

**LB9 – LINK BUDGETS – OFDMA (MODIFIED MIMAX)**

<b>Table A-17: OFDMA (Modified Wimax) Return Link Data Budget</b>		
<b>Satellite and Earth Station Information</b>		
Downlink name	Las Vegas, (6.3 m)	Las Vegas, (9.3 m)
Satellite longitude (degrees) (- = West)	-111.1	-111.1
Uplink elevation angle (degrees)	36.1	36.1
<b>Carrier Information</b>		
Frequency reuse pattern	4.0	4.0
Code reuse	3.0	3.0
Beam pitch (deg)	0.3	0.3
Number of bins per beam	16.0	16.0
Number of data subcarriers per bin	3.0	3.0
Number of pilots per bin	1.0	1.0
Information burst rate (Kbps)	50.8	50.8
Modulation	16-QAM	16-QAM
FEC code rate	0.50	0.50
Transmission rate (kbps)	101.6	101.6
Allocated bandwidth per bin (kHz)	43.8	43.8
Required total C/N with margin (dB)	7.4	7.4
<b>Uplink</b>		
Uplink frequency (GHz)	2.0	2.0
Uplink EIRP (not including pilot) (dBW)	-1.5	-1.5
Uplink atmospheric loss (dB)	0.1	0.1
Uplink free space loss (dB)	190.1	190.1
Fade + head loss(dB)	3.0	3.0
Transponder G/T dBi/K	21.5	21.5
Polarization Loss (dB) or dual polarization gain (-)	0.0	0.0
Uplink C/N (dB)	11.4	11.4
C/I Inband ATC (dB)	100.0	100.0
C/I Inter Beam (dB)	15.9	15.9
C/I adj-channel (dB)	16.0	16.0
Composite Uplink C/I (dB)	12.9	12.9
<b>Satellite Transponder</b>		
C/I ATC affecting amplifier backoff(dB)	-36.5	-36.5
Power control tolerance (dB)	1.0	1.0
Per carrier output backoff (dB)	44.8	44.8
Expected C/IM in digital carrier bandwidth at satellite (dB)	19.0	19.0
<b>Downlink</b>		
Downlink frequency (GHz)	11.0	11.0
Satellite EIRP per carrier (dBW)	9.7	9.7
Downlink free space pathloss (dB)	204.7	204.7
Downlink atmospheric loss (dB)	0.1	0.1

Rain availability (%)	99.99	99.99
Downlink rain fade (dB)	2.2	2.2
Pointing + line losses (dB)	1.0	1.0
Earth station on-axis G/T (with downlink rain fade) (dBi/K)	31.4	34.5
Downlink C/N (dB)	17.6	20.7
Expected composite downlink C/I (dB)	28.9	28.9
<b>Overall Performance Summary</b>		
Computed uplink or system margin (dB)	0.7	1.0
Downlink margin (dB)	4.1	7.2

<b>Table A-18: OFDMA (Modified WiMax) Return Link Voice Budget</b>		
<b>Satellite and Earth Station Information</b>		
Downlink name	Las Vegas, (6.3 m)	Las Vegas, (9.3 m)
Satellite longitude (degrees) (- = West)	-111.1	-111.1
Uplink elevation angle (degrees)	36.1	36.1
<b>Carrier Information</b>		
Frequency reuse pattern	4.0	4.0
Code reuse	3.0	3.0
Beam pitch (deg)	0.25	0.25
Number of beams	280.0	280.0
Number of subcarriers per 2.5 MHz	256.0	256.0
Number of bins per beam	16.0	16.0
Number of data subcarriers per bin	3.0	3.0
Number of pilots per bin	1.0	1.0
Number of voice channels per bin (time slots)	8.0	8.0
Information rate per bin	4.23	4.23
Number of simultaneous voice channels per beam	128.0	128.0
Information Burst Rate (kbps)	33.9	33.9
Modulation	QPSK	QPSK
FEC code rate	0.67	0.67
Transmission rate (kbps)	50.8	50.8
Allocated bandwidth per bin (kHz)	43.76	43.76
Required total C/N with margin (dB)	4.3	4.3
<b>Uplink</b>		
Uplink frequency (GHz)	2.0	2.0
Uplink EIRP (not including pilot) (dBW)	-1.5	-1.5
Uplink atmospheric loss (dB)	0.1	0.1
Uplink free space loss (dB)	190.1	190.1
Fade + head loss(dB)	9.0	9.0
Transponder G/T dBi/K	21.5	21.5
Polarization loss (dB) or dual polarization gain (-)	0.0	0.0
Uplink C/N (dB)	5.4	5.4
C/I inband ATC (dB)	100.0	100.0
C/I inter beam (dB)	15.9	15.9
C/I adj-channel (dB)	16.0	16.0
Composite uplink C/I (dB)	12.9	12.9
<b>Satellite Transponder</b>		
C/I ATC affecting amplifier backoff(dB)	-36.5	-36.5

Power control Tolerance (dB)	1.0	1.0
Per carrier output backoff (dB)	44.8	44.8
Expected C/IM in digital carrier bandwidth at satellite (dB)	19.0	19.0
<b>Downlink</b>		
Downlink frequency (GHz)	11.0	11.0
Satellite EIRP per carrier (dBW)	9.7	9.7
Downlink free space pathloss (dB)	204.7	204.7
Downlink atmospheric loss (dB)	0.1	0.1
Rain availability (%)	99.99	99.99
Downlink rain fade (dB)	2.2	2.2
Pointing + line losses (dB)	1.0	1.0
Earth station on-axis G/T (with downlink rain fade) (dBi/K)	31.4	34.5
Downlink C/N (dB)	17.6	20.7
Expected composite downlink C/I (dB)	28.9	28.9
<b>Overall Performance Summary</b>		
Computed uplink or system margin (dB)	0.0	0.1
Downlink margin (dB)	0.0	3.1