EXHIBIT 12: GALAXY KA LINK BUDGETS

Satellite information	Clear Sky	Up Fade	Dn Fade
Satellite Longitude (degrees)	-89.1	-89.1	-89.1
G/T (EOC. dB/K)	2.5	2.5	2.5
Attenuation setting (dB)	17.0	17.0	17.0
SED (EOC dBW/m2)	-77.2	-77.2	-77.2
Downlink FIRP (Beam Peak, dBW)	61.2	61.2	61.2
Carrier Information	01.2	01.2	01.2
Carrier Information	44040714	445140714	440140714
Emission Designation	110MG/W	11UMG/W	110MG/W
Bits/Symbol	2	2	2
Info Rate + Overnead (Mbit/s)	86.27	86.27	86.27
Codec:	0.50	0.50	0.50
RS:	0.92	0.92	0.92
Noise Bandwidth (MHz)	93.616	93.616	93.616
C/N required (dB)	3.1	3.1	3.1
Transmit Earth Station			
Antenna Diameter (m)	6.0	6.0	6.0
Rain Rate (mm/hr)	41.9	41.9	41.9
Peak Antenna Gain (dBi)	63.6	63.6	63.6
S/C Relative Gain from Peak towards E/S (dB)	-4.0	-4.0	-4.0
Receive Earth Station			
Antenna Diameter (m)	0.66	0.66	0.66
Rain Rate (mm/hr)	41.9	41.9	41.9
Peak Antenna Gain (dBl)	40.9	40.9	40.9
D/Lamda	43.9	43.9	43.9
S/C Relative Gain from Peak towards E/S (dB)	-4.0	-4.0	-4.0
Sustem (LNA, Sky) Noise Temp	150.0	150.0	150.0
Temperature due to rain fade and dates	20.7	20.7	151.6
O(T of EQ (dB)(/)	10.5	19.6	151.0
CALUPIC Carrier	10.0	10.0	10.1
Civilian Delink Per Carner			
Uplink EIRP per camer (EOC, dBW)	85.3	91.5	85.3
Pathioss at uplink frequency (dB)	213.4	213.4	213.4
Uplink gazeous attenuation (dB)	0.3	0.3	0.3
Uplink rain attenuation (dB)	0.0	6.3	0.0
Uplink control correction (dB)	0.0	6.2	0.0
Gain of 1 m2 antenna (dB)	50.9	50.9	50.9
Per carrier input back-off (dB)	0.0	0.0	0.0
C/N uplink, thermal (EOC, dB)	22.9	22.9	22.9
C/N Downlink Per Carrier			
Transponder BP saturation EIRP (dBW)	61.2	61.2	61.2
Per carrier output back-off (dB)	0.0	0.0	0.0
Per carrier EIRP (EOC, dBW)	57.2	57.2	57.2
Pointing Error (dB)	-0.5	-0.5	-0.5
Pathloss at downlink frequency (dB)	210.0	210.0	210.0
Downlink gazeous attenuation (dB)	0.3	0.3	0.3
Downlink rain attenuation (dB)	0.0	0.0	2.9
ES G/T (dB/K)	18.6	18.6	16.1
C/N downlink, thermal (EOC, dB)	13.0	13.0	85
Cil Ofber linke (roune IN)	30.0	20.0	30.0
INTERSERING SATELLITE #1	30.0	30.0	30.0
Orbital Separation (degrees)	1.77	1.77	1.77
G (AP-7) (dBl)	25.9	25.9	25.9
Interfering Uplink power density (dBVWHZ)	-55.5	-56.5	-56.5
Interfering D/L eirp density (dBW/Hz)	-15.9	-15.9	-15.9
C/I ASI uplink (dB)	40.6	46.8	40.6
C/I ASI downlink (dB)	8.5	8.5	8.5
INTERFERING SATELLITE #2			
Orbital Separation (degrees)	1.88	1.88	1.88
G (AP-7) (dBl)	23.9	23.9	23.9
Interfering Uplink power density (dBW/Hz)	-56.5	-56.5	-56.5
Interfering D/L eirp density (dBW/Hz)	-15.9	-15.9	-15.9
C/LASI uplink (dB)	40.6	46.8	40.6
C/I ASI downlink (dB)	10.4	10.4	10.4
Total C/N			
C/N available per carrier (dB)	5.5	5.5	4.2
Margin for other losses (dB)	1.1	1.1	1.1
C/N total (clear-sky, dB)	4.4	44	3.1
PSD (EOC dBW/Hz)	-58.0	-51.8	-58.0
ESD at beam peak (dB/W/Hz)	-18.5	-18.5	-18.5
# of carriers	-10.0	-10.0	-10.5
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- 1) Carrier modulation is QPSK
- 2) The orbital location listed for each adjacent satellite corresponds to the topocentric location corresponding to a 2 degree geocentric separation with respect to Galaxy Ka and incorporating 0.05 degrees of stationkeeping accuracy as well as 0.05 degrees of receive antenna mispointing towards one of the adjacent satellites (and 0.05 degree of mispointing away from the other adjacent satellite).

0 stallin information	Clear Chu	Lin Ende	Do Eado
Satellite Lengthude (degrees)	Clear Sky	Up Fade	Dh Fade
Satellite Longitude (degrees)	-89.1	-89.1	-89.1
G/T (EOC, dB/K)	2.5	2.5	2.5
Attenuation setting (dB)	15.0	15.0	15.0
SFD (EOC, dBW/m2)	-79.2	-79.2	-79.2
Downlink EIRP (Beam Peak, dBW)	61.2	61.2	61.2
Carrier Information			
Emission Designation	10M3G7W	10M3G7W	10M3G7W
Bits/Symbol	2	2	2
info Rate + Overhead (Mbit/s)	6.24	6.24	6.24
Codec:	0.50	0.50	0.50
RS:	0.92	0.02	0.92
Noise Bandwidth (MHz)	6.771	6.771	6.771
Obligation (MP2)	0.771	0.771	0.771
Cristrequired (dB)	3.9	3.0	3.6
Transmit Earth Station			
Antenna Diameter (m)	6.0	6.0	6.0
Rain Rate (mm/hr)	41.9	41.9	41.9
Peak Antenna Gain (dBi)	63.6	63.6	63.6
S/C Relative Gain from Peak towards E/S (dB)	-4.0	-4.0	-4.0
Receive Earth Station			
Antenna Diameter (m)	0.62	0.62	0.62
Rain Rate (mm/hr)	41.9	41.9	41.9
Peak Antenna Gain (dBi)	40.4	40.4	40.4
D/Lamda	41.2	41.2	41.2
S/C Relative Cain from Deak towards S/C (#5)		.40	-4.0
S/C Relative Gain from Peak towards E/S (dB)	-4.0	-4.0	-4.0
System (LNA_SKy) Noise Temp	150.0	150.0	150.0
Temperature due to rain fade and gases	20.7	20.7	151.6
G/T of ES (dB/K)	18.1	18.1	15.6
C/N Uplink Per Carrier			
Uplink EIRP per carrier (EOC, dBW)	69.4	75.6	69.4
Pathioss at uplink frequency (dB)	213.4	213.4	213.4
Uplink gazeous attenuation (dB)	0.3	0.3	0.3
Liplink rain attenuation (dB)	0.0	6.3	0.0
Liplink control correction (dB)	0.0	6.2	0.0
Cale of 1 m2 actions (dB)	50.0	50.0	50.0
Gam of Finz antenna (db)	30.9	50.9	50.9
Per camer input back-off (dB)	-13.9	-13.9	-13.9
C/N uplink, thermal (EOC, dB)	18.4	18.4	18.4
C/N Downlink Per Carrier			
Transponder BP saturation EIRP (dBW)	61.2	61.2	61.2
Per carrier output back-off (dB)	-8.8	-8.8	-8.8
Per carrier EIRP (EOC, dBW)	48.4	48.4	48.4
Pointing Error (dB)	-0.5	-0.5	-0.5
Pathioss at downlink frequency (dB)	210.0	210.0	210.0
Downlink gazeous attenuation (dB)	0.3	0.3	0.3
Downlink rain attenuation (dB)	0.0	0.0	2.9
ES G/T (dB/K)	18.1	18.1	15.6
C/N downlink, thermal (EOC, dB)	16.0	16.0	10.6
Cil Ofber linke (re use 15th	10.0	16.0	16.0
INTERCERING SATELLITE #4	10.0	10.0	10.0
Orbital Separation (degrees)	1.75	1.75	1.75
G (AP-7) (dBl)	27.4	27.4	27.4
Interfering Uplink power density (dBW/Hz)	-56.5	-56.5	-56.5
Interfering D/L eirp density (dBW/Hz)	-15.9	-15.9	-15.9
C/I ASI uplink (dB)	36.1	42.3	36.1
C/I ASI downlink (dB)	9.0	9.0	9.0
INTERFERING SATELLITE #2			
Orbital Separation (degrees)	1.85	1.85	1,86
G (AP-7) (dBl)	25.7	25.7	25.7
Interfacing Linink power dessity (dBM/Hat	-55.5	-56.5	-56.5
Interfering Opinik power density (down2)	-50.5	-00.0	-56.5
on a character (dD)	-10.9	-15.9	-13.9
Cri Asi upink (dB)	36.1	42.3	36.1
C/i ASI downlink (dB)	10.7	10.7	10.7
Total C/N			
C/N available per carrier (dB)	5.6	5.6	4.7
Margin for other losses (dB)	1.1	1.1	1.1
C/N total (clear-sky, dB)	4.5	4.5	3.6
PSD (EOC, dBW/Hz)	-62.5	-56.3	-62.5
ESD at beam peak (dB/W/Hz)	-15.9	-15.9	-15.9
# of carriers	7	7	7
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Satellite Information	Clear Sky	Up Fade	Dn Fade
Satellite Longitude (degrees)	-89.1	-89.1	-89.1
G/T (EOC, dB/K)	2.5	2.5	2.5
Attenuation setting (dB)	15.0	15.0	15.0
SED (EOC dBW/m2)	-79.2	-79.2	-79.2
Downlink FIRD (Beam Deak, (BW)	61.2	61.2	61.2
Ocertes Information	01.2	01.2	01.2
camerinionilation			
Emission Designation	100KG7W	100KG7W	100KG7W
Bits/Symbol	2	2	2
Info Rate + Overhead (Mbit/s)	0.07	0.07	0.07
Codec:	0.50	0.50	0.50
RS:	0.93	0.93	0.93
Noise Bandwidth (MHz)	0.075	0.075	0.075
C/N required (dB)	3.0	2.8	2.8
Transmit Earth Station	0.0	2.0	2.0
Astessa Dismeter (m)	6.0	6.0	6.0
Antenna Diameter (m)	6.U	6.0	6.U
Rain Rate (mm/hr)	41.9	41.9	41.9
Peak Antenna Gain (dBl)	63.6	63.6	63.6
S/C Relative Gain from Peak towards E/S (dB)	-4.0	-4.0	-4.0
Receive Earth Station			
Antenna Diameter (m)	0.60	0.60	0.60
Bain Bate (mm/br)	419	41.9	41.9
Deak Antenna Cala (dBl)	40.4	40.4	40.4
Dil amén	40.1	40.1	40.1
D/Lamda	39.9	39.9	39.9
S/C Relative Gain from Peak towards E/S (dB)	-4.0	-4.0	-4.0
System (LNA_Sky) Noise Temp	150.0	150.0	150.0
Temperature due to rain fade and gases	20.7	20.7	151.6
G/T of ES (dB/K)	17.8	17.8	15.3
C/N Uplink Per Carrier			
Uplink EIRP per carrier (EQC, dBW)	49.8	56.0	49.8
Dathlass at unlink fraguancy (dB)	213.4	213.4	213.4
Pathoes at uplint inequelloy (db)	210.4	210.4	210.4
Uplink gazeous attenuation (dB)	0.3	0.3	0.3
Uplink rain attenuation (dB)	0.0	6.3	0.0
Uplink control correction (dB)	0.0	6.2	0.0
Gain of 1 m2 antenna (dB)	50.9	50.9	50.9
Per carrier input back-off (dB)	-33.5	-33.5	-33.5
C/N uplink, thermal (EOC, dB)	18.4	18.3	18.4
C/N Downlink Per Carrier			
Transponder BD saturation FIRD (dBW)	61.2	61.2	61.2
Des carries output back-off (dB)	-28.4	-29.4	-29.4
Per carrier output back-oil (db)	-20.4	-20.4	-20.4
Per camer EIRP (EOC, dBW)	28.8	28.8	28.8
Pointing Error (dB)	-0.5	-0.5	-0.5
Pathloss at downlink frequency (dB)	210.0	210.0	210.0
Downlink gazeous attenuation (dB)	0.3	0.3	0.3
Downlink rain attenuation (dB)	0.0	0.0	2.9
ES G/T (dB/K)	17.8	17.8	15.3
C/N downlink, thermal (EOC, dB)	15.6	15.6	10.3
Cil Ofber linke (re-use 189	16.0	16.0	16.0
	18.0	10.0	10.0
INTERVERING SATELLITE #1			
Orbital Separation (degrees)	1.74	1.74	1.74
G (AP-7) (dBl)	28.1	28.1	28.1
Interfering Uplink power density (dBW/Hz)	-56.5	-56.5	-56.5
Interfering D/L eirp density (dBW/Hz)	-15.9	-15.9	-15.9
C/I ASI uplink (dB)	36.1	42.3	36.1
C/LASI downlink (dB)	79	7.9	79
INTERFERING SATELLITE #2	1.2		1.2
Orbital Capacities (despect)	1.05	1.05	1.05
Orbital Separation (degrees)	1.85	1.85	1.85
G (AP-7) (dBi)	26.5	26.5	26.5
Interfering Uplink power density (dBW/Hz)	-56.5	-56.5	-56.5
Interfering D/L eirp density (dBW/Hz)	-15.9	-15.9	-15.9
C/I ASI uplink (dB)	36.1	42.3	36.1
C/LASI downlink (dB)	9.5	9.5	9.5
Total C/N			
C/M available ner earrier (47%	47	47	2.0
Griv available per carrier (08)	4./	4./	3.9
margin for other losses (dB)	1.1	1.1	1.1
C/N total (clear-sky, dB)	3.6	3.6	2.8
PSD (EOC, dBW/Hz)	-62.5	-56.3	-62.5
ESD at beam peak (dBW/Hz)	-16.0	-16.0	-16.0
# of carriers	689	689	689

- 1) Carrier modulation is QPSK
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Satellite Information	Clear Sky	Up Fade	Dn Fade
Satellite Longitude (degrees)	-89.1	-89.1	-89.1
	2.5	2.5	2.5
Attenuation cettion (dR)	2.0	2.0	2.0
Attenuation setting (db)	15.0	15.0	15.0
SFD (EOC, dBW/m2)	-79.2	-79.2	-79.2
Downlink EIRP (Beam Peak, dBW)	61.2	61.2	61.2
Carrier Information			
Emission Designation	1M45G7W	1M45G7W	1M45G7W
Bits/Symbol	1	1	1
Inte Opinion	0.61	0.61	0.61
(moles)	0.01	0.01	0.01
Codec:	0.50	0.50	0.50
RS:	1.00	1.00	1.00
Noise Bandwidth (MHz)	1.229	1.229	1.229
C/N required (dB)	3.4	2.7	2.7
Transmit Earth Station			
Antenna Diameter (m)	6.0	6.0	6.0
Pala Pala (merila)	41.0	44.0	44.0
Rail Rate (minini)	41.9	41.9	41.9
Peak Antenna Gain (dbi)	63.6	63.6	63.6
S/C Relative Gain from Peak towards E/S (dB)	-4.0	-4.0	-4.0
Receive Earth Station			
Antenna Diameter (m)	0.66	0.66	0.66
Rain Rate (mm/hr)	41.9	41.9	41.9
Peak Antenna Gain (dBl)	40.9	40.9	40.9
D/J amda	43.0	43.0	43.0
orcanida ele Balativa Cala tran Dont incento anti-	40.9	40.9	40.9
S/C Relative Gain from Peak towards E/S (dB)	-4.0	-4.0	-4.0
System (LNA_Sky) Noise Temp	150.0	150.0	150.0
Temperature due to rain fade and gases	20.7	20.7	151.6
G/T of ES (dB/K)	18.6	18.6	16.1
C/N Uplink Per Carrier			
Uplink FIRP per carrier (EQC, dBW)	59.5	65.7	59.5
Dathinss at unlink frequency (dB)	213.4	213.4	213.4
Pathoes at uplink inequelity (ub)	210.4	210.4	210.4
Uplink gazeous attenuation (dB)	0.3	0.3	0.3
Uplink rain attenuation (dB)	0.0	6.3	0.0
Uplink control correction (dB)	0.0	6.2	0.0
Gain of 1 m2 antenna (dB)	50.9	50.9	50.9
Per carrier input back-off (dB)	-23.8	-23.8	-23.8
C/N uplink, thermal (EOC, dB)	15.9	15.9	15.9
C/N Downlink Per Carrier			
Transponder BP saturation FIRP (dBW)	61.2	61.2	61.2
Per carrier output back-off (dB)	-18.7	-18.7	-18.7
Des comies 5/50 (500, dBM)	20.5	20.5	70.5
Per camer EIRP (EOC, dBW)	30.5	30.5	30.5
Pointing Error (dB)	-0.5	-0.5	-0.5
Pathioss at downlink frequency (dB)	210.0	210.0	210.0
Downlink gazeous attenuation (dB)	0.3	0.3	0.3
Downlink rain attenuation (dB)	0.0	0.0	2.9
ES G/T (dB/K)	18.6	18.6	16.1
C/N downlink, thermal (EQC, dB)	14.0	14.0	87
Cil Ofber linke (re-use 1M)	16.0	16.0	15.0
INTERSERING SATELLITE #1	10.0	10.0	10.0
Orbital Separation (degrees)	1.77	1.77	1.77
G (AP-7) (dBl)	25.9	25.9	25.9
Interfering Uplink power density (dBW/Hz)	-56.5	-56.5	-56.5
Interfering D/L eirp density (dBW/Hz)	-15.9	-15.9	-15.9
C/I ASI uplink (dB)	33.6	39.8	33.6
C/LASI downlink (dB)	8.6	8.6	8.6
INTEREERING SATELLITE #2	0.0		0.0
	4.55	4.55	4.55
Orbital Separation (degrees)	1.00	1.00	1.00
G (AP-7) (0BI)	23.9	23.9	23.9
Interfering Uplink power density (dBW/Hz)	-56.5	-56.5	-56.5
Interfering D/L eirp density (dBW/Hz)	-15.9	-15.9	-15.9
C/I ASI uplink (dB)	33.6	39.8	33.6
C/I ASI downlink (dB)	10.5	10.5	10.5
Total C/N			
C/N available per carrier (dB)	4.0	4.9	2.0
Griv available per carrier (dB)	4.9	4.9	3.8
margin for other losses (dB)	1.1	1.1	1.1
C/N total (clear-sky, dB)	3.8	3.8	2.7
PSD (EOC, dBW/Hz)	-65.0	-58.8	-65.0
ESD at beam peak (dBW/Hz)	-18.4	-18.4	-18.4
# of carriers	74	74	74

- 1) Carrier modulation is BPSK
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Satellite Information	Clear Sky	Lin Eade	Dn Eade
	Clear Sky	Oprade	Dirrade
Satellite Longitude (degrees)	-89.1	-89.1	-89.1
G/T (EOC, dB/K)	2.5	2.5	2.5
Attenuation setting (dB)	15.0	15.0	15.0
SFD (EOC, dBW/m2)	-79.2	-79.2	-79.2
Downlink EIRP (Beam Peak, dBW)	61.2	61.2	61.2
Carrier Information			
Emission Designation	400KG7W	400KG7W	400KG7W
Dite/Cumbel	40010711	40010711	40000777
Bits/Symbol	1	1	1
Info Rate + Overhead (Mbit/s)	0.15	0.15	0.15
Codec:	0.50	0.50	0.50
RS:	1.00	1.00	1.00
Noise Bandwidth (MHz)	0.307	0.307	0.307
C/N required (dB)	34	27	27
Transmit Earth Station	0.1		
Antenna Diamatas (m)	0.7	0.7	0.7
Antenna Diameter (m)	0.7	0.7	0.7
Rain Rate (mm/hr)	41.9	41.9	41.9
Peak Antenna Gain (dBi)	44.4	44.4	44.4
S/C Relative Gain from Peak towards E/S (dB)	-4.0	-4.0	-4.0
Receive Earth Station			
Antenna Diameter (m)	6.00	6.00	6.00
Rain Rate (mm/hr)	41 0	41.0	41.9
Dook Antonno Coin (dDi)	-1.3	-1.3	
Peak Aritenna Gain (dBi)	00.1	00.1	00.1
D/Lamda	399.0	399.0	399.0
S/C Relative Gain from Peak towards E/S (dB)	-4.0	-4.0	-4.0
System (LNA_Sky) Noise Temp	150.0	150.0	150.0
Temperature due to rain fade and gases	20.7	20.7	151.6
G/T of ES (dB/K)	37.8	37.8	35.3
C/N Uplink Der Carrier	01.0	01.0	00.0
Liplink FIDB per serrier (EQC, dDM)	42.6	40.0	42.6
oplink EIRF per carrier (EOC, dBW)	42.0	49.0	42.0
Pathloss at uplink frequency (dB)	213.4	213.4	213.4
Uplink gazeous atttenuation (dB)	0.3	0.3	0.3
Uplink rain attenuation (dB)	0.0	6.3	0.0
Uplink control correction (dB)	0.0	6.2	0.0
Gain of 1 m2 antenna (dB)	50.9	50.9	50.9
Por corrier input back off (dP)	40.6	40.6	40.6
	-40.0	-40.0	-40.0
C/N uplink, thermal (EOC, dB)	5.2	5.1	5.2
C/N Downlink Per Carrier			
Transponder BP saturation EIRP (dBW)	61.2	61.2	61.2
Per carrier output back-off (dB)	-35.5	-35.5	-35.5
Per carrier EIRP (EOC, dBW)	21.7	21.7	21.7
Pointing Error (dB)	-0.5	-0.5	-0.5
Pathloss at downlink frequency (dP)	210.0	210.0	210.0
Deumlink geneeue ettenuetien (dD)	210.0	210.0	210.0
Downlink gazeous attenuation (dB)	U.3	0.3	0.3
Downlink rain attenuation (dB)	0.0	0.0	2.9
ES G/T (dB/K)	37.8	37.8	35.3
C/N downlink, thermal (EOC, dB)	22.5	22.5	17.1
C/I Other links (re-use, IM)	16.0	16.0	16.0
INTERFERING SATELLITE #1			
Orbital Separation (degrees)	2.05	2.05	2.05
G (AB 7) (dBi)	24.0	21.00	21.2
	21.2	21.2	21.2
Interrering Uplink power density (dBW/Hz)	-56.5	-56.5	-56.5
Interfering D/L eirp density (dBW/Hz)	-15.9	-15.9	-15.9
C/I ASI uplink (dB)	22.9	29.1	22.9
C/I ASI downlink (dB)	21.7	21.7	21.7
INTERFERING SATELLITE #2			
Orbital Separation (degrees)	2.16	2.16	2.16
C (AP 7) (dPi)	2.10	2.10	20.6
G (AFF7) (GDI)	20.0	20.0	20.0
Interiering Uplink power density (dBW/Hz)	-56.5	-56.5	-56.5
Interfering D/L eirp density (dBW/Hz)	-15.9	-15.9	-15.9
C/I ASI uplink (dB)	22.9	29.1	22.9
C/I ASI downlink (dB)	22.3	22.3	22.3
Total C/N			
C/N available per carrier (dB)	4.5	4.5	43
Margin for other losses (dP)	4.5		
margin for other losses (dB)	1.1	1.1	1.1
C/N total (clear-sky, dB)	3.4	3.4	3.2
PSD (EOC, dBW/Hz)	-56.7	-50.3	-56.7
ESD at beam peak (dBW/Hz)	-29.1	-29.1	-29.1
# of carriers	275	275	275

- 1) Carrier modulation is BPSK
- 2) The orbital location listed for each adjacent satellite corresponds to the topocentric location corresponding to a 2 degree geocentric separation with respect to Galaxy Ka and incorporating 0.05 degrees of stationkeeping accuracy as well as 0.05 degrees of receive antenna mispointing towards one of the adjacent satellites (and 0.05 degree of mispointing away from the other adjacent satellite).