Verizon 3.5 GHz NR Experiment Proposal

1. Introduction

Verizon Communications Inc. ("Verizon") 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. Why an STA is needed

Verizon and partners will conduct the proposed 5G tests using pre-commercial equipment in prototype form. The 5G CBSDs, 5G mobile devices, and corresponding management systems, will use test software to validate key 5G functionality. The test software is not yet fully functional to support E2E commercial operation, with 5G protocol, with a SAS administrator. SAS to/from 5G CBSD interoperability tests are not fully supported today, therefore the 5G CBSDs need to operate w/o a SAS E2E connection during these proposed tests. However, Verizon and partners will work offline with at least one SAS administrator to ensure that prior to initial testing, and throughout the testing period, only clear spectrum will be used, and that no interference will arise to other possible users of this band. This is accomplished by providing the SAS administrator all the CBSD system parameters normally used during CBSD registration (but offline), then SAS runs an interference analysis with the input data, just as if the CBSD were connected to a SAS. The offline interference analysis will be run periodically, prior and throughout the testing period.

3. Experiment Description

Verizon is working with partner companies to develop equipment that will use 5G technologies, using Citizens Band Radio Service (CBRS) spectrum, also known as Band n48, using 5G 3GPP terminology. As part of the technology validation, Verizon plans to conduct a series of field tests with category B Citizen Band Service Devices (CBSDs) at various locations.

The purpose of the proposed tests is:

1) Evaluation of 5G signal characteristics of 3.5 GHz
2) Evaluation of several 5G functional and performance-related features using 3.5 GHz
3) Evaluation of end-to-end (excluding SAS) CBRS architecture in a production network
4) Evaluation of intra-band and inter-band carrier aggregation between 3.5 GHz and licensed (and/or unlicensed) bands. Licensed bands are restricted to VZ legacy licensed bands

Note: Verizon will limit all of the above tests in the CBRS band to 3550-3700 MHz.

Field tests will be conducted in a pre-production network, in a very rural area with no CBRS commercial traffic. 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 up to one Category B CBSD. The CBSD 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 5G base stations that may operate on 700 MHz (3GPP Band 13), PCS (3GPP Band 2) and/or AWS (3GPP Band 4), operating under 47 CFR Part 24 or Part 27. Transmission on 700 MHz, PCS and/or AWS spectrum will be constrained to VZ's legacy licensed spectrum.

Verizon and a mobile device partner company are planning to conduct testing with an aggregate of no more than ten mobile 5G prototype devices, to support the field trial testing. The mobile devices will operate within the RF coverage area of the rural CBSD. Most of the tests with mobile stations will be using CBRS spectrum only. Some of the tests, however, will include mobiles and base station with C-band transmitter that operate in Carrier aggregation mode with CBRS band.

Mobile devices will only be used by test engineers, from either Verizon or mobile device partners. They are strictly limited to field trial testing between Verizon and partner.

The equipment used in these trials will be compliant with FCC rules. Verizon has the ability to shut down all transmissions operated under the experimental license in the unlikely event any interference occurs.

4. 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"

5. Interference Coordination

Immediate requests to stop transmissions under this STA can be communicated to Jerry Haffield, at Mobile 605-366-0005 or by email at jerry.haffield@verizonwireless.com, or to John Mullins at Mobile 612-791-1710 or by email at john.mullins@verizonwireless.com

6. Trial Duration

Approximately 6 months, from 6/30/2021 to 12/29/2021

7. Evaluation Equipment Transmitter Information

Small cells supporting CBRS band will be operating in compliance with FCC Part 96 rules. Both directional antennas (embedded and external) will be used with the small cell systems within the maximum EIRP and antenna gain constraints as specified in the Part 96 rules.

Some tests are limited to 5G mobile devices supporting TDD-5G operation with a 5G uplink in Band n48 and receive in the same band. Other tests involve mobile devices supporting inter-band carrier aggregation

- Up to 1 category B CBSD (EIRP ≤ 50 dBm/20 MHz) using Band n48
- Multiple mobile terminals (up to 10 test mobiles), from a mobile device partner, each terminal operating in either standalone Band n48 only, or in Carrier Aggregation (CA) mode, using one or more licensed bands n2 and/or n66 and/or, and/or n5, and/or n77 or a combination of these, in CA aggregation with n48, with a maximum transmitter power (EIRP) = 23 dBm

Verizon will conduct the above proposed tests at a rural test location:

Test Location – Jackson, South Dakota, will be used for outdoor 3.5 GHz testing between Category B CBSD and mobile terminals. For outdoor radio installations, integrated antennas as well as external directional antennas will be used.

Location: 24410 Cottonwood Rd. Jackson SD, with coordinates Lat/Lon = 43.863367, -101.898553 uses radio with orientations in horizontal plane 350, 260, 190, 0, 40, 90, 120, 160 (nominal values) ± 20° from nominal values