



1300 NORTH 17th STREET, 11th FLOOR
ARLINGTON, VIRGINIA 22209

OFFICE: (703) 812-0400
FAX: (703) 812-0486
www.fhhlaw.com
www.commlawblog.com

CHENG-YI LIU
(703) 812-0478
liu@fhhlaw.com

June 8, 2016

Via IBFS

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

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

Dear Ms. Dortch:

The Fixed Wireless Communications Coalition, Inc. (“FWCC”)¹ files this letter to voice its continued opposition to the application of Higher Ground LLC for operation of satellite-based mobile devices in 6 GHz fixed spectrum under waiver of the Commission’s rules.² Below, we articulate our reasons for doubting that Higher Ground’s system will reliably prevent interference to the fixed service. We also explain why a waiver proceeding is inadequate to evaluate the proposed departure from a frequency coordination system proven over decades, especially considering the grave consequences should Higher Ground’s alternative fail to perform as

¹ The FWCC is a coalition of companies, associations, and individuals interested in the fixed service – i.e., in terrestrial fixed microwave communications. Our membership includes manufacturers of microwave equipment, fixed microwave engineering firms, licensees of terrestrial fixed microwave systems and their associations, and communications service providers and their associations. The membership also includes railroads, public utilities, petroleum and pipeline entities, public safety agencies, cable TV providers, backhaul providers, and/or their respective associations, communications carriers, and telecommunications attorneys and engineers. Our members build, install, and use both licensed and unlicensed point-to-point, point-to-multipoint, and other fixed wireless systems in frequency bands from 900 MHz to 95 GHz. For more information, see www.fwcc.us.

² Higher Ground LLC, Application for a Blanket License to Operate C-band Mobile Earth Terminals, Application for Authority, File No. SES-LIC-20150615-00357, Call Sign E150095 (filed June 15, 2015).

Marlene H. Dortch

June 8, 2016

Page 2

intended. For these reasons, we ask the Commission to treat Higher Ground's request as a Petition for Rulemaking.

The 6 GHz band is crucially important to fixed service operations. Long-haul communications must occur below 10 GHz to avoid rain fade. With the former 2 GHz fixed service band having been reallocated to PCS, and the 4 GHz band impossible to coordinate over much of the country due to proliferation of C-band downlink earth stations,³ 6 GHz often is the only option.

The 6 GHz band routinely carries applications critical to safety of life and property: pipeline control, operation of the electric grid, synchronizing the movement of railroad trains, real-time financial and market data, and public safety communications, among many others. These require extremely high reliability. The fixed service industry accomplishes that in two ways. One is through expensive engineering to achieve very high link availability through the use of reliable equipment. Availabilities of 99.999% and beyond, particularly on long links, are costly. Operators' willingness to pay top dollar for equipment attests to the importance they place on reliability. The other approach relies on the bilateral, notice-and-response frequency coordination system embodied in the Commission's rules.⁴ Honed over decades, the system has become all but foolproof. It is almost unheard-of for a properly coordinated link to cause interference. The same system also provides for effective sharing between fixed microwave and satellite operations. Just as the Commission would not allow a fixed service operator to deploy a non-coordinated system—even though fixed-source interference would be easier to identify and trace—it should not allow Higher Ground to deploy an unproven unilateral system.

Higher Ground seeks to bypass today's successful frequency coordination system with one of its own devising. Higher Ground's approach is wholly unilateral: the system makes its own decision on whether it is safe for a particular unit to transmit. The mechanism is not subject to review by independent parties. There is no way for a victim to protest interference. As we explain below, Higher Ground's business incentives run against protecting fixed communications. Fixed service operators will have no practical recourse if interference does occur. This puts the fox in charge of the henhouse. Where different services share a band, the

³ Every 4 GHz earth station is coordinated and licensed for the entire geostationary arc, and for the entire 4 GHz band, even if it communicates with only one transponder on one satellite. It thus blocks fixed service coordination over far more spectrum than it actually uses. *See Communications Satellite Corp.*, Memorandum Opinion, Order and Authorization, 8 F.C.C.2d 1001 at ¶ 7 (1967).

⁴ 47 C.F.R. § 101.103(d).

coordination between them should rely on bilateral coordination through independent coordinators who are neutral as to the two services, not on one of the parties acting on its own.⁵

Independent coordination would also make it possible for other parties to compete with Higher Ground, without increasing the interference risks. As it stands, a grant of Higher Ground's requested waiver would give it an effective monopoly in 6 GHz mobile satellite services. A competing provider would not only have to coordinate with the fixed service, but would need Higher Ground's cooperation as well. This outcome is inconsistent with Commission policy that favors open competition, wherever possible, in virtually every arena.

Higher Ground's plan is highly complex, with many moving parts and much to go wrong. It will be implemented in consumer equipment in large numbers and at uncontrolled locations. The devices will be subject to mishandling and abuse, and to the breakdowns that are common in consumer electronics.

Because the fixed service industry has made interference so unusual, it would be difficult to assess and analyze any interference that occurs, particularly short-term interference, and attribute it to a particular source.

Higher Ground assures us that even if its various protection tools were to fail, the resulting outages to a typical link would amount to "only" a few second a year.⁶ This is not reassuring. Fixed service operators invest heavily in systems whose total outages from all causes amount to no more than a few seconds a year. We are reluctant to let Higher Ground eat into that expensive margin.

In addition to the overall complexity of Higher Ground's system, we have these specific concerns:

Lack of transparency. Where the successful Part 101 coordination regime arose over many years in collaborative industry fora, open to all concerned, the Higher Ground system comes from behind closed doors. It lacks any transparency or independent validation. By contrast, when TV White Space proponents sought to introduce a new service among protected incumbents, the Commission launched a decade-long proceeding that developed rules in public debate, undertook live testing with public

⁵ The Commission has instituted such independent coordination for TV White Space service, and is doing so for the Citizens Broadband Radio Service.

⁶ Presentation by Rob Reis of Higher Ground at the National Spectrum Management Association (May 18, 2016).

involvement, and set up a program to certify database administrators. The upcoming Citizens Broadband Radio Service's protection of incumbents will similarly result from a thorough and highly public process. Compared to these, Higher Ground's proposal is unacceptably opaque, and its request for approval by waiver is shockingly casual.

Conflicting incentives. Higher Ground's primary responsibilities are to its customers and shareholders. Its business model, like that of any provider, relies on completing a large percentage of customers' communications. When cases arise in which Higher Ground must block its own communication in order to protect a fixed service link, Higher Ground will have every incentive to please the customer and proceed with the communication. Higher Ground says, "you can trust us," but offers nothing to back up its promise.

Lack of recourse. If interference occurs, and even if the affected fixed service operator can prove Higher Ground caused it, the operator will have little recourse. In principle the causation of harmful interference should suffice for the Commission to revoke Higher Ground's waiver. In practice, Higher Ground will fight hard to protect its investment. We expect there will also be political pressure on the Commission to preserve service to Higher Ground's customers. We fear the Commission will be unable to act unless Higher Ground causes massive, sustained interference, while it will take far less to disrupt the operations that rely on fixed service communications.

Adjacent channel interference. Like all receivers, those in the fixed service are vulnerable to interference sources in adjacent channels, and under some conditions, in second-adjacent channels as well (as where the interfering mobile is close to the victim microwave receiver). Our own frequency coordination procedures take these channels into account. So far as we can tell, Higher Ground does not offer any protection against adjacent channel operations.

Errors in ULS database. The fixed service database on which Higher Ground proposes to rely has errors, particularly in tower locations. Most of the errors are small, but could still mislead Higher Ground's system into causing interference. While licensees have the responsibility to keep the database accurate, Higher Ground's proposal greatly worsens the consequences of errors.

Model used to calculate interference. Higher Ground rests its waiver petition on the claim that its system will permit only non-interfering transmissions. As we understand it, the model used to calculate interference is based upon a number assumptions that create a "one-size-fits-all" approach.⁷ The RF environment in this band, however, is variegated

⁷ *Id.*

and complex, requiring individualized, hands-on coordination decisions. We have concerns, moreover, regarding Higher Ground's resistance to providing the algorithm for and notification of changes to its interference calculation model.⁸

Differential fading. A microwave signal is said to “fade” when weakened by atmospheric conditions that cause destructive interference, or from wet ground surface reflections, or other causes. Modern systems use Automatic Transmit Power Control, Adaptive Modulation, and sensitive receivers to engineer in a “fade margin” that preserves communications during fading events. A microwave link may be operating in a deep fade while an interfering mobile unit, perhaps close to the microwave receiver, does not experience the fade. That makes the microwave receiver more vulnerable to mobile interference by tens of dB.

Reliance on phone sensors. The mobile device incorporates a directional antenna, and uses the sensors in the attached consumer cell handset to turn off the device if the antenna is wrongly oriented—as toward a fixed microwave receiver.⁹ This puts critical communications at the mercy of a consumer's handset hardware feature that was engineered for games and the like, not for critical applications. Moreover, the wide beamwidth of the mobile transmit antenna could easily encompass both the satellite and a victim fixed link receiver, particularly at higher latitudes where satellite look angles are closer to the horizon.

Attributing interference. Higher Ground insists that its billing logs will be able to confirm or deny that a mobile caused any particular interference event.¹⁰ Even if Higher Ground's operations were to seriously degrade fixed service operations, however, the affected fixed service operators would have no way to connect the interference to Higher Ground. We are sensitive to this problem after repeated interference from supposedly coordinated Earth Stations on Vessels (ESVs) whose source proved very difficult to

⁸ See *Ex Parte* Letter to Marlene H. Dortch, Secretary, FCC from Adam D. Krinsky, Counsel to Higher Ground, IBFS File No. SES-LIC-20150616-00357, at 5 (April 20, 2016) (rejecting CenturyLink's request for written notification of changes to Higher Ground's model or method used to calculate interference).

⁹ Presentation by Rob Reis of Higher Ground at the National Spectrum Management Association (May 18, 2016).

¹⁰ *Id.*

identify.¹¹ Even if interference events were properly attributable to a mobile device, retroactive identification of a transient interference event is a poor consolation prize. The damage would be done and there would be no way for a fixed service operator to address the root cause of the problem.

Higher Ground's stated aim is to limit interference caused by its transmitters to 6 dB below the thermal noise power level of affected fixed service receivers.¹² If Higher Ground's coordination methods are successful in achieving this goal, we agree the interference effects should be negligible. But if the coordination is ever unsuccessful—for the reasons above or otherwise—a transmitter at Higher Ground's power level will be capable of interrupting an unfaded fixed service link, or of taking margin from a fading link.

The Commission has been extremely cautious about intermingling dissimilar mobile and fixed applications in the same band, particularly the point-to-point fixed bands.¹³ The Mobile Satellite Service allocations, not shared with other critical services, are intended specifically for Higher Ground's type of application. Perhaps Higher Ground has financial reasons for preferring the 6 GHz fixed service band instead of an MSS band (*e.g.*, the Ku-band), but that does not justify its potential disruption of fixed service operations.

Considering the range of issues and affronts to precedent inherent in Higher Ground's proposal, a waiver proceeding is not an appropriate forum for its resolution. That will need careful attention to technical rules that can assure protection to the fixed service, at a level of detail at least comparable to the rules governing TV White Space service. Also needed will be mandatory procedures to promptly ameliorate any interference that does occur. Changes of this scope require the context of a rulemaking carried out pursuant to the Administrative Procedure Act. A comprehensive rulemaking will also provide needed sanctions against Higher Ground in the event that it fails in its responsibilities to prevent interference, and further, will open the band

¹¹ A major communications carrier with a fixed link across the Alaska inland waterway had received intermittent interference for some time but could not locate the source. A technician happened to be on site when the interference recurred, and saw a ship passing through the waterway. After it passed, the interference ceased. The kind and duration of the interference on that occasion were similar to those in the past, suggesting that ESVs had caused the problems all along.

¹² Presentation by Rob Reis of Higher Ground at the National Spectrum Management Association (May 18, 2016).

¹³ The only instance of mobile authorization in the fixed service bands are the ESVs referred to above, which in fact caused recurring interference.

Marlene H. Dortch
June 8, 2016
Page 7

to competition for mobile satellite services—an outcome that Higher Ground likely disfavors but will comport with Commission policy. Higher Ground may object that a rulemaking will delay its approval. We submit that delay is a small price to pay for the extraordinary access that Higher Ground seeks to a band long dedicated to other purposes.

Respectfully submitted,



Cheng-yi Liu
Mitchell Lazarus
*Counsel to Fixed Wireless
Communications Coalition, Inc.*

cc (via email):

José Albuquerque (FCC IB)
Paul Blais (FCC IB)
Stephen Buenzow (FCC WTB)
Diane Cornell, Special Counsel to Chairman Wheeler
Susan H. Crandall, Intelsat Corporation
Stephen Duall (FCC IB)
Chip Fleming (FCC IB)
Walter Johnston (FCC OET)
Ira Keltz (FCC OET)
Julius Knapp (FCC OET)
Adam D. Krinsky, Counsel for Higher Ground LLC
Hsing Liu (FCC IB)
David E. Meyer, National Spectrum Management Association
Kerry Murray (FCC IB)
John Schauble (FCC WTB)
Blaise Scinto (FCC WTB)
Mark Settle (FCC OET)
Tiffany West Smink, CenturyLink
Cindy Spiers (FCC IB)