

Qualcomm 5 GHz Experiment Proposal

1 Introduction

Qualcomm Incorporated (NASDAQ: QCOM) is a world leader in 3G, 4G and next-generation wireless technologies. Qualcomm Incorporated includes Qualcomm's licensing business, QTL, and the vast majority of its patent portfolio. Qualcomm Technologies, Inc., a subsidiary of Qualcomm Incorporated, operates, along with its subsidiaries, substantially all of Qualcomm's engineering, research and development functions, and substantially all of its products and services businesses, including its semiconductor business, QCT. For more than 30 years, Qualcomm ideas and inventions have driven the evolution of digital communications, linking people everywhere more closely to information, entertainment, and each other. For more information, visit Qualcomm's [website](#), [OnQ blog](#), [Twitter](#) and [Facebook](#) pages.

2 Modification Description

This purpose of this experimental license modification is to add two test sites to what has already been authorized under experimental license file 0377-EX-PL-2016 (call sign W12XJV) granted June 6, 2016. The licensed frequency AWS frequency band has also been added for all locations. There are no other changes to the technical parameters or test goals defined below and in the original experimental license application other than adding the new site information.

3 Experiment Description

Qualcomm is working with partner companies to develop equipment that will use multiple technologies, including 802.11 and LTE, in unlicensed 5 GHz frequency bands. This request for Special Temporary Authority ("STA") seeks authority to conduct very small scale product development testing of this equipment at two trial sites.

The purpose of the proposed testing is to evaluate the technical performance of pre-commercial LTE-U equipment, operating in downlink-only mode in the UNII-1 and UNII-3 portions of the 5 GHz band, in a highly controlled field environment in order to assist in the ultimate development of commercial products. The testing will benefit the public interest by enabling the pre-commercial testing of new products outside of a lab environment but in a controlled and managed manner.

Since LTE-U was conceived, Qualcomm, Verizon and their partner companies have engaged in extensive technical collaboration with, and outreach to, the Wi-Fi community. Indeed, Qualcomm is part of that community. These efforts are ongoing, and Qualcomm will continue to work with the Wi-Fi community to ensure successful coexistence in the UNII-1 and UNII-3 portions of the 5 GHz band.

In addition to the product development testing described above, Qualcomm, Verizon, and their partner companies intend to conduct separate and independent LTE-U/Wi-Fi coexistence testing in a real-world environment at a Verizon facility using a coexistence test plan being developed by the Wi-Fi Alliance. This test plan is a product of extensive technical collaboration between the Wi-Fi Alliance, Verizon, Qualcomm, and their partner companies and would be modified as appropriate based on the specific environment to be used for the testing. The Wi-Fi Alliance would be invited to observe these tests. This Wi-Fi Alliance test plan will initially be used for joint coexistence testing to take place within a Wi-Fi Alliance certified lab.

This trial will consist of up to 30 small cells and access points that will use the transmission parameters and operate inside the geographic regions defined in Section 4 below. Some equipment also includes a 3GPP LTE base station that operates on 3GPP Band 2 or 3GPP Band 4, also known respectively as the US 1900 MHz PCS and AWS bands operated under 47 CFR Part 24 and Part 27. Transmission on PCS spectrum will occur only with authorization from the respective spectrum licensee.

Mobile units will also operate within the RF coverage area of the small cell devices. The mobile units are receive-only in the 5 GHz spectrum but also include an LTE transmitter that operates on 3GPP Band 2.

Although the devices are prototypes that have not completed formal equipment authorization, the equipment used in this testing is compliant with 47 CFR Part 15 Subpart E, Part 24 Subpart E, and Part 27 technical requirements. Equipment from multiple equipment manufacturers will be used in the evaluation testing. Qualcomm has the ability to shut down all transmissions operated under this experimental license in the unlikely event any interference occurs.

The intent is to operate the evaluation devices, both small cells and mobile units, 24 hours per day 7 days per week during the test period.

4 Interference Coordination

Immediate requests to stop transmissions under this STA should be emailed to 5GHz.trial.shutdown@qti.qualcomm.com. Alternatively, a shutdown request can be communicated to John Forrester at 858-845-7428 or jforrest@qti.qualcomm.com.

5 Evaluation Equipment Transmitter Information

802.11 access points and small cells supporting either LTE or 802.11 will be operating with the transmitter parameters defined in Table 1. Both directional and omnidirectional antennas will be used with the small cell systems within the maximum EIRP and antenna gain constraints defined in Table 1. The LTE small cell will simultaneously transmit a single 20 MHz signal in a 5 GHz band and an LTE in the PCS band.

Mobile devices will operate near the small cell sites with the transmitter parameters defined in Table 1. LTE mobile devices support PCS FDD operation with an LTE uplink in the PCS/AWS bands but are receive only for LTE in the 5 GHz band. Mobile devices also support 802.11 modes in the requested 5 GHz band.

Table 2 defines the deployment areas where small cell and access points will be located during the evaluation testing. Up to 5 outdoor sites will be installed within the regions defined in Table 2. The outdoor sites are installed on rooftops where the antenna will not extend more than 6 meters above the top of the building. Indoor small cells and access points will be deployed anywhere within the defined regions.

Table 1 Transmitter Information

Device Type	Transmit Frequency Band (MHz)	Conducted TX Power (dBm)	Maximum Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	ERP (dBm)	ERP (W)	Maximum Transmission Bandwidth (MHz)	Emissions Designator	Technology
Small cell and Access Point	5150-5250	30	6	36 ⁽¹⁾	4.0	33.83	2.4	20 20/40	20M00F7D	LTE 802.11
Small cell and Access Point	5725-5850	30	6	36	4.0	33.83	2.4	20 20/40	20M00F7D	LTE 802.11
Mobile	5725-5850 5150-5250	24	3	27	0.5	24.83	0.3	20/40	20M00F7D	802.11
Small cell	1930-1990	37	6	43	20.0	40.83	12.1	20	10M00F7D	LTE
Mobile	1850-1910	24	3	27	0.5	24.83	0.3	20	10M00F7D	LTE
Small cell	2110-2155	37	6	43	20.0	40.83	12.1	20	10M00F7D	LTE
Mobile	1710-1755	24	3	27	0.5	24.83	0.3	20	10M00F7D	LTE

(1) Outdoor sites will be operated with a maximum EIRP of 21 dBm at any elevation above 30 degrees per FCC Part 15.407(a)(1)(i).

Table 2 Small Cell and Mobile Device Deployment Regions and Operational Radius

Location #	Address	County	Operational Center Point		Fixed Site Location Radius	
			Lat	Long	Miles	km
1	3817 NW Expressway Oklahoma City, OK 73112	Oklahoma	35 32 10 N	97 35 09 W	1	1.6
2	26 E Main St Oklahoma City, OK 73104	Oklahoma	35 28 3 N	97 30 39 W	1	1.6
3	6400 Weston Parkway Cary, NC 27513	Wake County	35 49 58 N	78 47 26 W	1	1.6
4	6325 Fall of Neuse Rd Raleigh, NC 27616	Wake County	35 52 13 N	78 37 21 W	1	1.6
5	500 W. Dove Rd, Southlake, TX 76092	Tarrant County	32 58 19 N	97 9 24 W	2	3.2
6	700 Hidden Ridge Rd, Irving TX 75038	Dallas County	32 52 37 N	96 57 12	2	3.2