

**Ex Parte**

Ms. Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 12th Street SW  
Washington, DC 20554

**Re:** *Promoting Investment in the 3550-3700 MHz Band, GN Docket No. 17-258;*  
*Amendment of the Commission's Rules with Regard to Commercial Operations in*  
*the 3550-3650 MHz Band, GN Docket No. 12-354*

Dear Ms. Dortch,

On October 16, 2017, Craig Cowden, Charter Communications, Inc.'s ("Charter") head of wireless technologies, Elizabeth Andrión and Colleen King, also of Charter, met with Chairman Ajit Pai and his Legal Advisor, Alison Nemeth; Commissioner Michael O'Rielly and his Chief of Staff, Brooke Ericson; Commissioner Brendan Carr and his Acting Legal Advisor, Kevin Holmes; Louis Peraertz, Senior Legal Advisor to Commissioner Mignon Clyburn; Travis Litman, Chief of Staff and Senior Legal Advisor to Commissioner Jessica Rosenworcel; and Don Stockdale, Dana Shaffer, Nese Guendelsberger, Paul Powell and Jessica Greffenius of the Wireless Telecommunications Bureau regarding the above-captioned proceedings.

During the meetings, Charter discussed the attached presentation. Charter noted that with the appropriate rules, it would view 3.5 GHz licenses as an important part of its overall wireless strategy, and it reiterated the importance of setting licensing rules that ensure and encourage deployment and investment by new entrants. It explained that its existing network infrastructure well-positions it to deploy high speed and high capacity wireless broadband quickly in the 3.5 GHz Band because it provides pervasive location, power and backhaul. Charter also noted that non-traditional licensing rules will facilitate new wireless entrants and increase wireless competition, spur investment and promote efficient and broad use of this spectrum.

The wireless component of Charter's network is transitioning from a nomadic WiFi network to one that supports full mobility by incorporating WiFi with multiple 4G and 5G access technologies to deliver a seamless connectivity experience. In navigating this transition, Charter is emphasizing an "Inside-Out" strategy, focusing first on wireless solutions inside the

home and office, and then eventually expanding outdoors. Charter already provides wireless connectivity to the over two hundred million wireless devices attached to its network, carrying as much as 80 percent of wireless traffic in the home and office.

Charter indicated that it currently plans for this transition to happen in two phases. First, in 2018, Charter will begin offering a mobile wireless service to its customers as a WiFi-first MVNO, partnering with Verizon Wireless and using its extensive WiFi infrastructure to enhance customer connectivity and experience. Following this, assuming the right rules had been adopted in the 3.5 GHz Band, Charter could utilize the 3.5 GHz Band in conjunction with our WiFi network.

Charter emphasized that the 3.5 GHz Band is a key component of its wireless strategy. Already this year, Charter has made significant investments in several robust trials in the 3.5 GHz Band, testing for both mobility and fixed wireless. Charter is working with eight different vendors in Tampa and Charlotte for its 3.5 GHz Band mobility use cases and plans to test a fixed wireless solution in the 3.5 GHz Band in six different markets by the first quarter of 2018.<sup>1</sup> Charter believes this testing will likely confirm that, with the right rules, the 3.5 GHz Band could be used as a cost effective solution for providing fixed wireless service in rural areas.

Charter's 3.5 GHz deployment plans would be harmed by the adoption of PEA-sized license areas for priority access licenses (PALs). Charter supports license areas that are bigger than census tracts for operational purposes, but to promote wireless competition and more expansive network deployment, Charter urged the FCC to adopt license sizes that are no bigger than counties. Charter pointed out that small cell technology is not well-suited for large geographic area licenses. Smaller license sizes will enable new entrants, like Charter, to tailor their investment and deployment plans by leveraging existing infrastructure. In particular, Charter's existing hybrid fiber-coaxial (HFC) network provides the backhaul, power and location to rapidly deploy small cells for the provision of wireless broadband service. By contrast, increasing the geographic licensing size of PALs to PEAs (which are too large to match up with Charter's network) would preclude new entrants such as Charter from investing in the 3.5 GHz Band due to their large geographic size. Charter has expressed that, under the right rules, it could be interested in acquiring licenses in the 3.5 GHz Band, but if the rules were changed to

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<sup>1</sup> See, e.g., CCO Fiberlink, File No. 1203-EX-ST-2017, Call Sign WL9XSI (authorization to conduct experimental testing in 3.5 GHz band in Centennial and Englewood, CO); CCO Fiberlink, File No. 1267-EX-ST-2017, Call Sign WL9XUH (authorization to conduct experimental testing in 3.5 GHz band in Bakersfield, CA, Coldwater, MI, and Charlotte, NC).

adopt PEA-size license areas, it is less likely that Charter would do so. Indeed, such large license sizes would limit access of the band to the country's largest wireless carriers and would likely result in deployment only to the most densely populated areas within each PEA. Charter explained that the goals of competition and innovation were best served by establishing geographic licenses that enable new entrants to compete directly for PALs rather than requiring them to rely on uncertain availability of secondary market transactions with larger carriers for access to 3.5 GHz spectrum.

Charter expressed its agreement with the goal of refining the rules for the 3.5 GHz Band to facilitate investment and deployment, and supports a number of the changes proposed by the Commission to promote greater certainty for investments in this band, such as longer license terms with the possibility of a renewal expectancy. However, it urged during its meetings that the Commission not make any changes to the existing 3.5 GHz Band rules that would delay the ability of new entrants, including Charter, to quickly deploy and provide service in this band.

Respectfully submitted,

/s/ Colleen King

Colleen King  
Vice President, Regulatory Affairs

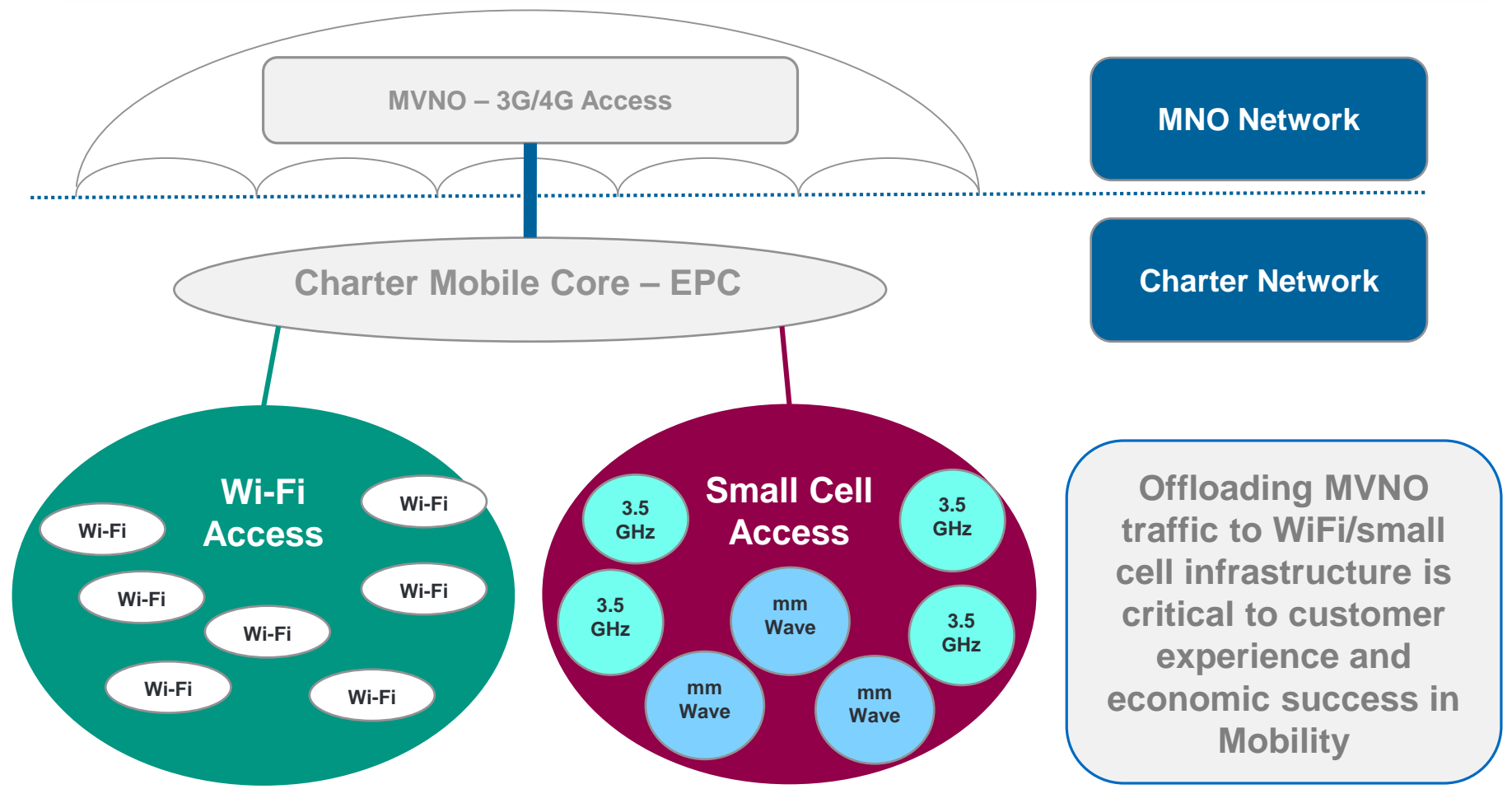
cc: Meeting attendees

# Evolution of Wireless Technologies in Un-Licensed and Shared Spectrum

CBRS Alliance  
September 2017

# Integrating Small Cells into a Mobility Framework

- 1. From "Wireless" to "Mobility": MVNO for coverage, small cells for capacity
- 2. Inside-Out Strategy: 80% wireless traffic is indoor; opportunistic outdoor



Key Advantage: Use existing assets – power, backhaul, ROW - to enable seamless connectivity experience

# Overview of 3.5 GHz - CBRS

The FCC and NTIA have agreed to consider a spectrum sharing approach within the 3.5GHz band that will offer access to service providers and commercial users.

## Background

- April 2015, FCC adopted the plan to make **150MHz available for commercial use** in the 3550-3700 MHz band, referred to as the Citizens Broadband Radio Service.
- Rules optimized for **small-cell use**, but also point-to-point and point-to-multipoint, especially in rural areas
- Operate under authority of a centralized **Spectrum Access System (SAS)**: incumbent protection to enable shared spectrum
- Creates path to commercial access of 150 MHz of wireless spectrum, on a SAS-coordinated, **licensed/unlicensed hybrid model**

## Spectrum Access Model

- **Three Tier Sharing Framework**: SAS-enforced prioritization at all times
  1. Incumbents – military/DoD, WISPs
  2. PAL - **Priority Access License**: “lightly licensed” tier
  3. GAA - **General Authorized Access**: unlicensed tier
- PAL licenses awarded via competitive bid and will have priority access to 70 MHz
  - PAL licensees can obtain up to 4x10 MHz channels
- GAA tier minimum of 80 MHz
  - Both PAL and GAA spectrum available to all if unoccupied

# CBRS: A Great Opportunity for the Industry

Subject to commercial viability, the 3.5GHz band (licensed or unlicensed) could become a new alternative for offering QoS services, MNO support and additional wireless capacity.

- Existing TDD-LTE ecosystem
- Major Chipset vendors developing small-cell on a chip to embed in residential & commercial gateways
- Strong interest from entire ecosystem: MSOs, MNOs OEMs and SAS providers
- Strong standards body support: WINN Forum, CBRS Alliance, 3GPP, MulteFire

CBRS Ecosystem

Neutral Host

Enhanced indoor coverage  
LTE-based 3.5GHz indoor small cells enable **DAS market disruption**

Rural Broadband Point-to-Multipoint

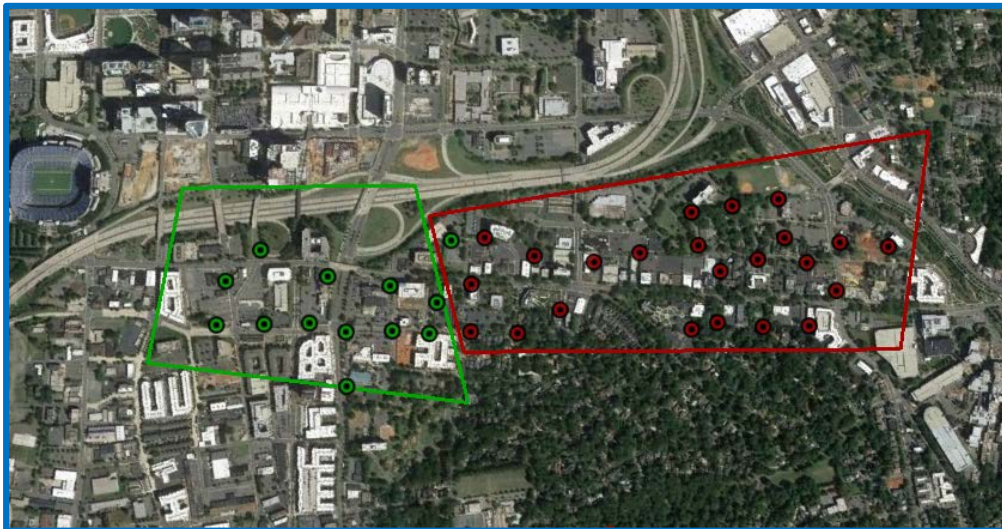
Fixed Wireless Access for **Rural Broadband and Point-to-Multipoint**

Private LTE Industrial IOT

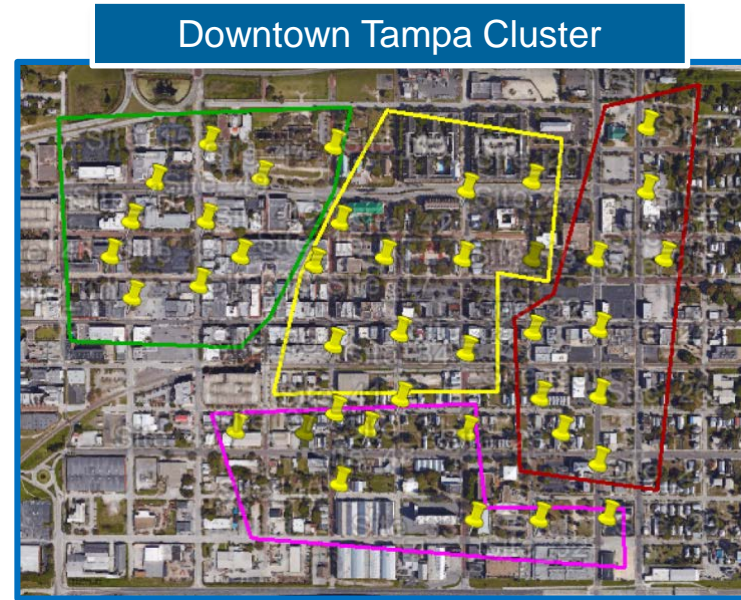
Specific, dedicated LTE solutions for **commercial use cases, including Venues and Enterprises**

# Charter CBRS Mobility Trial Objectives

- Test maturity of CBRS eco-system & 3.5GHz Small cells  
Performance: Coverage, Capacity/Throughput, Mobility, Power Consumption, Deployment, integration with WiFi, impact on plant.
- Four vendors per market (Tampa & Charlotte) providing a total of 200 sites providing for different morphology
- Trials start end of September



Downtown Charlotte Cluster



Downtown Tampa Cluster



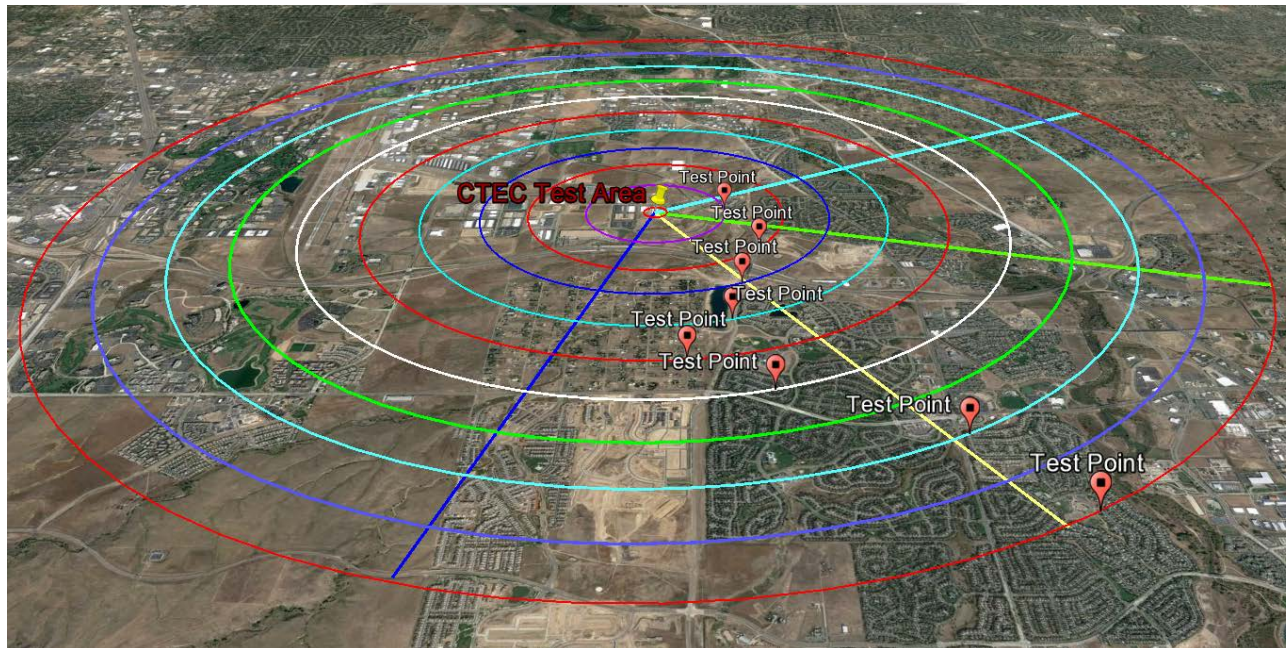


# Charter CBRS FWA Trial Objectives

- Test capabilities of CBRS in Fixed Wireless Access environment: Coverage, Capacity/Throughput, antenna placements and configurations (2X2 to NR).
- Test several vendors in Denver with rooftop mounting followed by testing 2-3 vendors in each of the test areas at Bakersfield, Tampa, Michigan with test van mounting.
- Denver pre testing started with 2 vendors, rest of the vendors and other markets will start end of September.



## Denver Test Location



# CBRS Regulatory Issues

## The Innovation Band (3.5 GHz)

**FCC considering changes to the licensing rules to facilitate deployment in the 3.5 GHz band.**

Things to think about...



- **Three-tiered sharing framework and licensing rules were designed to maximize efficient spectrum use and promote innovation**
- **Rules intentionally departed from traditional licensing**
  - *Intended to encourage investment and deployment by a variety of network operators and new wireless entrants*
- **Major changes to rules are not necessary to enable 5G**
  - *Should not disrupt or discourage investment and expansion of wireless market*
  - *Should ensure appropriate balance between incumbent, PAL and GAA users*