57-65 GHz Experiment License Callsign WK2XAL Modification Description (updated December 19, 2023)

1. Introduction

Qualcomm is a world leading wireless technology innovator and driving force behind the development, launch, and continued expansion of 5G. When we connected the phone to the internet, the mobile revolution was born. Today, our foundational technologies enable the mobile ecosystem and are found in every 3G, 4G and 5G smartphone. We bring the benefits of mobile to new industries, including automotive, the internet of things, and computing, and we are leading the way to a world where everything and everyone can communicate and interact seamlessly.

Qualcomm Incorporated includes our licensing business, QTL, and the vast majority of our patent portfolio. Qualcomm Technologies, Inc., a subsidiary of Qualcomm Incorporated, operates, along with its subsidiaries, substantially all of our engineering, research and development functions, and substantially all of our productsand services businesses, including our QCT semiconductor business.

For more information, visit Qualcomm's website, OnQ blog, Twitter and Facebook pages.

This experimental modification is in reference to call sign WM2XAL and file number 0086-EX-CR-2023 granted on 12/09/2022. This experiment modification seeks to increase the upper limit of the frequency range from 61 GHz to 65 GHz. This modification also seeks to add another location at Fiesta Island in San Diego, CA for the experiment. The transmission bandwidth remains limited to 1.67 GHz within the requested tunable bandwidth. The max transmit power also remains limited to 41dBm EIRP.

2. Experiment Description

Qualcomm is conducting research into radar technologies for use in vehicular applications. This license is required as the planned experiments require customized hardware restricted to the frequency range of 57-65 GHz.

The goal of these experiments is not to develop the 57-65 GHz band for application in automotive applications, but instead to use RF equipment that operates in this unlicensed band to develop radar applications that will operate in other bands and be designed to improve roadway safety and save lives. To be clear, commercial application of the radar technology developed via these experiments will use different frequency bands that are allocated for vehicular applications.

The experimentation will include up to 5 vehicles equipped with an experimental 60 GHz radar system. The vehicles will be parked or in motion in one of the three possible geographic areas:

1. Within 2 km (1.3 miles) around Qualcomm buildings defined in Table 1
2. Within 3 km (1.8 miles) around the coordinates in Table 1 that are not located near any commercial or public facilities.
3. Within 1 km (0.6 miles) around Fiesta Island, in San Diego. The coordinates of this location are noted in Table 1, and geographically shown in Figure 3.

3. Transmitter Information

Experimentation will be conducted in the immediate vicinity of the area described in Table 1 and Figures 2 and 3. As described in Table 2, the frequency range used for the experiments will be 57-65 GHz with a transmission bandwidth of 1.76 GHz and 100% duty cycle when active.

Up to 5 vehicles outfitted with 60GHz radar transmitters may operate within the operational area. The vehicles will be outfitted with a multi-element beamformed array using an EIRP of 41 dBm or lesser.

Vehicular radar transmitters use a highly directional antenna to steer its beam at ground level for measuring the reflection from other vehicles as shown in Figure 1. The scan parameters are listed in Table 1. The radar antennas are physically small (i.e., diameter less than 15 cm) and will be mounted to the body of the test vehicle, either in the front bumper, on the rear bumper, or on the roof. The narrow beam mitigates the risk of interference to other devices while the radars are active.

Figure 1: Vehicle Radar Beam

Figure 2: Sorrento Valley, San Diego, CA region of experimental operation.

Figure 3: Fiesta Island, San Diego, CA region of experimental operation.

Table 1 Experiment Area and Antenna Parameters

Tab Site #	Location of BS/UE	County	Latitude (center)	Longitude (center)	Antenna 3dB Beam width	Antenna Scan Azimuth	Antenna Scan Elevation
1	Vehicular radar equipment operating range bounded by each test location within 2 km radius	San Diego, CA	32° 53' 46'' N	117° 11' 44'' W	2 degrees	+/ 45 deg	+/- 10 deg
2	3 km radius in Miramar	San Diego, CA	32° 52' 16'' N	117° 5' 4" W	2 degrees	+/ 45 deg	+/- 10 deg
3	1 km radius at Fiesta Island	San Diego, CA	32° 46' 38'' N	117° 13' 08" W	2 degrees	+/ 45 deg	+/- 10 deg

Table 2 Transmitter Frequency/Power information

		Peak EIRP					
Type	Frequency (GHz)	dBm	dBW	W EIRP	W ERP	Emission designator	Modulation /multiplexing
experimental vehicular radar	57-65 GHz	41	30	1,000	1,000	1G76L0N	Time domain sequences e.g. Golay sequences

4. Points of contact to stop transmission

The following points of contact are available as a stop buzzer:
Email: transmitter.shutdown@qti.qualcomm.com (Please provide the impacted band and location.)

Alternative contact:
John Forrester
Phone: 858-845-7428 (24 hours)
Email: jforrest@qti.qualcomm.com