Table D4.2

IA-9 Link Budget **IA-9 Link Budget**

C-band Digital

Wanted System Orbital Location	-97 deg W						Uplink	I, psd	-35.7	dBw/hz	Tx F	6.000	GHz
Interfering System Orbital Location	-99 deg W and 95W (FCC allocation)						Dnlink	I, eirpd	-30	dBw/hz	Rx F	4.000	GHz
Minimum Orbital Separation (Geo-centric)	1.90 deg ; Note: the calculations take topocentric advantage into account												

Carrier Type	64K, 8PSK, R2/3 RS						64K, QPSK, R1/2 RS					
Transmit ES Location	CONUS	CONUS	Mexico	Mexico	Conus	Conus	CONUS	CONUS	Mexico	Mexico	Conus	Conus
Receive ES Location	CONUS	CONUS	Conus	Conus	Mexico	Mexico	CONUS	CONUS	Conus	Conus	Mexico	Mexico
Tx ES Size at SA	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Transmit ES Peak gain	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8	46.8
RX ES Size	3.8	16.0	3.8	16.0	6.0	16.0	2.4	16.0	2.4	16.0	3.0	16.0
Receive ES Gain	41.8	54.3	41.8	54.3	45.8	54.3	37.8	54.3	37.8	54.3	39.8	54.3
Receive ES G/T (Temp=83K)	22.6	35.1	22.6	35.1	26.6	35.1	18.6	35.1	18.6	35.1	20.6	35.1
Carrier Type	64KR2/3	64KR2/3	64KR2/3	64KR2/3	64KR2/3	64KR2/3	64KR1/2	64KR1/2	64KR1/2	64KR1/2	64KR1/2	64KR1/2
Occupied bandwidth per carrier (kHz)	34.9	34.9	34.9	34.9	34.9	34.9	69.7	69.7	69.7	69.7	69.7	69.7
Allocated bandwidth per carrier (kHz)	47.1	47.1	47.1	47.1	47.1	47.1	94.1	94.1	94.1	94.1	94.1	94.1
C/N Threshold	10.54	10.54	10.54	10.54	10.54	10.54	4.5	4.5	4.5	4.5	4.5	4.5
System Margin	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.30	1.00
C/N, Threshold + margin	11.54	11.54	11.54	11.54	11.54	11.54	5.53	5.53	5.53	5.53	4.83	5.53
Nominal e/s e.i.r.p. per carrier @ES(dBW)	49.7	46.7	53.0	50.2	50.5	47.2	53.2	43.1	56.5	46.6	56.5	43.2
TX ES PSD @ ES	-42.5	-45.5	-39.2	-42.0	-41.7	-45.0	-42.0	-52.1	-38.7	-48.6	-38.7	-52.0
ES eirp @ bp-- minimum (dBW)	48.0	45.0	47.3	44.5	48.8	45.5	51.5	41.4	50.8	40.9	54.8	41.5
ES Power @ bp dBW, min	1.2	-1.8	0.5	-2.3	2.0	-1.3	4.7	-5.4	4.0	-5.9	8.0	-5.3
ES Power @ site dBW, max	2.9	-0.1	6.2	3.4	3.7	0.4	6.4	-3.7	9.7	-0.2	9.7	-3.6
Sat G/T at bp	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Sat G/T at e/s	0.1	0.1	-3.9	-3.9	0.1	0.1	0.1	0.1	-3.9	-3.9	0.1	0.1
Free space path loss (dB)	199.5	199.5	199.2	199.2	199.5	199.5	199.5	199.5	199.2	199.2	199.5	199.5
Input back off, dB	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Output back off dB	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
C/N uplink (dB)	33.5	30.5	33.1	30.3	34.3	31.0	34.0	23.9	33.6	23.7	37.3	24.0
X-pol interf:C/I -uplink (dB)-wanted system	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
X-pol interf:C/I -uplink (dB)-interfering ES	23.4	20.4	26.7	23.9	24.2	20.9	23.9	13.8	27.2	17.3	27.2	13.9
C/I - copol asi uplink (dB)	17.3	14.3	16.6	13.8	18.1	14.8	17.8	7.7	17.1	7.2	21.1	7.8
HPA IM at 10 deg el angle(limit: 21,c;10,Ku)	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Satellite TWTA IM per carrier @ bp	-21.0	-21.0	-21.0	-21.0	-21.0	-21.0	-21.0	-21.0	-21.0	-21.0	-21.0	-21.0
C/N+I+others, uplink	15.4	12.6	15.3	12.7	16.1	13.1	15.8	6.5	15.7	6.6	18.3	6.6
Downlink e.i.r.p. -bp (dBW)	42.2	42.2	42.2	42.2	42.2	42.2	42.2	42.2	42.2	42.2	42.2	42.2
Downlink BP-BE difference	6	6	6	6	6	6	6	6	6	6	6	6
DL ES Pattern Advantage	4.7	4.7	4.7	4.7	0	0	4.7	4.7	4.7	4.7	0	0
Satellite e.i.r.p.d. per carrier (dBW)-tow es	-34.3	-36.4	-34.3	-36.4	-39.0	-41.1	-34.3	-36.4	-34.3	-36.4	-39.0	-41.1
Satellite e.i.r.p.d. per carrier (dBW)-bp	-33.0	-35.1	-33.0	-35.1	-33.0	-35.1	-33.0	-35.1	-33.0	-35.1	-33.0	-35.1
Satellite e.i.r.p. per carrier (dBW)-at es	11.1	9.1	11.1	9.1	6.4	4.4	14.1	12.1	14.1	12.1	9.4	7.4
Satellite e.i.r.p. per carrier (dBW)-bp	12.4	10.4	12.4	10.4	12.4	10.4	15.4	13.4	15.4	13.4	15.4	13.4
Free space path loss (dB)	196.0	196.0	195.7	195.7	196.0	196.0	196.0	196.0	195.7	195.7	196.0	196.0
Earth station pointing loss (dB)	0.30	0.3	0.3	0.3	0.3	0.3	0.30	0.3	0.3	0.3	0.3	0.3
C/N downlink towards BP (dB)	26.6	37.1	26.9	37.4	25.9	32.4	22.6	37.1	22.9	37.4	19.9	32.4
C/N downlink towards ES (dB)	25.3	35.8	25.6	36.1	19.9	26.4	21.3	35.8	21.6	36.1	13.9	26.4
C/N-thermal-total	24.7	29.4	24.9	29.3	19.7	25.1	21.1	23.6	21.3	23.5	13.8	22.0
Interference & Margins:												
C/I Co-polar downlink interference d/I(dB)	21.6	32.4	21.6	32.4	20.7	27.7	9.2	32.4	9.2	32.4	9.9	27.7
C/I X-polar external interference d/I (dB)	17.8	30.8	17.8	30.8	19.3	26.1	11.8	30.8	11.8	30.8	10.0	26.1
Downlink C/(Nth +I+others) composite with ASI dn	15.7	27.8	15.8	27.8	15.1	21.9	7.1	27.8	7.1	27.8	6.1	21.9
Total C/(Nth +I) composite with ASI tot	12.6	12.5	12.5	12.6	12.6	12.5	6.6	6.5	6.6	6.5	5.9	6.5
Total C/(Nth +others) w/o ASI	20.8	20.7	20.8	20.7	18.0	19.8	18.9	19.2	19.1	19.2	13.3	18.6
Other losses(terrestrial, OBE, etc.,)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Available C/N	11.6	11.5	11.5	11.6	11.6	11.5	5.6	5.5	5.6	5.5	4.9	5.5
C/N Margin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0