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July 29, 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 in reply to the *ex parte* letter of Higher Ground LLC dated July 21, 2016.

The FWCC spelled out its objections to Higher Ground’s waiver request in a Petition to Deny of September 1, 2015, a Reply of October 5, 2015, an *ex parte* filing on June 8, 2016, and a subsequent meeting with Commission staff on July 13, 2016, reported in an *ex parte* filing on July 15, 2016. This letter continues an exchange with Higher Ground.

Our objections rest on two related principles.

First, an applicant who seeks a waiver to introduce a non-allocated service into an established band has the burden of establishing it will not cause harmful interference to the

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.

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incumbents.² For the reasons given in our earlier filings and below, Higher Ground has not met this burden. Second, the first operational test of Higher Ground's system will not come until widespread commercial deployment. Demonstrations of software for Commission staff and others are no substitute for joint testing in the real world.

Higher Ground is counting on its complex system to work perfectly when it flips the switch for large-scale commercial use. That might be a first in the history of engineering. Higher Ground brushes off our concerns about the risks of imperfect operation, but any failures will harm incumbent fixed service operators, not Higher Ground.

The FWCC acknowledges the Commission's interest in combining fixed and mobile operations in the same band. We expect advances in technology will make this practical in the Part 101 fixed service bands. Indeed, the FWCC has previously acceded to other uses of the fixed bands, including mobile uses, where our analyses showed interference would not be a concern.³ For the reasons spelled out in our previous filings, however, we are not confident that Higher Ground can provide the needed level of interference protection.

Higher Ground's July 21 filing says it "provides responses" to the FWCC's concerns.⁴ In fact Higher Ground misconstrues many of the FWCC's points and answers its own misreadings. It ignores other points entirely.

The following lists the issues in contention. We do not burden the record by reproducing the FWCC's full arguments. For those, please see our previous filings.

Waiver vs. rulemaking: Past technical waivers have allowed small departures from the rules for small quantities of devices.⁵ We are not aware of a waiver ever having permitted

² *Ms. Laura Stefani*, 30 FCC Rcd 137 at 5 (Wireless Telecom. Bur. 2015) (applicant failed to meet burden of showing waiver would be consistent with the underlying purpose of rules sought to be waived, namely interference protection to other licensees), *rev'd in part on additional factual showings*, 30 FCC Rcd. 10164 (Wireless Telecom. Bur. 2015).

³ The FWCC raised no objection to the use of industrial wideband radars at 5.925-7.25 GHz, 47 C.F.R. § 15.256 (ET Docket Nos. 10-23 and 10-27), or earlier, to general purpose wideband devices at the same frequencies. 47 C.F.R. § 15.250 (ET Docket No. 98-153).

⁴ Letter from to Adam D. Krinsky, Counsel to Higher Ground LLC to Marlene H. Dortch, Secretary, FCC at 4 (dated July 21, 2016) (Higher Ground July 21 filing).

⁵ Often the Commission puts numerical limits on the distribution of a waived device for the first few years, to better control any interference that occurs. *E.g. ReconRobotics, Inc.*, 25 FCC Rcd. 1782 at ¶ 11 (Wireless Telecom. Bur. & Public Safety and Homeland Sec. Bur. 2010) (limiting units sold to 2,000 during first year and 8,000 during second year); *UltraVision Security Systems, Inc.*, 23 FCC Rcd at ¶ 21(5) 17632 (2008) (limiting systems installed to 100 during first year and 250 during second year); *SafeView, Inc.*, 21 FCC Rcd 8814 at ¶ 29(3) (Office of

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large numbers of consumer devices in a heavily occupied band. That calls for a rulemaking calculated to reach all of the entities who stand to be affected by Higher Ground's operation, not just the few who follow the FCC's technical public notices.⁶ A rulemaking can also include the kind of open testing that typically precedes the roll-out of a widely dispersed, potentially interfering technology.⁷ Higher Ground insists "[t]he record here is complete,"⁸ but the record contains nothing in the way of empirical data showing that the systems actually work as designed in a realistic environment.

Higher Ground finds "irony" in the FWCC's suggestion that a rulemaking would allow other parties to compete with Higher Ground.⁹ Higher Ground mistakes our position. We do not object to mobile satellite service *per se*, only to interference threats. If a rulemaking establishes the feasibility of mobile satellite service in the 6 GHz band, without harmful interference to the fixed service, we will drop our objections to Higher Ground and any competitors.

Bilateral vs. unilateral frequency coordination: The FWCC explained at length why bilateral, notice-and-response frequency coordination is necessary for the degree of interference protection the fixed service requires. Higher Ground's response amounts to: "Just trust us." As examples of the Commission's letting new entrants into occupied bands, Higher Ground cites two with listen-before-talk requirements, leading off with U-NII devices avoiding radar signals.¹⁰ These examples do not help Higher Ground. None of the incumbents in these proceedings use bilateral frequency coordination; and the initial U-NII/radar rules resulted in repeated harmful interference to incumbents.¹¹

Engineering & Technology 2006) (limiting systems installed to 100 during first year and 200 during second year).

⁶ The FWCC has heard from non-members who belatedly learned about Higher Ground's plans and say they would have participated had they known earlier.

⁷ *E.g., Unlicensed Operation in the TV Broadcast Bands*, ET Docket Nos. 04-186, 02-380; *Access Broadband over Power Line Systems*, ET Docket Nos. 04-37, 03-104; *Ultra-Wideband Transmission Systems*, ET Docket Nos. 98-153, 04-352.

⁸ Higher Ground July 21 filing at 3.

⁹ Higher Ground July 21 filing at 3.

¹⁰ Higher Ground July 21 filing at 4 n.20, *citing* 47 C.F.R. § 15.407(h).

¹¹ "[E]quipment that met the FCC's certification standards nonetheless caused interference" *Elimination of interference to Terminal Doppler Weather Radar (TDWR)*, Memorandum from Julius Knapp, Chief, FCC Office of Engineering and Technology and P. Michele Ellison, Chief, FCC Enforcement Bureau to Manufacturers and Operators of Unlicensed 5 GHz Outdoor Network Equipment (no release number) at 1 (released July 27, 2010). The document is available at <https://transition.fcc.gov/eb/uniitdwr.pdf> (checked on 7/24/2016).

Moreover, each of Higher Ground's examples was a rulemaking, not a waiver proceeding.

Consumer equipment subject to abuse and malfunction: Higher Ground made no response.

Unreliability of underlying cell phone directional sensors: Higher Ground made no response.

Conflicting incentives: Higher Ground thinks it "absurd" for the FWCC to fear that it might prioritize its own revenue over protecting point-to-point links.¹² Higher Ground can offer no assurances other than, again, "Just trust us."

Difficulty of detecting interference: Outages are so unusual in the fixed service that the industry has never tried to monitor them. Even if Higher Ground caused severe interference, fixed service operators would have no easy way even of knowing it occurred, much less attributing it to Higher Ground.¹³ Higher Ground's offer to give the FCC logs of its transmissions on request¹⁴ might be helpful if interference could be detected and attributed to Higher Ground, but it does not address the problem we raised. Nor is it practical to retrofit tens of thousands of microwave receivers to log interference caused by Higher Ground. The result: even serious shortcomings in Higher Ground's systems would go unreported.¹⁵

Lack of transparency. The FWCC noted the Higher Ground system comes from behind closed doors, lacking transparency and independent validation.¹⁶ Higher Ground made no response. We expressed concern about Higher Ground's resistance to providing its interference calculation model and algorithm, and giving notice of changes to it.¹⁷ Again, Higher Ground made no response. The fixed service industry should be able to examine the model on which the integrity of its service is to depend.

¹² Higher Ground July 21 filing at 4.

¹³ See Letter from Cheng-yi Liu and Mitchell Lazarus, Counsel to FWCC, to Marlene H. Dortch, Secretary, FCC at 3 (June 8, 2016) (FWCC June 8 filing)

¹⁴ Higher Ground July 21 filing at 4.

¹⁵ Our concerns here rest on experience. An FWCC member had great difficulty in identifying interference caused by supposedly frequency-coordinated Earth Stations on Vessels (ESVs). See FWCC June 8 filing at 5-6 & n.13.

¹⁶ FWCC June 8 filing at 3.

¹⁷ FWCC June 8 filing at 4-5.

Lack of recourse: Ordinarily the Commission corrects unlawful interference by shutting down the offending station. Here, if interference occurs, either some fraction of tens of thousands of mobile devices are defective, or else the system controlling them is not functioning as designed. The only practical remedy in either case is to shut down the system. To a far greater extent than shutting down a single station, this would strand investment and leave large numbers of customers unserved—circumstances that Higher Ground no doubt would attempt to leverage in support of continued operation.

Probability of worst-case interference: Higher Ground claims that even uncontrolled interference would amount to only a few seconds a year.¹⁸ The FWCC showed this calculation depends on highly unrealistic assumptions.¹⁹ Higher Ground made no response.

Adjacent channel interference: The FWCC noted that Higher Ground's system does not detect and avoid fixed service operations in adjacent channels.²⁰ Higher Ground responds that its system will comply with applicable out-of-band emission limits.²¹ This is a completely different issue. Higher Ground made no response to the point we raised.

Differential fading: Fixed links are engineered to withstand high degrees of fading due to atmospheric refraction, multipath, and the like, often by tens of dBs. The same capability would also help to make links resistant to interference from Higher Ground's system. The protection is expensive, however; the last few dB of fade margin can cost many thousands of dollars.²² Microwave operators pay these premiums because they need the protection against fades, not for Higher Ground's benefit. Every dB needed to withstand Higher Ground's signal is a dB less of fade margin. It would be fundamentally unfair for the Commission to coopt this expensive resource for the benefit of another party, by granting Higher Ground's waiver in part on the ground that fixed links can withstand the interference.

¹⁸ Higher Ground Application, Technical Appendix at 22-24.

¹⁹ Letter from Cheng-yi Liu and Mitchell Lazarus, Counsel to FWCC, to Marlene H. Dortch, Secretary, FCC, attachment at 11 (filed July 15, 2016). For example, the calculation assumes that mobile devices will be spread evenly over the country, while in fact they will necessarily concentrate in places that lack wireless broadband service. *See* Higher Ground Application, Narrative Statement at 1.

²⁰ FWCC June 8 filing at 4.

²¹ Higher Ground July 21 filing at 5.

²² Letter from Cheng-yi Liu and Mitchell Lazarus, Counsel to FWCC, to Marlene H. Dortch, Secretary, FCC, attachment at 4 (filed July 15, 2016).

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Higher Ground has not said why it seeks permission to operate in C-band, necessitating a complex avoidance system, rather than use a band allocated to mobile satellite service. We suspect the reasons have to do with lower costs. If so, greater profits for Higher Ground do not justify interference threats to critical fixed service operations.

Nor does the nature of Higher Ground's service warrant the risk. Text messaging, light email, and Internet of Things communications²³ no doubt can be useful to the relatively few people who are outside wireless service areas at any given time,²⁴ but cannot compete for priority with the operation of pipelines, the electric grid, railroad trains, and public safety communications, among many others. The non-zero risks of major disruption to the many who depend on these critical services, even if the risks were low, would not justify the much smaller benefits to the few who might subscribe to Higher Ground's services.

Please contact us with any questions.

Respectfully submitted,



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²³ Higher Ground Application at item 43.

²⁴ The Government reported last year that over 98 percent of Americans have access to wireless broadband. <https://www.whitehouse.gov/blog/2015/03/23/98-americans-are-connected-high-speed-wireless-internet>. Even if some of these people occasionally travel through or vacation in areas without coverage, the numbers lacking service will remain relatively small.