May 23, 2016

VIA ELECTRONIC FILING

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

Re: Ex Parte Presentation
Higher Ground LLC
Blanket License Application for C-band Mobile Earth Terminals
IBFS File No. SES-LIC-20150616-00357

Dear Ms. Dortch:

On May 19, 2016, Higher Ground CEO Rob Reis, Bruce McKinley, and the undersigned met with Brian Regan, Chris Holzer, Paul Powell, John Schauble, and Kamran Etemad of the Wireless Telecommunications Bureau. Higher Ground conducted an outdoor SatPaq demonstration and provided a presentation on Higher Ground’s interference protection regime for point-to-point microwave operations, the Channel Master, as described in the attached presentation.

Outdoor Demonstration of SatPaq Operations

The outdoor demonstration allowed Commission staff to directly engage with a “live” SatPaq embedded in a smartphone case, connected via Bluetooth to a smartphone, and operated by a downloaded app, the SatPaq app. Higher Ground showed that, for the consumer, the SatPaq app provides a standard messaging interface and a seamless, real-time service. The SatPaq delivered text messages to a mobile device in real-time via an Intelsat geostationary satellite 22,236 miles away, and received return text messages. In addition, the demonstration provided a visualization of the Channel Master software, which applied the GPS location of the SatPaq to a ULS-derived database of all C-band point-to-point microwave receivers to identify available non-interfering frequencies.

The demonstration provided a real-world showing of the permission-based, database-driven spectrum access regime that Higher Ground has developed to enable more intensive use
of C-band spectrum while ensuring no harmful interference to point-to-point microwave receivers. Higher Ground’s proposal will deliver on a promise of the National Broadband Plan to provide for innovative database-driven spectrum sharing, particularly where incumbent service facilities are “generally fixed and known,” and their radiofrequency (“RF”) operations are “well understood and predictable.”  

**Interference Protection Regime**

Higher Ground and WTB representatives also met to discuss the Channel Master software that Higher Ground has developed to identify non-interfering frequencies for SatPaq operations. Higher Ground will engage in a rigorous, conservative link analysis for C-band point-to-point microwave operations that requires the SatPaq to stay 6 dB (or more) below Boltzmann Noise generally in order to transmit.

The Channel Master analysis takes into account all relevant ULS-derived data for individual C-band point-to-point receivers, including their location and orientation, operating frequencies, antenna patterns, antenna height, height above mean sea level, diffraction, and polarization, as well as the SatPaq’s location and orientation, and the use of frequency diversity and satellite choice. The Channel Master software registers the SatPaq’s GPS-derived location and evaluates all nearby point-to-point microwave receivers not limited by signal blockage of the earth. This will include all point-to-point operational fixed licensees, operational fixed applicants operating pursuant to pre-authorization construction, and temporary fixed licensees. Applying these data points, the Channel Master software then finds all available non-interfering frequencies and identifies the SatPaq’s transmit frequencies and satellite choice to ensure no harmful interference to any point-to-point receiver.

Higher Ground has successfully incorporated the Channel Master software into the SatPaq app, so that point-to-point microwave interference protection analysis can be conducted both by the SatPaq as well the SatPaq Network Controller at the Teleport. This makes SatPaq operations more efficient and enables mobility. Higher Ground will update the Channel Master database of C-band point-to-point operations, including the database embedded in the SatPaq when ULS publishes new licensing or application information. Next, it will deliver these daily updates to the SatPaq app either via the smartphone’s mobile data network or Wi-Fi, or via the

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3. See Higher Ground Application for a Blanket License to Operate C-band Mobile Earth Terminals, IBFS File No. SES-LIC-20150616-00357, Technical Appendix at 12 (“The look-up table, or a portion of it, may be off-loaded to the SatPaq, enabling the SatPaq to identify and select a suitable frequency to request transmission with SatPaq Network Control.”).
satellite when the SatPaq is out of mobile network range. With regard to the latter option, the
satellites will constantly broadcast the current Channel Master database version number and
information about recent changes. A SatPaq will not transmit other than on the non-interfering
hailing frequency if its database does not contain current information, absent frequency
assignment from the SatPaq Network Controller. The SatPaq can use the hailing frequency to
request relevant updates, and the satellite will deliver “new” C-band point-to-point receiver
information to allow it to select a non-interfering frequency.

Notably, the SatPaq Network Controller at the Teleport will continue to maintain
supervisory control of all operations. While the Channel Master software on the SatPaq app will
select a non-interfering frequency, the SatPaq Network Controller can override the frequency
selection and assign a different frequency or satellite for a SatPaq transmission. It will manage
network usage to ensure compliance with adjacent satellite interference limits due to
simultaneous transmissions by multiple SatPaqs. The Network Controller can always shut off
the entire SatPaq operation by muting the forward path from a satellite necessary for the
communication “handshake” and can also direct a specific SatPaq to suspend or delay its
transmission.

If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

/s/ Adam D. Krinsky
Adam D. Krinsky

Attachment

cc: Brian Regan
    Chris Helzer
    Paul Powell
    John Schauble
    Kamran Etemad
    Tiffany West Smink, CenturyLink
    Susan Crandall, Intelsat
    Laura Stefani, FWCC
    David Meyer, NSMA
The SatPaq®

Rob Reis
Higher Ground LLC

May 19, 2016

The SatPaq®: Satellite texting/email [lite] from your everyday phone
Overview

Agenda

- Background on the SatPaq
- Channel Master:
  - Implementation of our Interference Protection Scheme
- Channel Master Demo
- SatPaq Demo [outside]

Higher Ground LLC Patent Pending
The SatPaq

Provides texting and email in the 50% of the US not covered by cell

❖ Two-way, message-only, satellite transmitter/receiver embedded in the protective case of a smartphone
❖ Includes battery, radio and antenna
❖ Bluetooth to the phone
❖ $139 retail; no monthly fee; $0.60 cents per message
❖ C band over geo satellites; spread spectrum at 9 dBW EIRP
❖ Frequency agile radio; no interference to PtP radios via self-coordination
SatPaq Update

- Alpha testing ongoing with 10 units
  - Underway in CA and VA
- Works well. Good link margins.
- Now building manufacturing test capabilities
- Application software [texting and email]
- Back-end software [teleport and internet connection]
Spectrum Sharing
The link analysis requires us to generally stay 6 dB (or more) below Boltzman Noise.
Channel Master Results
Shaver Lake, CA

SatPaq

Higher Ground LLC Patent Pending
The TopoSlice

Slice of the earth from SatPaq to PtP Rcvr

Protection Zone could end here

The TopoSlice can substantially increase the utility of the any spectrum.

Higher Ground LLC Patent Pending
The SatPaq transmitter is not enabled until:

- The database is current \([\text{updated ULS information}]\)
- A non-interfering frequency is selected \([\text{Channel Master}]\)
- The SatPaq is pointed correctly and has sync’d with the spread spectrum broadcast \([\text{authentication}]\)
- Transmit mask \([25.218]\) is confirmed \([\text{no ASI}]\)
- The SAR Criteria is confirmed \([\text{safe}]\)
- We can handle motion \([\text{client/server}]\)