

### **NARRATIVE STATEMENT**

By this application, and pursuant to Section 5.71(a)(2) of the Federal Communications Commission (FCC) Rules, 47 C.F.R. § 5.71(a)(a), Starry Spectrum LLC (Starry) respectfully seeks experimental authorization to test one or more Citizens Broadband Radio Service Devices (CBSDs) in and around the Boston, Massachusetts and Denver, Colorado markets. This test will involve five (5) or fewer CBSDs and up to ten (10) user terminals operating only in the 3650-3700 MHz band in the Boston area in outdoor deployments, and five (5) or fewer CBSDs and ten (10) user terminals operating in frequencies in the 3550-3700 MHz band in the Denver area. Starry will also test CBSDs across the full band in a controlled laboratory environment in its Boston, Massachusetts headquarters. Starry will comply with all necessary requirements to protect any operations of the United States Navy, in-band and adjacent band satellite earth stations, and grandfathered wireless broadband licensees in and around the area of authorization.

#### **Company Background and Purpose of the Experiment**

Starry, headquartered at 38 Chauncy Street, Second Floor, Boston, MA 02111 (FRN: 0025185505), is an innovator in fixed wireless equipment design using millimeter wave (mmW) spectrum, and is a new entrant fixed broadband provider. Starry's goal is to provide a high quality, gigabit capable, broadband service to consumers across the country. Starry has been operating successfully under its Experimental License in the 37-38.6 GHz band (W12XEB), and is generating a significant amount of technical and market data and expertise under the that license.

Starry wishes to test equipment in the Citizens Band Radio Service (CBRS). Specifically, Starry will test the ways in which CBRS might form part of Starry's access network, including the band's effectiveness for residential fixed broadband, and its utility for backhaul and redundancy. Starry will also explore the technical and economic implications of adding a CBRS layer to Starry's existing robust mmW network, and the potential for creating an enhanced heterogeneous multi-band network in a shared spectrum environment.

The test will involve the operation of no more than five (5) CBSDs and up to ten (10) user terminals in either market at any time. We are requesting authorization to test in a 40-kilometer (km) radius around the Boston, Massachusetts area and following the coast line to exclude areas over water, and only in the 3650-3700 MHz portion of the band. While we will only use a small number of CBSDs, we would like the flexibility to test a variety of deployment models around various parts of the Boston market. We will also test CBSDs in a controlled indoor laboratory environment across the full 3550-3700 MHz band in our Boston, Massachusetts headquarters. In the Denver, Colorado area, we are requesting authorization to test in a 5-kilometer radius to include parts of downtown and suburban Denver in portions of the full 3550-3700 MHz band. The test will only involve operation of fixed CBSDs and terminal equipment.

The CBSDs will mostly operate only intermittently, but may sometimes operate continually if we are testing the ability to directly serve an end user.

We will design and operate the experiments in a manner that avoids harmful interference to other users. We will maintain an actively monitored email address and phone number to receive any

interference complaints. We will immediately terminate operation in the event we receive notice that the CBSD(s) may be causing interference to a Navy, Fixed Satellite Service, or grandfathered wireless broadband licensees.

## Technical Specifications and Equipment

Starry will operate consistent with the CBRS rules in Part 96 of the Commission's rules (47 C.F.R. § 96). Specifically, the CBSDs have the following technical specifications:

*Maximum output power:* 4 Watts

*Maximum effective radiated power:* CBRS Category A limit – 30 dBm/10 MHz EIRP

*Bandwidth:* 10 megahertz and 20 megahertz

*Emissions:* LTE

All power levels will comply with the limits set forth in the FCC's rules, including those relating to human exposure to radiation. Although we are requesting power up to the Category A limit, all operations will be conducted at the minimum power level necessary to establish and maintain a reliable radio link.

Starry will operate the listed commercially-available CBSDs and terminal equipment:

### ***CBSD***

Bai Cells Nova-436 Outdoor TDD Base Station

Bai Cells Nova-233 G2 Outdoor FDD/TDD eNB

### ***Terminal Equipment***

Bai Cells Atom ODo4-19.5 Outdoor UE

Bai Cells Atom ODo4-14 Outdoor UE

Bai Cells Atom IDo4-6.5 Indoor UE

## Antenna Information

Each CBSD will be connected to an external directional antenna to direct RF between the CBSDs and terminal equipment to maximize link reliability and to minimize the potential of causing harmful interference to any other user in the band. The terminal equipment will use an internal antenna; either a directional antenna for the outdoor terminal equipment or an omnidirectional antenna for the indoor equipment. Antenna specifications are listed below:

### **AW3014-To - Alpha Wireless 3.3 - 3.8GHz 18dBi Dual Slant 65deg Sector Antenna**

Polarization:  $\pm 45^\circ$  Slant Linear

Gain: 18dBi

Azimuth Beamwidth:  $65^\circ$

Azimuth Beam Squint:  $3^\circ$

Elevation Beamwidth:  $7^\circ$

Electrical Downtilt:  $To^\circ$

Electrical Downtilt Deviation:  $1^\circ$

Impedance: 50 $\Omega$

VSWR: 1.4:1

Return Loss: 15dB

Isolation: 28dB

Front to Back Ratio (total power  $\pm 30^\circ$ ): 30dB

Upper Sidelobe Suppression (peak to  $20^\circ$ ): 18dB

Cross Polar Discrimination at Sector: 16dB

Maximum Effective Power per Port: 100W

**Atom ODo4-19.5 – internal directional antenna**

Gain: 19.5 dBi  
Polarization:  $\pm 45$   
Isolation:  $\leq -20$  dB  
VSWR:  $\leq 2.5$   
Horizontal Beamwidth:  $25 \pm 50$   
Vertical Beamwidth:  $25 \pm 50$

**Atom ODo4-19.5 – internal directional antenna**

Gain: 14 dBi  
Polarization:  $\pm 45$   
Isolation:  $\leq -25$  dB  
VSWR:  $\leq 2$   
Horizontal Beamwidth:  $60 \pm 30$   
Vertical Beamwidth:  $25 \pm 50$

**Atom IDo4 – internal omnidirectional antenna**

Gain: 6.5 dBi  
Polarization: Linear, Vertical  
Isolation: N/A  
VSWR:  $\leq 2$   
Horizontal Beamwidth: N/A  
Vertical Beamwidth: N/A

**airMax AMO-3G12 – internal omnidirectional antenna**

Gain: 12 dBi  
Polarization: : Dual-Linear  
Isolation: 25 dB minimum  
VSWR:  $\leq 1.6$   
Horizontal Beamwidth: N/A  
Vertical Beamwidth: 80

**Directional antenna orientation in vertical and horizontal plane**

Because the tests will take place at various locations within the requested experimental area, it is not possible to identify at this time the vertical and horizontal orientation of each antenna for each test. Starry will take every precaution to identify suitable testing sites such that when in use, the antennas will be oriented such that they minimize the potential for causing harmful interference to other users of the band.

**Protection Against Interference**

Starry will not cause interference to any other user in the band, and will terminate service immediately upon notification of any potential interference caused by its experiment.

### Contact and Stop Buzzer

Technical	Legal
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#### Location

Starry will operate CBSDs in the 3650-3700 MHz band at various locations in the Boston, Massachusetts area within a 40 km radius (and following the coast line) from the following center point: Latitude: 42°13'40.97"N; Longitude: 71° 7'50.99"W. CBSDs will be located at a maximum height of 50 feet above ground level. Starry will operate CBSDs across the full band in a controlled laboratory environment in its Boston, Massachusetts headquarters located at 38 Chauncy Street, Boston, MA 02111.

Starry will operate CBSDs in the 3550-3700 MHz band at various locations in the Denver, Colorado area within a 5-kilometer radius from the following center point: Latitude: 39°45'2.18"N; Longitude: 105° 1'19.70"W. CBSDs will be located at a maximum height of 50 feet above ground level.

#### Public Interest

This experimental authorization will serve the public interest, convenience, and necessity. It will allow Starry to test strategies for using CBRS, in addition to high-capacity millimeter wave bands, to further enhance broadband connectivity and competition across the country.