

## EXHIBIT 4A: Galaxy 4R C-Band Link Budgets

<b>UPLINK BEAM INFORMATION</b>						
Uplink Beam Name	Conus		Conus		Conus	
Uplink Frequency (MHz)	6175		6175		6175	
Uplink Beam Polarization	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal	Vertical/Horizontal
Uplink Relative Contour Level (dB)	-4		-4		-4	
Uplink Contour G/T (dB/K)	-4.0		-4.0		-4.0	
Uplink SFD (dBW/m <sup>2</sup> )	-88.0		-88.0		-84.0	
Uplink Input Backoff (dB)	0		0		5	
<b>DOWNLINK BEAM INFORMATION</b>						
Downlink Beam Name	Conus		Conus		Conus	
Downlink Frequency (MHz)	3950		3950		3950	
Downlink Beam Polarization	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical	Horizontal/Vertical
Downlink Relative Contour Level (dB)	-4		-4		-4	
Downlink Contour EIRP (dBW)	38.1		38.1		38.1	
Downlink Output Backoff (dB)	0		0		3.5	
<b>ADJACENT SATELLITE 1</b>						
Satellite 1 Orbital Location	74.85 WL		74.85 WL		74.85 WL	
Uplink Power Density (dBW/Hz)	-38.7		-38.7		-38.7	
Uplink Polarization Advantage (dB)	0		0		0	
Downlink EIRP Density (dBW/Hz)	-32.0		-32.0		-32.0	
Downlink Polarization Advantage (dB)	0		0		0	
<b>ADJACENT SATELLITE 2</b>						
Satellite 2 Orbital Location	78.85 WL		78.85 WL		78.85 WL	
Uplink Power Density (dBW/Hz)	-38.7		-38.7		-38.7	
Uplink Polarization Advantage (dB)	0		0		0	
Downlink EIRP Density (dBW/Hz)	-32.0		-32.0		-32.0	
Downlink Polarization Advantage (dB)	0		0		0	
<b>CARRIER INFORMATION</b>						
Carrier ID	1		2		3	
Information Rate (kbps)	N/A		36863		6000	
Carrier Modulation	TV/FM		QPSK		QPSK	
Peak to Peak Bandwidth of EDS (MHz)	4		n/a		n/a	
Code Rate	N/A		3/4 - RS		3/4 - RS	
Occupied Bandwidth (kHz)	36000		30133		4154	
Allocated Bandwidth (kHz)	36000		36000		6875	
Minimum C/N <sub>min</sub> (dB)	10.0		6.1		6.7	
5.7						
3.0						
<b>UPLINK EARTH STATION</b>						
Earth Station Diameter (meters)	7.0		7.0		7.0	
Earth Station Gain (dBi)	51.0		51.0		51.0	
Earth Station Elevation Angle	20		20		20	
<b>DOWNLINK EARTH STATION</b>						
Earth Station Diameter (meters)	8.1		3.5		3.5	
Earth Station Gain (dBi)	49.3		41.1		41.1	
Earth Station G/T (dB/K)	28.4		21.0		21.0	
Earth Station Elevation Angle	20		20		20	
<b>UPLINK PERFORMANCE</b>						
Uplink Earth Station EIRP (dBW)	74.9		74.9		68.4	
Uplink Path Loss, Clear Sky (dB)	-200.2		-200.2		-200.2	
Satellite G/T (dB/K)	-4.0		-4.0		-4.0	
Boltzman Constant (dBW/K-Hz)	228.6		228.6		228.6	
Carrier Noise Bandwidth (dB-Hz)	-75.6		-74.8		-66.2	
Uplink C/N (dB)	23.7		24.5		26.6	
25.5						
22.8						
<b>DOWNLINK PERFORMANCE</b>						
Downlink EIRP per Carrier (dBW)	38.1		38.1		29.1	
Antenna Pointing Error (dB)	-0.5		-0.5		-0.5	
Downlink Path Loss, Clear Sky (dB)	-196.3		-196.3		-196.3	
Earth Station G/T (dB/K)	28.4		21.0		21.0	
Boltzman Constant (dBW/K-Hz)	228.6		228.6		228.6	
Carrier Noise Bandwidth (dB-Hz)	-75.6		-74.8		-66.2	
Downlink C/N (dB)	22.7		16.1		15.7	
14.5						
11.9						
<b>COMPOSITE LINK PERFORMANCE</b>						
C/N Uplink (dB)	23.7		24.5		26.6	
C/N Downlink (dB)	22.7		16.1		15.7	
C/I Intermodulation (dB)	n/a		n/a		21.1	
C/I Uplink Co-Channel (dB)*	24.0		24.0		25.7	
C/I Downlink Co-Channel (dB)*	24.0		24.0		25.7	
C/I Uplink Adjacent Satellite 1 (dB)	16.0		16.8		18.9	
C/I Downlink Adjacent Satellite 1 (dB)	23.0		16.4		16.0	
C/I Uplink Adjacent Satellite 2 (dB)	16.0		16.8		18.9	
C/I Downlink Adjacent Satellite 2 (dB)	21.6		11.6		11.2	
10.1						
7.5						
C/(N+I) Composite (dB)	11.0		7.7		7.7	
Required System Margin (dB)	-1.0		-1.0		-1.0	
Net C/(N+I) Composite (dB)	10.0		6.7		6.7	
Minimum Required C/N (dB)	-10.0		-6.1		-6.7	
Excess Link Margin (dB)	0.0		0.6		0.0	
Number of Carriers	1.0		1.0		3.6	
15.8						
360.0						
<b>CARRIER DENSITY LEVELS</b>						
Uplink Power Density (dBW/Hz)	-42.1		-50.9		-48.8	
Downlink EIRP Density At Beam Peak	-23.9		-32.7		-33.1	
-34.2						
-36.9						

\*The C/I level is adjusted depending on the signal level and transponder mode of operation