

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)
)
Higher Ground LLC) File No. SES-LIC-20150616-00357
)
Application for a Blanket License to)
Operate C-band Mobile Earth Terminals)

**FIXED WIRELESS COMMUNICATIONS COALITION
PETITION TO DENY**

The Fixed Wireless Communications Coalition, Inc. (“FWCC”)¹ files this Petition to Deny the Application and request for waiver of Higher Ground LLC (“HG”).² HG seeks authorization for up to 50,000 mobile earth stations in a band allocated only for fixed operations, without engaging in the bilateral coordination process that serves as the foundation for effective spectrum sharing in the 6 GHz band. The waiver process is not appropriate for circumventing these rules, and HG fails to provide valid reasons why a waiver should be granted in this instance.³ Moreover, HG’s proposed unilateral interference protection mechanism is

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 (filed June 15, 2015) (“Application”).

³ HG’s proposal to introduce a new spectrum sharing mechanism and to permit mobile operations in a band allocated only for fixed operations involves questions and issues better suited for a notice and comment rulemaking proceeding.

insufficient. For these reasons, the Federal Communications Commission (“Commission” or “FCC”) should deny HG’s Application and the requested waiver.

BACKGROUND

Higher Ground LLC seeks authority to operate 50,000 earth station terminals in a fixed satellite service band, using 5925 to 6425 MHz for the uplink. HG request waivers of the Commission's coordination rules, *i.e.*, 47 C.F.R. §§ 25.130(b), 25.203(c), 101.103., intending to use an automated frequency coordination analysis system, *aka* database, instead.⁴ HG also seeks a waiver of the Table of Allocations to permit use of mobile (*i.e.*, earth station) operations.⁵

HG states that it will use “self-coordination techniques” in lieu of the required Part 101 coordination with fixed services (“FS”). These “self-coordination techniques” involve a combination of the ULS database and reliance on Global Positioning System and software-defined radio technologies.⁶ HG states that the database will match the “SatPaq” devices’ geocoordinates with a look-up table that incorporates ULS database information for FS licensees and applicants, identifying a protection zone that HG claims will provide the same level of interference protection as Part 101 coordination techniques.⁷

The 6 GHz band is vitally important to FWCC members. 6 GHz links are used for both voice and data communications, supporting such applications as interconnecting mobile radio base stations used for dispatching vehicles (first responders, locomotives, emergency repair crews etc.); remote control of railroad switches and signals, pipeline valves, and electric utility circuit breakers; and carrying backhaul traffic on cellular and PCS systems.

⁴ *See* Application.

⁵ *Id.*

⁶ *Id.* at Reed Engineering Declaration p. 2.

⁷ *Id.* at Technical Appendix p. 4 and Reed Engineering Declaration p.3.

The 6 GHz band is especially important for fixed services because it is the only band below 10 GHz where licensed microwave links can be reasonably coordinated.⁸ Due to favorable propagation characteristics and lack of rain fade, 6 GHz is highly utilized by fixed services and coordination is not always easy. Moreover, the FCC identified 6 GHz as the primary relocation band for FS licensees displaced from other bands by Commission action, making access to the band vitally important.⁹

The 6 GHz band is allocated only for FSS and FS use in the international and U.S. allocation table,¹⁰ and the regulatory framework for those services and their associated stations contemplates that both will be situated at fixed locations. Spectrum sharing in 6 GHz has been successful due to bilateral frequency coordination prior to site-by-site licensing.¹¹ The Commission has determined that:

[F]requency coordination is one of the essential elements for protecting FS in the 6 GHz band. Frequency coordination is a process that helps to eliminate interference between different satellite systems or between terrestrial microwave systems and satellite.¹²

Thus, bilateral coordination enables licensees, frequency coordinators, equipment manufacturers, and system designers to rely on geographic and spectral separation to achieve efficient use of the

⁸ While there is an allocation in the 4 GHz band, satellite use renders coordination for new FS links almost impossible.

⁹ FS licensees were displaced by PCS licensees in the 1.9 GHz band and by MSS licensees in 2.1 GHz band.

¹⁰ 47 C.F.R. § § 2.102(a) and 2.106.

¹¹ FS licenses are coordinated through a process that requires a search for available links; prior notification to other licensees in the geographic area (with a procedure for objections to be made); filing an application with the FCC; and, upon grant of license, registration of the coordinated sites.

¹² *Procedures to Govern the Use of Satellite Earth Stations on Board Vessels in the 5925-6425 MHz/3700-4200 MHz Bands and 14.0-14.5 GHz/11.7-12.2 GHz Bands*, Report and Order, 20 FCC Rcd 674 at ¶21 (2005) (“ESV Order”) (emphasis added).

band for both satellite and FS use. Moreover, bilateral coordination ensures that previously licensed systems have adequate interference protection from those seeking to license systems later in time.

The purpose of the Part 101 coordination requirements is not just to coordinate initial licensing, but also to provide licensees with the ability to pinpoint a potential interfering station at a fixed location. In the event interference does occur (notwithstanding prior coordination), with coordination information readily available it is a relatively easier matter to find interfering sources, as licensees are only operating in previously specified locations. Absent prior coordination, in the event of interference FS operators may be required to shut down their systems to investigate, something the Commission has found “an impractical solution.”¹³ Because HG’s waiver depends on “impractical solutions,” and for the reasons discussed below, the Application and waiver must be denied.

DISCUSSION

Given the many important FS uses of the 6 GHz band, waiver of important spectrum management tools in a way that could have a detrimental effect on other licensed users requires a close look and careful consideration by the Commission. Here, HG’s waiver request does not pass muster, as HG has failed to show that it meets the standards of a waiver or that it would be able to protect incumbent FS licensees, who must know where to find, and how to stop, sources of interference.

A. The Waiver Request Does Not Meet the Commission’s Standards.

The FCC can grant a waiver only when: 1) the underlying purpose of the rule(s) would not be served or would be frustrated by requirement of the rules, and grant of the waiver is in the

¹³ ESV Order at ¶ 25.

public interest; or 2) there are unique or unusual factual circumstances so that application of the rule(s) would be inequitable, unduly burdensome or contrary to the public interest, or the applicant has no reasonable alternative.¹⁴ HG's waiver request does not meet this high standard.

Part 101 bilateral coordination procedures are intended—in part—to protect prior licensees from potential harmful interference caused by the proposed operations of newcomers and to identify the source of such interference should it occur. This entire regime would be frustrated by the introduction of HG's proposed unilateral self-coordination mechanism. As HG has recognized, the Commission's rules prohibit assignment of the "5925-6425 MHz band to mobile earth stations" and that this restriction is "intended to protect terrestrial FS from potential harmful interference."¹⁵ HG's proposal for unconstrained nationwide mobile device usage would be irreconcilable with the Commission's existing rules designed to provide licensed FS facilities the ability to readily identify culprits (*via* a site-by-site geographic coordination and licensing mechanism) should harmful interference occur. Moreover, HG has provided no justification as to why its proposed operation is so unique that it must operate in a fixed band and without engaging in coordination. Similarly, HG has not demonstrated that it has no other reasonable alternative, such as using mobile satellite frequencies where allocations already exist for mobile applications. Indeed, there are many mobile satellite devices already in the market that provide the functionality of HG's SatPaq devices without the need for a waiver that would negatively impact incumbent licensees in the 6 GHz band.¹⁶ For these reasons, HG does not meet the standards for a waiver.

¹⁴ 47 C.F.R. § 1.925(b)(3).

¹⁵ Application narrative at n.5. *See* 47 C.F.R. § 101.147(a), note 6. The prohibition of mobile earth stations in a fixed service band is a natural byproduct of the incompatibility of mobile operations with fixed service interference protection requirements.

¹⁶ *See, e.g.*, <http://www.wired.com/2014/04/sat-comms/>, last visited September 10, 2015.

B. Grant of the Waiver Would Increase the Potential for Harmful Interference to Fixed Services and Hinder Resolution of Interference.

The Part 101 frequency coordination procedures are one of the Commission's great success stories. Applicants and licensees themselves, with the help of private frequency coordinators, achieve very dense packing of links and extremely high spectrum efficiencies, with practically no Commission involvement. Any proposal that threatens the functioning of these arrangements must be subject to the greatest scrutiny. In this instance, HG's planned system does not appear to adequately prevent interference to FS in advance, nor does it provide a means to identify the source and quickly eliminate any interference that arises.

HG's request for waiver of Part 2 to allow for use of mobile consumer devices is concerning, as coordination with mobile devices is much more difficult given that the path is not predictable. Worse, if interference does occur, the transient nature of the mobile device makes the task of tracking down and confirming the source almost impossible. This is even more true given that the SatPaq is a consumer device, highly susceptible to uncontrollable and unexpected usage behaviors of consumers. HG argues that the Commission has allowed "similar mobile earth stations, such as vehicle-mounted earth stations and earth stations aboard aircraft, are permissible applications of the FSS, even though they operate on mobile platforms while in motion or at unspecified location points."¹⁷ While the FCC did authorize Earth Stations on Vessels ("ESVs"), it did so only after ensuring the protection of fixed services by maintaining coordination requirements and other protections.¹⁸

¹⁷ Letter from Adam D. Krinsky, Counsel to Higher Ground LLC, to Paul E. Blais, Chief, Systems Analysis Branch, Satellite Division, International Bureau, Federal Communications Commission, at 3, Call Sign E150095, IBFS File No. SES-LIC-20150616-00357 (filed July 30, 2015).

¹⁸ ESV Order at 686-691 (requiring coordination within certain distances offshore of the U.S. coastline).

FS licensees could experience interference sufficient to disrupt a vital FS communications link, only to have the interfering source move on without a trace. FS stations have experienced this problem with ESVs, which, as noted, do require coordination. In one case, repeated instances of unidentified harmful interference was experienced by microwave links spanning a waterway; only because a technician was on site investigating when a vessel operating ESVs happened to pass through was the cause of interference identified. It is likely that many other instances of harmful ESV interference occur without ever being identified simply due to the transient nature of the operations. HG's proposed operations would present the same problem – HG could simply claim its interference protection mechanism operated flawlessly because there would be absolutely no way for a FS licensee to even identify or locate the transient interference source.¹⁹

There are also serious concerns with HG's proposal to rely on its own database in lieu of an authorized coordination procedure. While the FCC recently has provided for use of databases to enable spectrum sharing in certain bands, it has required those database administrators to be certified by the Commission.²⁰ Moreover, coordination and database functionality in those cases were carefully considered by the Commission and affected parties. Here, the HG database does not appear to meet the robust Commission standards for certification of database administrators, such as authenticating device location and ensuring secure and reliable transmission of information between spectrum users, including end-to-end security to prevent tampering of

¹⁹ It is also unclear what protections can be provided in the event that a SatPaq malfunctions or there is unanticipated consumer misuse or malfeasance (*e.g.*, modification or abuse of the device). Should anomalies occur, it would be difficult, if not impossible, for FS operators to determine and protect against sources of potential SatPaq interference.

²⁰ See *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd 3959 at ¶ 320 (2015).

devices. HG has unilaterally defined its own database coordination process and seeks to implement it without agreement by affected FS licensees or public vetting through the Commission's notice and comment rulemaking process.

The quality and implementation of the HG database appears ineffective to protect FS. First, it depends entirely upon data in the FCC's Universal Licensing System ("ULS") being 100% reliable and up-to-date. This is not always the case, and it is also unclear how often the database will update the ULS dataset. While FS coordination also relies upon ULS, the fact that the FS sites are fixed, coordinated and registered allows for an easy determination of potential sources of interferences. The pre-licensing coordination procedures, often conducted through authorized frequency coordinators, also provide additional protection from database errors. When a party seeks to license a new FS station, the proposed operating details must be provided to all licensees (or their frequency coordinators) operating within the potentially affected geographic area. This offers licensees and their frequency coordinators a critical opportunity to assess the interference potential to existing systems, regardless of what data sets might exist in ULS, and puts licensees on notice that a potentially interfering system is in the works. In contrast, the proposed HG database mechanism does not appear to protect against ULS errors, provides absolutely no notice of imminent operations to incumbent users, and proposes to bypass altogether the prior coordination procedures that would ensure FS licensees can determine whether nearby operations are likely to cause harmful interference to existing licensed facilities.

C. The Application and Waiver should be Denied Because the Proposed Interference Protection Mechanism is Insufficient

As proposed, the technical assumptions underlying HG's "unilateral" coordination mechanism make it insufficient to protect FS stations from potential harmful interference. To illustrate, the FWCC provides the following example.

In its Technical Appendix, HG uses assumed gain values for a 6 GHz point-to-point receive antenna of -40 dBi and -20 dBi to calculate stand-off distances of 630 and 6300 meters, respectively.²¹ It then selects the 6300 meter distance as the radius of its “close proximity circle” “no-transmit” zone. However, the “typical” antenna radiation pattern envelope (RPE) that HG provides in Technical Appendix Figure A-8 has gain of +9 dBi (29 dB higher) at an off-axis angle of (+/-) 10 degrees,²² and only decreases below -20 dBi when the magnitude of the off-axis angle is greater than 70 degrees.

Furthermore, based on the suppression requirements in Section 101.115 (plotted as gain in Figure 1 below),²³ a point-to-point link could use an antenna with gain as high as about 16 dBi under Category B1, or 12 dBi under Category A, at 10 degrees off axis. The Category A and Category B1 requirements permit higher gain than HG’s -20 dBi assumption at all angles, and far higher gain at many angles.

²¹ FWCC notes that HG’s -40 dBi gain used to calculate a “behind-the-dish stand-off distance” is 7 dB lower than the -33 dBi gain indicated by its Figure A-8 radiation pattern envelope.

²² See Application Technical Appendix, Figure A-6 for HG’s “Protection Zone”.

²³ 47 C.F.R. § 101.115.

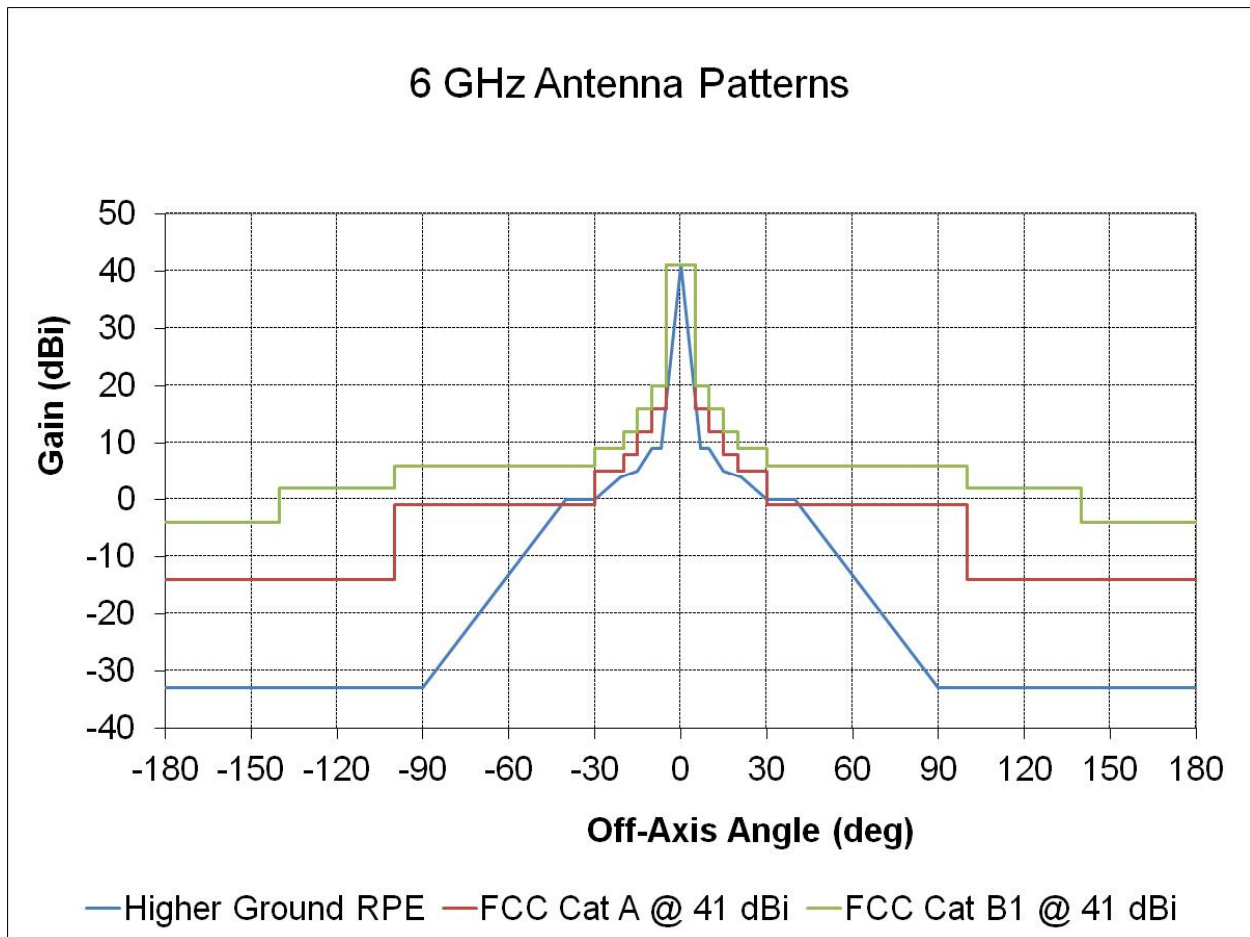


Figure 1: Higher Ground Assumed Point-to-Point Receiver RPE versus FCC Standards

While HG describes its Figure A-8 pattern as typical, FWCC believes that in fact only about 40% of 6 GHz antennas suppress the off-axis gain to this ultra-high performance level. Most antennas are at lower performance levels, including about 40% that are either standard-performance (only meeting Category B1) or improved-performance (just meeting Category A). A common antenna in the standard-performance category is the Commscope PL6-59, and in the improved-performance category, the Commscope PAR6-59. Radiation Pattern Envelopes for these antenna models are plotted in Figure 2 below. Most antennas have gain far higher than -20 dBi for large ranges of the off-axis angle, and some that are used do not have gain as low as -20 dBi for any angle.

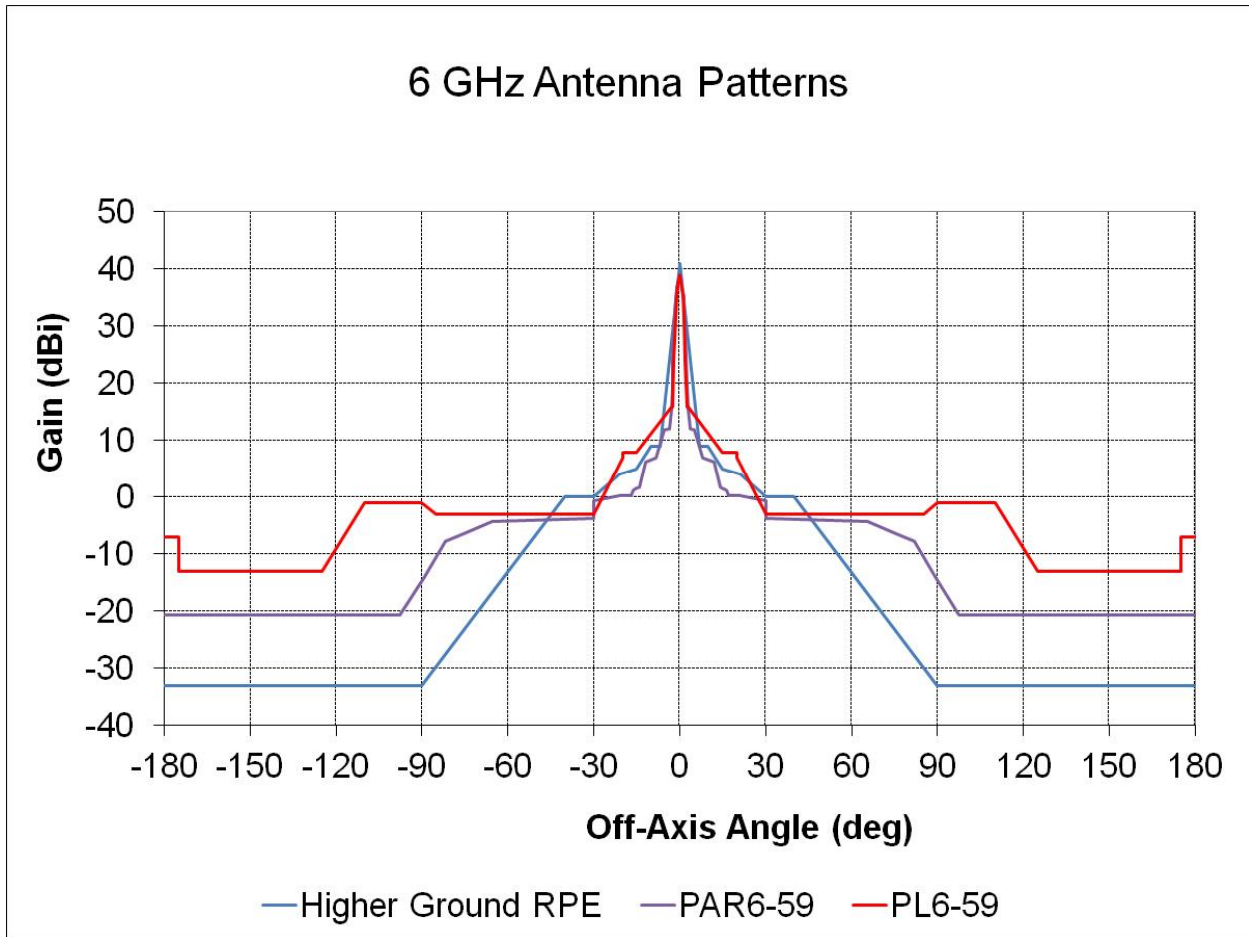


Figure 2: Higher Ground Assumed Point-to-Point Receiver RPE versus Common Lower Performance Antenna RPEs

In short, HG’s assumptions about the performance level and off-axis gain of the antennas that would be subject to its interference are improper, and therefore the separation distance it calculates is not nearly large enough to satisfy its interference objective. In calculating free-space loss for a line-of-sight path, each doubling of the path length increases the loss by 6 dB. For example, the distance must be increased by a factor of 16 to increase the free-space loss by 24 dB. To compensate for the large differences between HG’s -20 dBi assumption and much higher realistic gains for 6 GHz antennas beyond 10 degrees, FWCC believes that the necessary distance would be many times the 6.3 km (3.9 mi) that HG calculates.

CONCLUSION

For the foregoing reasons, the Commission should deny the Higher Ground LLC Application and waiver request.

Respectfully submitted,



Laura Stefani
Cheng-yi Liu
Fletcher, Heald & Hildreth, PLC
1300 N. 17th Street, Suite 1100
Arlington, VA 22209
(703) 812-0400
*Counsel for the Fixed Wireless Communications
Coalition*

September 11, 2015

TECHNICAL CERTIFICATION

I certify, under penalty of perjury, that I am a technically qualified person who reviewed the foregoing Petition to Deny and that the technical statements therein are correct to the best of my knowledge.



William W. Perkins
Committee Member, Technical Committee
Fixed Wireless Communications Coalition, Inc.

September 11, 2015

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing Fixed Wireless Communications Coalition Petition to Deny, was sent by United States mail, first class postage prepaid, on this 11th day of September, 2015, to the following:

Robert S. Reis
President
Higher Ground, LLC
2225 E. Bayshore Rd, Suite 200
Palo Alto, CA 94303

William J. Sill/Adam Krinsky
Wilkinson Barker Knauer, LLP
2300 N Street, NW
Suite 700
Washington, DC 20037-1128



Laura Stefani