Red Rover on behalf of

Yuma School District

STA Exhibit

Date: 01/24/2017

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Subject: Complementary Exhibits

File Number: 0090-EX-ST-2017

To Whom It May Concern:

Consistent with the standards set forth in Section 5.61 of the Federal Communications Commission's (Commission's) Rules, 47 C.F.R. § 5.61, Red Rover Ltd, on behalf of Yuma School District, requests Special Temporary Authority (STA) to conduct demonstrations of Shared Spectrum experimental 4G LTE Cell Base Stations in Yuma, Arizona. Operations under this STA would be consistent with the Part 96 rules the Commission has adopted to govern use of the 3.5 GHz band. The STA is sought for a period of 180 days beginning on 02/01/2017. Red Rover Ltd outlines below its need for the requested STA and the reasons that the STA should be granted expeditiously.

The STA is needed to execute operation and performance of 4G LTE Cell in the 3.5 GHz band, which the Commission has designated for broader use. The operation of Cell Base Stations will be consistent with the Commission's Part 96 rules and the incumbent operators will be protected from any harmful interference. The School District of Yuma wants to test the capabilities of CBRS in providing Educational broadband Internet services to low income students at home. In support of their chromebook deployments and digital educational material online. This service will enhance the students and families for

Red Rover and Yuma School District requests authorization to operate on the frequencies between 3680-3700 MHz, part of 3550-3700 MHz which have been opened for innovative small cell spectrum sharing in connection with the new Citizens Broadband Radio Service (CBRS). Operations across the proposed frequencies will be consistent with the rules for Category B CBRS devices (CBSDs) set forth in Part 96 of the Commission's rules. As stated above and described below, Red Rover Ltd and Yuma School District will avoid harmful interference to incumbent operations throughout the band, and to operations in adjacent bands.

Planned Operations

Red Rover anticipates performing the following tests under the requested STA. The proposed experimental operations in the 3.5 GHz band will be conducted without harmful interference to other authorized users.

- 4G LTE outdoor coverage and performance: Red Rover Ltd in collaboration with its Air Span radio equipment, model Air Symphony 4200 will test:
    - The operation of the Cell base station to understand the coverage and performance of indoor base stations in the 3.5 GHz band in rural environments.
        - The frequency of operation will be limited to 3650 to 3670 MHz
        - A single antenna site will be established on existing muli-story structures.
        - The network will broadcast, "filter content" to students at home. The desire outcome is the ability to provide educational Internet services to low income students at home.
        - While traditional the FCC Educational Broadband Spectrum (EBS) is used for these deployments, Yuma School District does not have, nor can receive new EBS allocation. The application of CBRS would open the door for other Educational Institutions to consider this new spectrum in support of their students needs.
    - The performance and operation of a CBSD when instructed by SAS to switch frequency.
    - The impact on an end user when a CBSD has switched its frequency
- SAS Management of Shared Spectrum: Red Rover, in collaboration with its SAS Administrator (Federated Wireless) and radio partner Air Span, will test spectrum sharing, including General Authorized Access (GAA) registration, CBSD spectrum grant request and SAS response, spectrum grant revocation, and simulated protection scenarios in an operation environment.

Non-Interference Analysis

Operation under the STA will not adversely impact any authorized user of RF Spectrum.

Morphology of Test Site: The city of Yuma is located between a series of mountain ranges. The location is urban and geography is mix with several tall buildings thoughout the town.

The test site located at the Yuma High School campus. The site has existing Multi-story buildings that will be used as the radio towers. These existing structures assure no aircraft flight pattern issues.

- A single eNodeB (antenna site) will be tested providing 360 degree broadcast of the 4G LTE signal using the TDD protocol. The network will provide broadband wireless Internet service to a test bed of students.

- With the higher frequency and low transmit power, reduces the conflict to adjoining areas.

CBSD power will be limited to 47dBm/10MHz (EIRP) in alignment with CBSD's Category B specifications

Radar Protection (Shoreline): Yuma is not located within the protected zone, regardless, we select the use of the 3680-3700MHz frequency to avoid any possible contention with ship born radar. Red Rover Ltd does not expect any interference to Radars that operate on the shorelines.

Federal Government Radiolocation Facilities: The Yuma test bed is not within the protected zone. Yet, to avoid any conflicts, we request 3680-3700MHz frequency to avoid any possible contention with military facilities meeting the 80 km distance requirement of the Part 96 rules.

Ground Based Radar: The City test bed is located outside of any ground-based radar Exclusion Zone. The STA desired frequency is 3680-3700MHz frequencies to avoid any possible contention with ground-based radar.

International Border: is more than 1800 km from the nearest Canadian border and over 29 km from the Mexican border. The STA site is to the far north of Yuma city providing the highest protection from conflict with operations in Mexico. Based on the Antenna hight and RF power, there is free space to prevent and conflict.

In-Band FSS Protection: The Commission has identified in-band fixed satellite service (FSS) operations in 3600-3700 MHz that require protection under Part 96. Part 96 further requires coordination with any in-band FSS operations within a 150 km coordination contour, operating within the 3680-3700MHz MHz band. There are no in-band FSS operations within the protected zone.

Adjacent Band FSS Protection: The Commission has identified adjacent band FSS operations in the 3700-4200 MHz that require protection under Part 96. Part 96 requires adjacent band FSS protection within 40km of the FSS site. There are no adjacent band FSS operations within the protected zone.

Part 96 requires a blocking level of -60 dBm. Assuming Free Space path loss between a CBSD in Yuma and the nearest FSS over 100 miles the blocking level of -60 dBm will not be an issue due to free space distance between the sites.

Part 90 (GWBL): A search in the FCC ULS for any GWBL license holders within 18KM of the proposed STA site indicated there are are current GWBL within the area

operating on frequency of 3650 to 3675MHz. To avoid GWBL conflict we request spectrum in the 3680-3700MHz range for this STA.

Exhibit B – Technical Information:

Applicant Name: Red Rover Ltd

Applicant FRN: 0024036667

Technical Contact Details:

Name of Contact	Steve Rovarino – President Red Rover Ltd
Contact Address	748 South Meadows Parkway Suite A9-52 Reno, NV 89521 408-921-8945 Steve@redroverltd.com

Base Station General Information

Equipment	Air Span Air Symphony 4200 (Undergoing SAS certification process)
Quantity	2
Address of Location	Yuma High School 400 S 6th Ave, Yuma, AZ 85364
Area of Operation	Operation not to exceed 3 km radius from the following geographic center points: 32 43 06.5 N and 114 37 42.3 W

Amplifier Detail

Antenna	External
Type	Omnidirectional
Quantity	Qty 3 120^{o} coverage from each Antenna
Gain	17 dB
Height	24M
Tower/Structure	Antenna's will be mounted on existing Stadium Field Lights
Beamwidth at Half-Power Point	60^{o} Horizontal
Orientation in Horizontal Plane	0^{o}
Orientation in Vertical Plane	Various (0^{o} to -10^{o})

Radio Equipment

Radio	Modulation	Emission Designator	Bandwidth	Maximum Output	Maximum EIRP

				Power	
Air Symphony 4200 Cat B CBRS	**Digital 64QAM**	**20M0D1D**	**20 MHz**	**2.5W**	**47 dBm/10MHz**
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AirHarmony 4000	LTE
Tx power	4 x 40 dBm (4 x 10W)
LTE Band	Band 42 , CBRS
Tx and Rx Paths	4 X 4
(per) Channel size	Up to 20 MHz LTE
Users	1024
Throughputs	TDD: 2x 120 Mbps * HW ready for 600 Mbps
Backhaul	2x Fiber (SFP) + 2x Copper Ethernet (int. iRelay, iBridge option)
Synchronization	GPS IEEE1588-2008 SyncE
Antenna Spec	1x Quad 2x X-Polar antenna

Red Rover Ltd. is submitting an application for Special Temporary Authority to test certain aspects of prospective wireless operations of Experimental Category B CBRS Radios in the 3.5 GHz band.

Respectfully submitted,
Steve Rovarino
Red Rover Ltd
President