

Verizon 3.5 GHz Experiment Proposal

1. Introduction

Verizon Communications Inc. (Verizon or the Company) is a holding company that, acting through its subsidiaries, is one of the world's leading providers of communications, information and entertainment products and services to consumers, businesses and governmental agencies. With a presence around the world, we offer voice, data and video services and solutions on our wireless and wireline networks that are designed to meet customers' demand for mobility, reliable network connectivity, security and control. We have two reportable segments, Wireless and Wireline. Our wireless business, operating as Verizon Wireless, provides voice and data services and equipment sales across the United States (U.S.) using one of the most extensive and reliable wireless networks.

2. Experiment Description

Verizon is working with partner companies to develop equipment that will use LTE technologies, using Citizens Band Radio Service (CBRS) spectrum [3550 – 3700 MHz], also known as Band 48, using 3GPP terminology. As part of the technology validation, Verizon plans to conduct a series of field tests with Category B and Category A Citizen Band Service Devices (CBSDs) at one or more locations, restricted to the frequency range 3650 MHz – 3700 MHz (i.e. the upper 50 MHz of the CBRS band)

The purpose of the proposed tests is:

- 1) Evaluation of the radio propagation characteristics of 3.5 GHz for outdoor installations
- 2) Evaluation of end-to-end CBRS architecture
- 3) Evaluation of TDD-LTE using 3.5 GHz
- 4) Evaluation of inter-band carrier aggregation between 3.5 GHz and licensed bands using 3GPP Band 2, Band 4, Band 66 or Band 13 (Verizon's legacy licensed bands)

Field tests will be conducted in a production network, in a highly controlled field environment, in order to assist in the 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.

This field trial will consist of an aggregate of no more than four (4) Category B CBSDs and no more than five (5) Category A CBSDs, for all the trial locations. The CBSDs will use the transmission parameters and operate inside the geographic regions defined below. Some of the tests will use solely base stations and user equipment operating in CBRS spectrum only. Some equipment however, includes 3GPP LTE base stations that operate on 3GPP Band 2, Band 4, Band 66 or Band 13, also known respectively as the US 1900 MHz PCS, AWS bands and 700 MHz operated under 47 CFR Part 24 and Part 27. Transmission on PCS, AWS or 700 MHz spectrum will occur only with authorization from the respective spectrum licensee.

Mobile devices will also operate within the RF coverage area of the small cell devices. Some of the tests with mobile stations will be using CBRS spectrum only. The majority of the tests, however, will include mobiles and base stations with LTE transmitters that operate on 3GPP

Band 2, Band 4, Band 66 or Band 13, in carrier aggregation mode (in both Downlink and Uplink) with Band 48.

Although the initial devices are prototypes and have not completed formal equipment authorization, the equipment used in these trials will be compliant with FCC rules. As time progresses, pre-commercial devices will be introduced. Equipment from multiple equipment manufacturers will be used in the evaluation testing. Verizon has the ability to shut down all transmissions operated under the experimental license in the unlikely event any interference occurs.

3. Hours of operation and equipment shut down

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. Equipment can be shut down speedily, if the need arises, by contacting one or more of the interference coordinators identified in the section “Interference Coordination”

4. Interference Coordination

Immediate requests to stop transmissions under this STA can be communicated to Nicholas Bracco at 845-274-6346 or by email at nicholas.bracco@verizonwireless.com

5. Trial Duration

Approximately 6 months, beginning approximately from July 16, 2018

6. Evaluation Equipment Transmitter Information

Small cells supporting a subset (3650-3700 MHz) of Band 48 will be operating in compliance with FCC Part 96 rules. Directional antennas will be used with the small cell systems within the maximum EIRP and antenna gain constraints as specified in the rules.

LTE mobile devices support TDD-LTE operation with an LTE uplink in Band 48 (3550 – 3700 MHz) and receive in the same band. Upon availability of mobile devices supporting inter-band carrier aggregation, CBSD devices supporting one or more of Verizon’s licensed bands will be used.

- Up to four (4) Category B CBSDs ($\text{EIRP} \leq 50 \text{ dBm}/20 \text{ MHz}$) and up to five (5) Category A CBSDs ($\text{EIRP} \leq 33 \text{ dBm}/20 \text{ MHz}$) using Band 48
- Multiple mobile terminals (approximately up to 10 terminals), supporting band 48 (per 3GPP) using LTE-TDD. Maximum transmitted power = 24 dBm
- Multiple mobile terminals (approximately up to 10 terminals) operating in Carrier Aggregation (CA) mode, using licensed bands B2, B4, B66 or B13 or a subset of these, in CA aggregation with B48, using LTE(FDD/TDD), with a maximum transmitter power = 24 dBm

For outdoor Category B CBRS B48 radio installations, directional antenna with horizontal orientation ranging from 30-degree to 360-degree in step of 30-deg (i.e., 0, 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 330) will be evaluated for transmission and reception.