

DESCRIPTION OF RESEARCH PROJECT

Pursuant to Sections 5.3(j) and 5.61 of the Federal Communications Commission's ("FCC's) rules, 47 C.F.R. §§ 5.3(j) and 5.61, CCO Fiberlink, LLC ("Charter"), a limited liability company and subsidiary of Charter Communications, Inc., seeks Special Temporary Authority ("STA") for 180 days, beginning April 1, 2019, to test and evaluate coverage, capacity, and propagation characteristics in the 3550-3700 MHz band. The proposed operations will advance Charter's understanding of technology and network potential in the 3550-3700 MHz band and will advance the potential deployment of fixed and mobile wireless services.

Location of Testing

Charter will conduct outdoor and indoor fixed and mobile testing within 4.0 miles (6.4 km) each of two provided fixed locations of 35° 13' 30" N, 80° 50' 21" W and 35 11' 32" N, 80 53' 24" W in Charlotte, North Carolina.

Description of Testing

Charter will deploy experimental fixed and mobile equipment in various configurations. The majority of devices will be operated in and around a major venue, similar to existing enterprise WiFi deployments. In addition, Charter will test some devices attached to our existing cable TV strand, to existing buildings and poles, and some additional devices indoors. Specifically, Charter will use the following deployment approaches:

1. Indoor deployment (Category A or B Radios)¹
2. Cable strand deployment (Category B Radios)
3. Outdoor Building/pole mount deployment (Category A or B Radios)

Other equipment will be used by Charter to receive signals from the mounted devices and transmit back to those devices ("End User Equipment"). Charter will evaluate propagation characteristics; conduct connectivity and throughput testing in the vicinity of each device; and assess inter-cell interference, mobility characteristics, Spectrum Access System ("SAS") compatibility and individual performance of each vendor.

Radio Equipment Description

For the testing, Charter will use multiple models of fixed equipment and mobile End User Equipment. The technical information below provides the greatest bandwidth and power levels intended to be used for each type of prototype equipment.

Charter intends to operate approximately 25 fixed transmitters and employ up to 10 mobile transmitters during the testing, with less than 50% of the total devices operational at any given time, with the remainder in a non-transmitting state.

¹ Category A and B radios are defined in Sections 96.3 and 96.41 of the FCC's rules. See 47 C.F.R. §§ 96.3 and 96.41.

Fixed Equipment (multiple models):

Equipment	Category	Tx Power (mW)	EIRP (dBm)	ERP (Watts)	Mean or Peak	Emission Designator	Frequency Tolerance	Modulation
Prototype 1	A	800	33	1.2	Peak	40M0W7W	0.00001%	256QAM/64QAM/16QAM/
Prototype 2	B	2000	40	6.1	Peak	40M0W7W	0.0005%	256QAM/64QAM/16QAM/

End User Equipment (6 models):

Equipment	Category	Tx Power (mW)	EIRP (dBm)	ERP (Watts)	Mean or Peak	Emission Designator	Frequency Tolerance	Modulation
Prototype 3-8	EUD	400	29	0.48	Peak	40M0W9W	0.0005%	256QAM/64QAM/16QAM/

All testing will be conducted within Charter's existing service areas, and leverage power and/or backhaul from Charter's existing cable distribution plant, and well as building utility power. The outdoor fixed devices will be mounted on Charter's existing strand, as well as select street furniture and/or building facades.

Based on the height of these facilities, the outdoor devices may be slightly more than 6 meters above ground level. However, there is no risk of physical interference because all devices will be mounted on existing facilities, and will not extend above those facilities.

Protection Against Interference

Charter requests use of the 3550-3700 MHz band. Charter understands that it must accept interference from any federal and non-federal incumbent users of this band and that all Charter operations will be on a secondary basis.

Charter is conducting this testing in cooperation with Federated Wireless ("Federated"), and will employ Federated's developmental SAS. The Charlotte test area is not located within the coastal exclusion zone. However, the following methods will be used to prevent harmful interference:

- Primary: Via the design process of a fully functional SAS, with the SAS commanding the test devices to use non-interfering CBRS channels.
- Secondary: Federated will manually command the SAS to command test devices to shift to non-interfering CBRS channels.
- Tertiary: Charter has established a point of contact, identified below, available 24/7 during all testing, with "kill switch" authority should any interference occur to primary licensed services. Should interference occur, Charter will take immediate steps to resolve the interference, including, as appropriate, channel shifting or discontinuing operations.

Charter has confirmed there are no Fixed Satellite Service (FSS) earth stations operating in the 3600-3650 MHz band in the areas in which Charter seeks to conduct testing.

Charter will coordinate all testing with other grandfathered Wireless Broadband Licensees with registered locations in the requested testing areas, and intends to employ Federated's developmental SAS to coordinate channel assignments. Where the SAS is not capable of doing so, Charter will manually coordinate operations.

Finally, given the low EIRP transmit levels of the proposed radios, coupled with their low installed elevation, Charter expects limited RF propagation distances as well as limited and localized aggregative contribution to the RF noise floor.

Restrictions on Operation

Charter does not seek authority to perform a market study under the requested license and will retain control over the equipment in the testing at all times.

Contact Information

Point of contact for FCC licensing issues:

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Vice President, Regulatory Affairs
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Point of contact for questions about testing operations:

Haider Syed
Senior Director, Wireless Engineering
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The following individual will be available 24/7 during all testing, and has authority and ability to immediately cease all operations:

Todd Herring
Director of Wireless Operations
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Wireless Ops Hotline: (720) 536-9205