Table D4.1

IA-5-77W Link Budget

Ku-band Digital

Wanted System Orbital Location	-77 deg	Equivalent	Uplink	I, psd	-48.7	dBw/hz	Tx F	14.000 GHz
Interfering System Orbital Location	-79 deg	and 74W (FCC allocation)	Dnlink	I, eirpd	-21.7	dBw/hz	Rx F	11.700 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	2.4	2.4	2.4	2.4	2.4	2.4	1.8	1.8	1.8	1.8	1.8	1.8
Transmit ES Peak gain	48.7	48.7	48.7	48.7	48.7	48.7	46.2	46.2	46.2	46.2	46.2	46.2
RX ES Size	2.4	12.0	2.4	12.0	2.4	12.0	1.2	12.0	1.2	12.0	1.2	12.0
Receive ES Gain	47.2	61.1	47.2	61.1	47.2	61.1	41.1	61.1	41.1	61.1	41.1	61.1
Receive ES G/T (Temp=105K)	26.9	40.9	26.9	40.9	26.9	40.9	20.9	40.9	20.9	40.9	20.9	40.9
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	5.0	5.0	4.1	4.9	3.0	5.0	5.0	5.0	5.0	5.0	2.3	5.0
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
Clear Sky C/N	16.5	16.5	15.6	16.4	14.5	16.5	10.5	10.5	10.5	10.5	7.8	10.5
Nominal e/s e.i.r.p. per carrier @ES(dBW)	42.9	41.8	44.1	44.1	44.1	42.0	40.3	38.5	42.8	40.9	41.1	38.5
TX ES PSD	-51.2	-52.3	-50.0	-50.0	-50.0	-52.1	-54.3	-56.1	-51.8	-53.7	-53.5	-56.1
ES eirp @ bp-- minimum (dBW)	41.1	40.0	39.5	39.5	42.3	40.2	38.5	36.7	38.2	36.3	39.3	36.7
Sat G/T at bp	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Sat G/T at e/s	0.9	0.9	-1.9	-1.9	0.9	0.9	0.9	0.9	-1.9	-1.9	0.9	0.9
Free space path loss (dB)	207.0	207.0	206.7	206.7	207.0	207.0	207.0	207.0	206.7	206.7	207.0	207.0
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)	20.1	19.0	18.7	18.7	21.3	19.2	14.5	12.7	14.4	12.5	15.3	12.7
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	29.6	28.5	30.8	30.8	30.8	28.7	24.0	22.2	26.5	24.6	24.8	22.2
C/I - copol asi uplink (dB)	23.4	22.3	21.8	21.8	24.6	22.5	17.8	16.0	17.5	15.6	18.6	16.0
HPA IM at 10 deg el angle(limit: 21,c;10,Ku)	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
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	17.7	16.6	16.5	16.5	18.8	16.8	12.4	10.6	12.4	10.5	13.1	10.6
Downlink e.i.r.p. -bp (dBW)	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8
Downlink BP-BE difference	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
DL ES Pattern Advantage	4.6	4.6	4.6	4.6	0	0	4.6	4.6	4.6	4.6	0	0
Satellite e.i.r.p.d. per carrier (dBW)-tow es	-25.5	-27.7	-25.5	-27.7	-30.1	-32.3	-25.5	-27.7	-25.5	-27.7	-30.1	-32.3
Satellite e.i.r.p.d. per carrier (dBW)-bp	-23.0	-25.2	-23.0	-25.2	-23.0	-25.2	-23.0	-25.2	-23.0	-25.2	-23.0	-25.2
Satellite e.i.r.p. per carrier (dBW)-bp	22.4	20.2	22.4	20.2	22.4	20.2	25.4	23.2	25.4	23.2	25.4	23.2
Satellite e.i.r.p. per carrier (dBW)-ES	19.9	17.7	19.9	17.7	15.3	13.1	22.9	20.7	22.9	20.7	18.3	16.1
Free space path loss (dB)	205.4	205.4	205.1	205.1	205.4	205.4	205.4	205.4	205.1	205.1	205.4	205.4
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)	31.4	43.2	31.7	43.5	26.8	38.6	25.4	43.2	25.7	43.5	20.8	38.6
C/N downlink towards ES (dB)	28.9	40.7	29.2	41.0	19.7	31.5	22.9	40.7	23.2	41.0	13.7	31.5
C/N-thermal-total	19.5	18.9	18.3	18.7	17.4	18.9	13.9	12.6	13.9	12.5	11.4	12.6
Interference & Margins:												
C/I Co-polar downlink interference d/l(dB)	28.5	40.8	28.5	40.8	23.9	36.2	21.8	40.8	21.8	40.8	17.2	36.2
C/I X-polar external interference d/l (dB)	25.9	38.1	25.9	38.1	21.3	33.5	17.2	38.1	17.2	38.1	12.6	33.5
Downlink C/(Nth +I+others) composite with ASI dn	22.8	34.9	22.9	35.0	16.6	28.6	15.1	34.9	15.2	35.0	9.4	28.6
Total C/(Nth +I) composite with ASI tot	16.5	16.6	15.6	16.4	14.5	16.5	10.5	10.6	10.6	10.5	7.8	10.5
Total C/(Nth +others) w/o ASI	19.0	18.4	18.0	18.2	17.1	18.4	13.7	12.5	13.7	12.4	11.3	12.5
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