

Spectrum Sharing Study

San Diego, CA



Prepared on Behalf of
Qualcomm
November 25, 2006

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1.0 Executive Summary

On behalf of Qualcomm, Comsearch has completed a Spectrum Sharing Study in San Diego, CA to re-evaluate the interference impact into existing microwave systems from a their devices temporarily operating in 2160-2180 MHz. Comsearch utilized specific site information, base station operational parameters and locations provided by Qualcomm for the study. Interference calculations were made based on this cell layout using our iQ.clear XG software and our proprietary microwave database of incumbent systems. The results of this study determine the availability of the spectrum and identify any predicted victim active microwave links and their respective interference margins.

Summary of Results

Qualcomm's system will not create any harmful interference into any active MW path. The maximum output power must not exceed an EIRP of 57 dBm.

	2160 – 2180 MHz
Links considered in analysis	49
Links cleared by OH loss	49
Licensed 2.1 GHz victim links	0

2.0 Parameters and Assumptions

Spectrum Allocation

This study analyzed the use of frequencies 2160 – 2180 MHz.

Study Area

The study was conducted using 3 sites provided by Qualcomm and located in the San Diego, CA market (see table 1). All microwave links within the Bulletin 10-F derived coordination contour and within ± 20 MHz of the band edges of the spectrum block were analyzed for potential interference.

Site	Latitude	Longitude	Radius (km)	Coord Dist (km)	Ant Ht(m)	EIRP (dBm)	Antenna	Tilt (deg)	Frequency Range (MHz)
25665 Morehouse Dr	32.89569	-117.19608	5	347.3	60.8	57	Omni	0	2160-2180
5745 Pacific Center Blvd	32.90353	-117.19672	5	348.3	62.5	57	Omni	0	2160-2180
6965 Lusk Blvd	32.90083	-117.20892	5	343.7	16	57	Omni	0	2160-2180

Table 1

AWS Parameters

Number of Sites	3
Base Station EIRP	57 dBm
Max BTS Cell Size (Radius)	5 kilometers
Antenna used	Omni
Frequency Division Duplex	Base Station Transmit at 2.1 GHz
Bandwidth of system	20 MHz

Interference Criteria

Propagation Model	OH Loss (base)
Analog Interference Criteria (C/I)	Threshold Degradation and Baseband Noise
Noise Objective	25 pWpO
Digital Interference Criteria	Receiver Threshold - T/I
Excess Fade Margin Based on	99.999% Link Reliability
Polarization	Co-polarization

3.0 Analysis Results

2.1 GHz Microwave Systems

Summary of Results

A table summarizing the analysis results is provided on the following pages.

Interference Calculations

Plot of victim links and Link Severity Reports are provided in Appendix B. They show the extent of interference from Qualcomm's system into each victim microwave receiver as compared to the interference objective calculated per Bulletin 10-F, the TSB standard document for these calculations.

The interference objective is the calculated required maximum level that microwave receivers can withstand from this proposed system. The interference level is the calculated aggregated level of interference into each receiver. The Margin depicts the difference between these two levels. If the Margins are negative, then interference from the proposed system is predicted. If the Margins are positive, then interference is not predicted. Receivers listed without calculated levels either have frequencies beyond co- and adjacent-channel, or are outside of the coordination contour.

Microwave Data

Detailed microwave data for each victim link is provided in Appendices B1.

The reports in the Appendices contain status information for each link. The various statuses are defined as follows:

- Licensed - Licensed with the Federal Communications Commission (FCC).
- Replaced - Licensed with the FCC but a new application has been filed to replace the existing path. Once the new path becomes licensed by the FCC, the status changes to Relocated.
- Relocated – Within the 18-month build out period for a new license on a different frequency band.
- Expired – Past the FCC expiration date and no renewal filed.
- Operating - Confirmed by licensee to be operating, but actual site data does not match FCC license.
- Questionable - One side of the path is listed as licensed with the FCC while the other end has been canceled or expired. This occurs because the FCC maintains licenses by transmit site rather than by path.
- Secondary - Operating in a secondary capacity based on FCC special conditions.

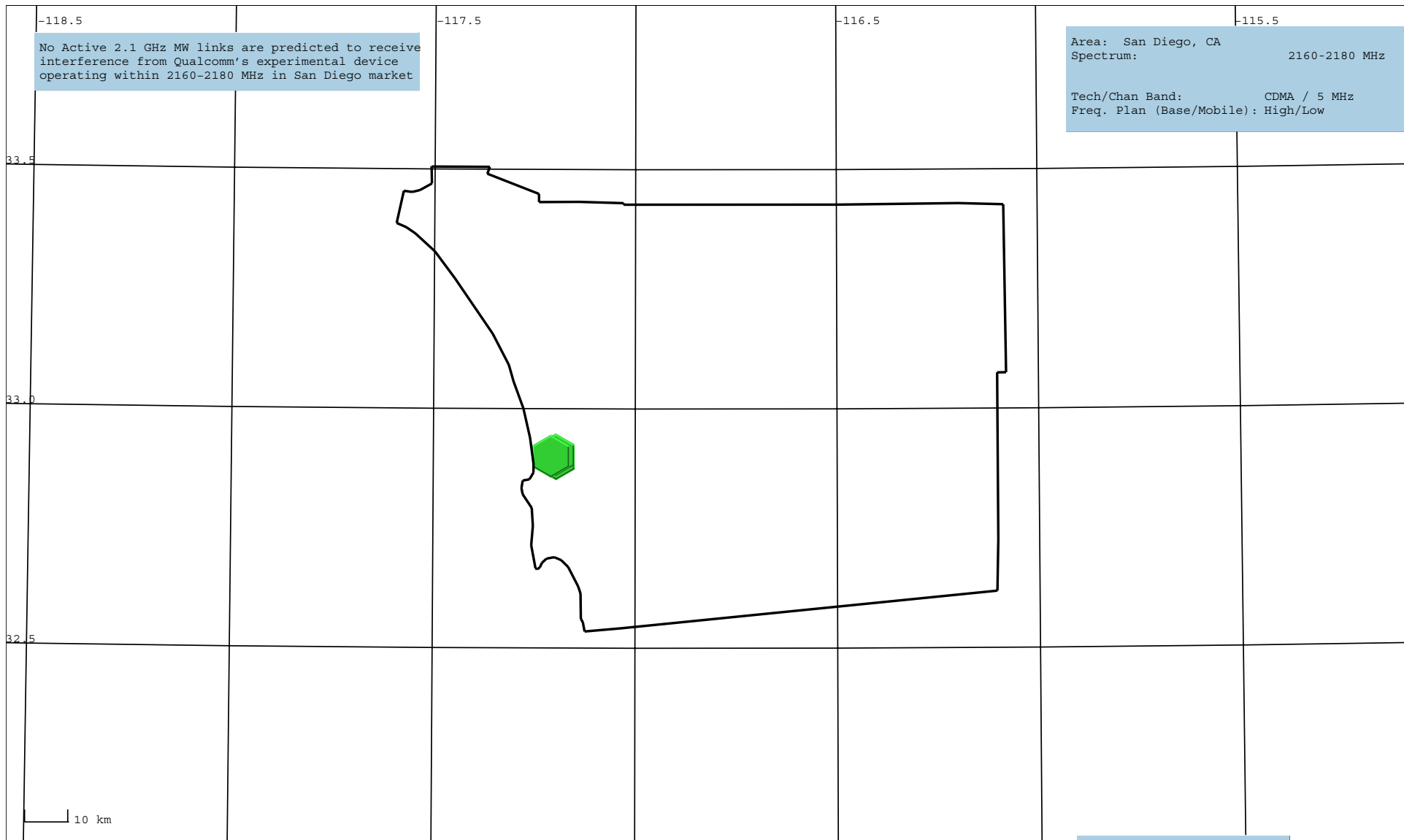
The various microwave path statuses are maintained to most accurately describe the state of transition that the microwave path may be in at any given time. Further investigation into the application history of specific paths may be necessary to establish a final determination on its license validity.

APPENDIX A:

Cell Layout and Coordination Contour

APPENDIX B1:

Interference Calculations – 2160- 2180 MHz



Link Severity Report

Interference Calculation from Qualcomm's System to all Active 2.1 GHz MW Links

Link ID	Callsign	Status	Frequency	IntLev (dBm)	IntObj (dBm)	Margin (dB)	Owner
210415950	WGW650 WGW645	Licensed Secondary	2121.6 2171.6	-158.2	-28.1	130.1	Arch Wireless License C
210119850	WGX322 WLL404	Licensed Not Licensed	2124 2174	-155.3	-92	63.3	Arch Wireless License C
211169050	WLU292 WLU290	Licensed Licensed	2169.2 2119.2	-175	-34.7	140.3	AT&T California
211158761	WLR558 KMQ75	Relocated Questionable	2121.6 2171.6	-161.9	-67	94.9	AT&T California
211169040	WLU293 WLU292	Licensed Licensed	2169.2 2119.2	-177.7	-31.8	145.9	AT&T California
211169070	WLU295 WLU294	Licensed Licensed	2170.8 2120.8	-165.2	-36.5	128.7	AT&T California
211169080	WLU296 WLU295	Licensed Licensed	2170.8 2120.8	-181.8	-39.8	142	AT&T California
211158760	WLR558 KMQ75	Relocated Questionable	2118.4 2168.4	-161.9	-66	95.9	AT&T California
220093290	KQP30 WED231	Licensed Licensed	2180.8 2130.8	-169.8	-80.7	89.1	California State of
211254120	WDU518 KXQ67	Licensed Secondary	2171.6 2121.6	-189.5	-34.9	154.7	Citizens Utilities Rura
220093470	WHC680 WNTJ924	Licensed Licensed	2130.8 2180.8	-159.1	-35	124.1	Dos Cuadras Offshore Re
211730760	KLF520A KLF520B	Licensed Licensed	2128 2178	-121.7	-97.4	24.3	Fisher Wireless Service
210111330	WLN377 WMJ302	Licensed Licensed	2171.6 2121.6	-161.3	-42.9	118.4	Fresno MSA Limited Par
210444970	WMJ298 WLN376	Licensed Licensed	2165.2 2115.2	-170	-41.5	128.5	Fresno MSA Limited Par
211550700	WLU212 WLU316	Secondary Licensed	2115.2 2165.2	-197.5	-49.9	147.7	Fresno MSA Limited Par
210990300	WMJ299 WMJ300	Licensed Licensed	2124.8 2174.8	-127.4	-88.2	39.2	Fresno MSA Limited Par
210915410	WMI728 WMI246	Licensed Licensed	2121.6 2171.6	-183	-56	127	GTE Mobilnet of Santa B
210135840	WLL504 WMJ641	Licensed Licensed	2124.8 2174.8	-200.1	-89.5	110.6	New Cingular Wireless P

Link Severity Report

Interference Calculation from Qualcomm's System to all Active 2.1 GHz MW Links

210135800	WLL502 WLL503	Licensed Licensed	2128 2178	-181.5	-94.4	87.1	New Cingular Wireless P
210135240	WLV397 WLV358	Questionable Questionable	2115.2 2165.2	-180.1	-2.4	177.7	New Cingular Wireless P
210135830	WLL499 WLL504	Licensed Licensed	2168.4 2118.4	-178.1	-66.7	111.4	New Cingular Wireless P
210637110	WMJ338 WMJ339	Licensed Licensed	2171.6 2121.6	-123.4	-50.6	72.8	New Cingular Wireless P
210135250	WLV405 WLV358	Replaced Replaced	2121.6 2171.6	-171.5	-50.6	120.9	New Cingular Wireless P
211824700	WNEH623 LAMESA	Licensed Licensed	2178.5 2122.5	-117.4	-91.6	25.8	San Diego Gas & Electri
220061990	WAQ662 WNEU813	Licensed Licensed	2180.8 2130.8	-62.8	-55.8	7	SAN DIEGO TRANSIT CORPO
211839710	KWU510A KWU510B	Licensed Licensed	2120.4 2170.4	-115.9	-29.2	86.7	SKYTEL CORPORATION
211818900	KMA251A KMA251B	Licensed Licensed	2124.8 2174.8	-155.4	-75.6	79.8	SOUTHERN MESSAGE SERVIC
210080391	KXQ76 KXQ78	Licensed Licensed	2178.2 2128.2	-162.5	-84.7	77.9	Verizon California Inc.
210080570	KNZ40 KXQ76	Licensed Licensed	2112.4 2162.4	-189.1	-56.3	132.7	Verizon California Inc.
210080571	KNZ40 KXQ76	Licensed Licensed	2117.2 2167.2	-189.1	-55.6	133.4	Verizon California Inc.
210080572	KNZ40 KXQ76	Licensed Licensed	2122 2172	-189.1	-63.6	125.4	Verizon California Inc.
210080573	KNZ40 KXQ76	Licensed Licensed	2126.8 2176.8	-189.1	-103.4	85.7	Verizon California Inc.
210111180	WLC826 WLC827	Licensed Licensed	2115.2 2165.2	-140.9	-13.8	127.1	Verizon California Inc.
210119900	KYO72 KYO73	Licensed Licensed	2126.8 2176.8	-169.9	-102.2	67.7	Verizon California Inc.
210080390	KXQ76 KXQ78	Licensed Licensed	2169.6 2119.6	-162.5	-39.7	122.8	Verizon California Inc.
210080381	KXQ76 KXQ78	Licensed Licensed	2174.4 2124.4	-166.1	-76.7	89.4	Verizon California Inc.
210080380	KXQ76 KXQ78	Licensed Licensed	2164.8 2114.8	-166.1	-34.6	131.6	Verizon California Inc.
210080130	WQQ33 WQQ32	Licensed Licensed	2165.2 2115.2	-181.5	-58.3	123.2	Verizon California Inc.

Link Severity Report

Interference Calculation from Qualcomm's System to all Active 2.1 GHz MW Links

210119880	KMU48 KNE70	Questionable Licensed	2118.4 2168.4	-164.8	-51.1	113.7	Verizon California Inc.
210056180	WHT232 WHT235	Questionable Questionable	2124.8 2174.8	-140.6	-108.3	32.2	WWC License L.L.C.
211555440	WLC668 WLC667	Licensed Licensed	2110.8 2160.8	-143.1	-58.3	84.8	WWC License L.L.C.
211190680	WHO887 WHO886	Expired Questionable	2174.8 2124.8	-168.7	-103.5	65.2	WWC License L.L.C.
210466640	WMS280 WMS281	Licensed Licensed	2124.8 2174.8	-147.3	-89.3	58	WWC License L.L.C.
210080120	WHT233 WHO886	Licensed Licensed	2174.8 2124.8	-168.7	-103.5	65.2	WWC License L.L.C.
210080110	WHO886 WLN924	Licensed Licensed	2118.4 2168.4	-180.6	-41.3	139.3	WWC License L.L.C.