April 25, 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 April 21, 2016, Higher Ground CEO Rob Reis, Bruce McKinley, and the undersigned met with Diane Cornell, Special Counsel to Chairman Wheeler, and with Julius Knapp, Ron Repasi, Ira Keltz, Mark Settle, and Walter Johnston of the Office of Engineering and Technology. Higher Ground conducted a SatPaq demonstration for Ms. Cornell and, for the OET representatives, conducted a separate demonstration followed by a meeting on Higher Ground’s interference protection regime for point-to-point microwave operations, the Channel Master software, 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 OET 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 Boltzman 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. The Channel Master software, as Higher Ground stated previously, performs an even more rigorous analysis than, and thus replaces, the protection zone approach identified in the Technical Appendix to the application.

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

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3 *Id.*
4 *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 (“Technical Appendix”) (“The look-up
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 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.

Higher Ground also briefly responded to issues raised by CenturyLink in recent ex parte presentations. Further testing is not a prerequisite, as Higher Ground has been engaged in rigorous testing of SatPaq technology since it obtained an experimental authorization in June 2014. It conducted testing for a year before filing the instant application for a mobile earth terminal authorization in June 2015. And since then, Higher Ground has continued to test and refine SatPaq operations, with technical advancements as described above proven via test operations. Higher Ground also noted it already plans to meet the vast majority of CenturyLink’s proposed operating requirements, including maintaining a log of SatPaq locations and transmissions, providing a direct contact in case of harmful interference and a contact who can work jointly to quickly resolve harmful interference, and immediately ceasing SatPaq transmissions in the event of a database outage. Finally, Higher Ground explained that any request for indemnification was unprecedented. Higher Ground will be a Commission licensee
subject to Commission oversight, and this is sufficient cause for company operations to avoid harmful interference.

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

Sincerely,

/s/ Adam D. Krinsky
Adam D. Krinsky

Attachment

cc: Diane Cornell
Julius Knapp
Ron Repasi
Ira Keltz
Walter Johnston
Mark Settle
Tiffany West Smink, CenturyLink
Susan Crandall, Intelsat
Laura Stefani, Counsel to FWCC
David Meyer, NSMA
The SatPaq®: Satellite texting/email [lite] from your everyday phone
Agenda

- SatPaq Update
- Channel Master:
  - Implementation of our Interference Protection Scheme
- Channel Master Demo
- SatPaq Demo
SatPaq Update

- Alpha testing ongoing with 10 units
  - Underway in CA and VA/MD/DC

- Works as planned; Good link margins; $70 COGS;

- Now setting up production at CA contract manufacturer

- Application software [texting and email]

- Back-end operations [teleport signal demodulation and internet/telephone connectivity]
Spectrum Sharing Concept [2014]

‘the TopoSlice’
The link analysis (originally limited to the Simple Protection Zone) is now done everywhere.
Beyond Standard Protection Zones

Exhaustive PtP Link Analysis

The link analysis requires us to generally stay 6 dB (or more) below Boltzman Noise

Link Analysis includes:
- All ULS data
- Link Equation
- Antenna Patterns
- GPS
- Ant. Height
- Diffraction
- Transmit Power
- Polarization
- Diversity
- Passive Reflectors
- Boltzman Noise
- Orientation
- Satellite Choice
- Refraction
- Terrain (option)
Channel Master Results
Shaver Lake, CA
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
SatPaq Self-Coordination

It works!

The SatPaq transmitter is not enabled until:

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

We can now use 500 MHz of C band spectrum for consumer messaging and IoT applications