPSK 1/2	5.631 Mbps, QPSK 1/2
Carrier designation	36M0G7W	2M00G1W	8M00G1W
Allocated bandwidth (MHz)	36.0	2000.0	8000.0
Uplinks:			
Transmit Power (dBW)	32.0	13.5	19.6
Transmit Loss (dB)	-0.2	0.0	0.0
TX earth station antenna diameter (m)	3.7	3.7	3.7
TX earth station antenna gain (dBi)	45.5	45.5	45.5
TX earth station antenna EIRP (dBW)	77.3	58.7	64.9
Uplink Atm. Loss (dB)	-3.9	-3.2	-3.3
Free Space Loss (dB)	-200.0	-200.0	-200.0
Satellite G/T (dB/K)	-4.1	-4.1	-4.1
Boltzmann's Constant (dBW/K-Hz)	-228.6	-228.6	-228.6
C/N uplink (dB)	26.0	20.1	20.1
C/I uplink (dB)	22.5	13.4	13.4
C/N+I uplink (dB)	20.9	12.6	12.6
Downlinks:			
Satellite Carrier EIRP (dBW)	38.5	21.7	27.9
Interference bandwidth (MHz)	27.5	1.5	6.1
Satellite EIRP density (dBW/4KHz)	0.1	-3.9	-3.9
Downlink Atm. Loss (dB)	-0.8	-0.8	-0.8
Free Space Loss (dB)	-195.8	-195.8	-195.8
RX earth station antenna diameter (m)	3.0	3.0	3.0
RX earth station antenna G/T (dB/K)	20.5	18.7	18.7
C/N downlink (dB)	16.1	10.3	10.3
C/I downlink (dB)	22.5	18.0	18.0
C/N+I downlink (dB)	15.2	9.6	9.6
C/N system (dB)	15.6	9.9	9.9
C/I system (dB)	19.5	12.1	12.1
C/N+I system (dB)	14.1	7.8	7.8

TABLE B-7. BEACON CARRIER, 25K0N0N

Link Parameters	Units	25K0N0N
Downlink Frequency	GHz	11.701
Carrier Allocated Bandwidth	kHz	25.0
Downlink:		
Downlink e.i.r.p. (- 3.9dB contour)	dBW	5.1
Free Space Loss	dB	205.7
Atmospheric and Polarization Losses	dB	1.0
Rain Fade	dB	5.0
Receive E/S Pointing Loss	dB	0.3
Receive E/S G/T	dB/K	38.4
Downlink C/No	dB	60.1
Required C/No	dB	47.0
Margin	dB	13.1

TABLE B-8. C-BAND TT&C

		TT&C	
Link Parameters	**Units**	**300KF9D**	**800KF9D**
Uplink Frequency	GHz		6.176
Downlink Frequency	GHz	3.950	
Carrier Allocated Bandwidth	kHz	300.0	800.0
Energy Dispersal	MHz	n/a	n/a
Uplink:			
Nominal E/S e.i.r.p. per carrier	dBW		72.0
Earth Station Diameter	m		9.0
Earth Station Gain	dBi		54.0
Uplink Input Power per Carrier	dBW		18.0
Free Space Loss	dB		200.2
G/T Satellite (EOC)	dB/K		-18.1
C/N Thermal Uplink	dB		23.2
C/I XPOL, ACI, IM, ASI	dB		36.0
C/(N+I) uplink	dB		23.0
Downlink:			
Satellite e.i.r.p. per carrier	dBW	12.0	
Maximum e.i.r.p. density	dBW/4kHz	-6.8	
Free Space Loss	dB	196.3	
Earth Station Diameter	m	9.0	
Earth Station Gain	dBi	50.0	
Noise Temperature	K	100.0	
Earth Station G/T	dB/K	30.0	
C/N Thermal Downlink	dB	19.6	
C/I XPOL, ACI, IM, ASI	dB	20.3	
C/(N+I) downlink	dB	16.9	
Adjacent Satellite Interference:			
Uplink Inp. Pwr. Dens. @ 2 degrees	dBW/Hz	-47	-47
Downlink e.i.r.p. Dens @ 2 degrees	dBW/Hz	-37	-37
C/I up (single satellite)	dB	999.0	39.0
C/I dn (single satellite)	dB	23.3	999.0
Aggregate C/I up	dB	999.0	36.0
Aggregate C/I down	dB	20.3	999.0
Overall:			
C/(N+I) overall	dB	16.9	23.0
C/(N+I) required	dB	9.0	10.0
System Margin	dB	7.9	13.0