

**LB7 – LINK BUDGETS GMR1F**

<b>TABLE A-9: NEXT GENERATION GMR-1 FORWARD VOICE LINK BUDGET</b>		
<b>Satellite and Earth Station Information</b>		
Uplink name	Las Vegas, (6.3 m)	Las Vegas, (9.3 m)
Satellite longitude (degrees) (- = West)	-111.10	-111.10
Downlink elevation angle (degrees)	36.10	36.10
<b>Carrier Information</b>		
Frequency reuse plan	12.00	12.00
Beam pitch (deg)	0.25	0.25
Number of beams	280.00	280.00
Number of carriers per beam	8.80	8.80
Traffic channels per carrier	8.00	8.00
Information rate (kbps)	4.39	4.39
Activity factor	0.40	0.40
Number of simultaneous voice channels per beam	176.00	176.00
Information burst rate (kKbps) plus overhead	35.10	35.10
Modulation	QPSK	QPSK
FEC code rate	0.75	0.75
Transmission rate (kbps)	46.80	46.80
Allocated bandwidth per carrier (kHz)	31.25	31.25
Required total C/N with margin (dB)	4.76	4.76
<b>Uplink</b>		
Uplink frequency (GHz)	12.88	12.88
Uplink EIRP (on-axis) (dBW)	42.48	45.68
Uplink atmospheric loss (dB)	0.11	0.11
Rain availability (%)	99.99	99.99
Uplink rain fade (dB)	3.37	3.37
Uplink free space pathloss (dB)	206.05	206.05
Transponder G/T (dBi/K)	15.06	15.06
Uplink C/N (dB)	32.92	36.12
Composite uplink C/I (dB)	17.66	17.66
<b>Satellite Transponder</b>		
Power control tolerance (dB)-per user	0.50	0.50
Power control tolerance (dB)-per uplink	1.00	1.00
Per carrier output backoff (dB)	36.92	36.92
Expected C/IM in digital carrier bandwidth at satellite (dB)	12.50	12.50
<b>Downlink</b>		
Downlink frequency (GHz)	2.19	2.19
Satellite EIRP per carrier (dBW)	46.43	46.43
Downlink free space path loss (dB)	190.87	190.87
Downlink atmospheric loss (dB)	0.06	0.06
Average shadowing + fading (dB)	3.00	3.00
Earth station on-axis G/T (dBi/K)	-28.00	-28.00
Polarization loss (dB)	3.00	3.00
Downlink C/N (dB)	6.41	6.41

Expected composite downlink C/I (dB)	15.00	15.00
<b>Overall Performance Summary</b>		
Computed uplink or system margin (dB)	0.00	0.01
Downlink margin (dB)	0.00	0.01

<b>TABLE A-10: NEXT GENERATION GMR-1 FORWARD DATA LINK BUDGET</b>		
<b>Satellite and Earth Station Information</b>		
Uplink name	Las Vegas, (6.3 m)	Las Vegas, (9.3 m)
Satellite longitude (degrees) (- = West)	-111.10	-111.10
Downlink elevation angle (degrees)	36.10	36.10
<b>Carrier Information</b>		
Frequency reuse plan	12.00	12.00
Beam pitch (deg)	0.25	0.25
Information burst rate (kKbps) plus overhead	623.99	623.99
Modulation	16-QAM	16-QAM
FEC code rate	0.67	0.67
Transmission rate (kbps)	935.98	935.98
Allocated bandwidth per carrier (kHz)	312.50	312.50
Required total C/N with margin (dB)	9.58	9.58
<b>Uplink</b>		
Uplink frequency (GHz)	12.88	12.88
Uplink EIRP (on-axis) (dBW)	51.93	55.13
Uplink atmospheric loss (dB)	0.11	0.11
Rain availability (%)	99.99	99.99
Uplink rain fade (dB)	3.37	3.37
Uplink free space path loss (dB)	206.05	206.05
Transponder G/T (dBi/K)	15.06	15.06
Uplink C/N (dB)	32.36	35.56
Composite uplink C/I (dB)	17.66	17.66
<b>Satellite Transponder</b>		
Power control tolerance (dB)-per user	0.50	0.50
Power control tolerance (dB)-per uplink	1.00	1.00
Per carrier output backoff (dB)	28.97	29.27
Expected C/IM in digital carrier bandwidth at satellite (dB)	12.50	12.50
<b>Downlink</b>		
Downlink frequency (GHz)	2.19	2.19
Satellite EIRP per carrier (dBW)	73.61	73.31
Downlink free space path loss (dB)	190.87	190.87
Downlink atmospheric loss (dB)	0.06	0.06
Average fade and head loss (dB)	3.00	3.00
Earth station on-axis G/T (dBi/K)	-28.00	-28.00
Polarization loss (dB)	3.00	3.00
Downlink C/N (dB)	23.59	23.29
Expected composite downlink C/I (dB)	15.00	15.00
<b>Overall Performance Summary</b>		
Computed uplink or system margin (dB)	0.05	0.07

Downlink margin (dB)

0.06

0.05