

DESCRIPTION OF RESEARCH PROJECT

Pursuant to Sections 5.3(j) and Section 5.61 of the Federal Communications Commission'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 March 23, 2018, to test and evaluate coverage, capacity, and propagation characteristics in the 3550-3700 MHz band for fixed locations with multiple devices. 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 wireless services.

Location of Testing

Charter will conduct outdoor fixed testing within a radius of 15 km from the specified fixed location in Lexington, Kentucky (38° 6' 6.102" N, 84° 28' 51.3588" W).

Description of Testing

Charter will deploy the experimental fixed base station antennas on an existing six-story building rooftop, or on a portable mast immediately adjacent to the six-story building, and will test the radio link between each prototype base station's antenna and multiple end user antennas and equipment sequentially and simultaneously. The antennas are three sector directional antennas with a beam width of 65° and horizontal orientation of 300°, 10°, and 80°. There is no vertical orientation.

End user antennas will be mounted on portable masts placed at fixed locations within the test area as well as selected fixed rooftop locations on single family homes. The testing will not employ more than twenty units of end user antennas and equipment.

Charter will evaluate propagation characteristics, conduct connectivity and throughput testing in the vicinity of each device, and assess individual performance of each end user equipment.

Radio Equipment Description

For the testing, Charter will use nineteen different models of fixed equipment. The technical information below provides the greatest bandwidth and power levels that will be used for each piece of prototype equipment. Aggregated bandwidth per sector will be up to 80 MHz.

Equipment	Category ¹	Fixed or mobile	Tx Power mW	EIRP (dBm)	ERP (watts)	Mean or Peak Power	Frequency Tolerance (%)	Emission Designator	Signal Modulation Format(s)
Prototype 1	B	Fixed	8000	56.0	242.66	Peak	+/- 0.0005	80M0W9W	Digital, 256 QAM
Prototype 2	B	Fixed	37,767	54.8	184.08	Peak	+/- 0.0005	60M0W9W	Digital, 256 QAM
Prototype 3	B	Fixed	251	40.0	6.10	Peak	+/- 0.0005	10M0W8W	OTFS ²
Prototype 4	B	Fixed	1000	43.0	12.16	Mean	+/- 0.000001	20M0D7D	256 QAM/64 QAM/16 QAM
Prototype 5	B	Fixed	1000	43.0	12.16	Mean	+/- 0.000001	20M0D7D	256 QAM/64 QAM/16 QAM
Prototype 6	B	Fixed	1000	43.0	12.16	Mean	+/- 0.000001	20M0D7D	256 QAM/64 QAM/16 QAM
Prototype 7	B	Fixed	1000	37.0	3.06	Mean	+/- 0.000005	20M0W7W	64 QAM, 16 QAM, QPSK, BPSK
Prototype 8	B	Fixed	2000	47.0	30.55	Mean	+/- 0.000005	20M0W9W	256QAM/64QAM/16 QAM/QPSK
Prototype 9	B	Fixed	2000	47.0	30.55	Mean	+/- 0.000005	20M0W9W	256QAM/64QAM/16 QAM/QPSK
Prototype 10	B	Fixed	2000	50.0	60.95	Mean	+/- 0.000005	20M0F9W	256QAM/64QAM/16 QAM/QPSK
Prototype 11	B	Fixed	251	33.0	1.22	Mean	+/- 0.000001	20M0W7W	64QAM/16QAM/QPSK
Prototype 12	B	Fixed	199	35.0	1.93	Peak	+/- 0.000001	20M0W7W	64QAM/16QAM/QPSK
Prototype 13	A	Fixed	199	25.5	0.22	Peak	+/- 0.000001	20M0W7W	64QAM/16QAM/QPSK
Prototype 14	B	Fixed	316	47	30.6	Mean	+/- 0.000001	20M0W7D	64QAM/16QAM
Prototype 15	B	Fixed	200	38	3.9	Mean	+/- 0.000001	20M0W7D	64QAM/16QAM
Prototype 16	B	Fixed	200	33	1.2	Mean	+/- 0.00005	80M0W9W	256QAM, 64QAM
Prototype 17	B	Fixed	200	23	0.12	Mean	+/- 0.00005	40M0W9W	64 QAM
Prototype 18	B	Fixed	3160	50	61	Peak	+/- 0.000005	20M0W9W	256QAM
Prototype 19	B	Fixed	6310	53	122	Peak	+/- 0.000005	40M0W9W	256QAM

Protection Against Interference

Charter has taken a number of steps to protect against interference. In particular, the base station location was chosen specifically to avoid risk of physical interference. The base station site will likely be atop an existing structure, and the equipment will not extend more than 6 meters above that structure. If the rooftop is not available, the base station antennas will be mounted on a portable mast immediately adjacent to the six-story structure, and will be raised to a maximum

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.

² "Orthogonal Time Frequency and Space" is a proprietary vendor signal modulation format.

height of 15 meters. The nearest airport is over 8 km away, and is a heliport atop a similar six-story structure, providing no risk of aviation interference.

Charter has also selected individual “end user device” test locations to mitigate any risk of physical interference. Several locations will be on rooftops, and the equipment will not extend more than 6 meters above those structures. Some end user devices may be mounted on portable masts, but would not extend more than 6 meters above ground level.

Charter understands it must accept RF interference from any federal and non-federal incumbent users of this band and that all Charter operations will be on a secondary basis. With regard to existing users, Charter has confirmed there are no protected Fixed Satellite Service (“FSS”) earth stations operating in the 3550-3700 MHz band in the areas in which Charter seeks to conduct testing. Charter is aware of the NorthStar Studios 3625-4200 MHz FSS earth station (call sign E970010) in Nashville, TN (181 miles SW) and has verified all intended test operations are outside its coordination zone. All operations are well clear of the NTIA coastal exclusion zones, and a minimum of 439 miles from any of the three CBRS-protected Navy land-based RADAR sites.

Charter also identified all grandfathered 3650-3700 MHz “NN” Wireless Broadband Licensees with registered locations within 30 km of the requested testing areas and will coordinate individually to avoid impacting their existing operations.

Finally, as transmit levels of the proposed radios comply with approved CBRS band operations, and will be operated sequentially, 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.

Contact Information

Point of contact for FCC licensing issues:

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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:

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