

SUMMARY

After more than a year-and-a-half of careful study, the International Bureau, the Wireless Telecommunications Bureau, and the Office of Engineering and Technology (collectively, the “Bureaus”) granted Higher Ground’s application to operate earth stations (*i.e.*, “SatPaq” user terminals) to communicate with certain U.S.-licensed satellites in the C-band at 5925-6425 MHz. Higher Ground has developed technology to realize more intensive, non-interfering use of those frequencies to provide consumer messaging and Internet of Things services via a satellite transceiver embedded in a protective case attached to a smartphone. The Bureaus based their decision on a thorough and detailed evidentiary record demonstrating that Higher Ground’s proposed system “provides necessary safeguards against harmful interference” to Fixed Service (“FS”) microwave point-to-point operations, as well as to other satellite links.

The C-band frequencies involved here comprise a 500 megahertz swath that includes unoccupied frequencies across virtually the entire country. As the Bureaus noted, Higher Ground will operate at very low power levels in 4- or 8-MHz channels, avoiding interference by accounting for individual ULS-derived data for all C-band point-to-point receivers, as well as the SatPaq terminal’s location and other factors. Further, as the Bureaus found, Higher Ground’s “use of a single database that authorizes and manages the devices within a single network is relatively simple” and “should prevent or minimize the risk of harmful interference to FS operators in the 5925-6425 MHz frequency band.”

APCO, EWA, FWCC, and UTC filed applications for review (the “AFRs”) seeking Commission review of the Bureaus’ order. They fail to make a persuasive showing of any factual or legal error in the Bureaus’ decision. The arguments therein are specious, based solely on “what if” speculation and a wholesale disregard of the record reflected in the *Higher Ground Order*. Petitioners offer few technical-related arguments, and none of them contain any technical analysis or support.

It is well established that the Commission may waive rules when waiver does not undermine the policy objective of the rule and would better serve the public interest than requiring strict rule compliance. The Bureaus rigorously applied these standards, finding that grant of the waiver will not undermine FCC rules “given that it is limited to a specific, unique type of operation and ... is being authorized under a carefully drawn set of conditions designed to minimize any risk of interference due to operations under the waiver.” And as the Bureaus concluded, Higher Ground’s offering will be a clear public interest benefit, especially in areas not served by cellular service.

Further, the Bureaus’ decision to proceed by waiver is well within their discretion and consistent with governing precedent. Agency adjudication procedures are far more appropriate than rulemaking processes in dealing with specific, unique circumstances such as those presented by Higher Ground’s applications.

In sum, the Bureaus’ decision to authorize Higher Ground’s operations with stringent conditions is a reasonable and prudent course of action. The Commission should uphold the *Higher Ground Order*.

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**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Higher Ground LLC)	File No. SES-LIC-20150616-00357
)	
Application for a Blanket License to)	Call Sign E150095
Operate C-band Mobile Earth Terminals)	

CONSOLIDATED OPPOSITION TO APPLICATIONS FOR REVIEW

The Commission should deny the applications for review (“AFRs”) filed by the Association of Public-Safety Communications Officials-International, Inc. (“APCO”), the Enterprise Wireless Alliance (“EWA”), the Fixed Wireless Communications Coalition (“FWCC”), and the Utilities Technology Council (“UTC”) (collectively the “Petitioners”).¹

I. INTRODUCTION.

The AFRs challenge the joint decision of the International Bureau, the Wireless Telecommunications Bureau, and the Office of Engineering and Technology (collectively, the “Bureaus”) to grant Higher Ground LLC (“Higher Ground”) a blanket license to operate a limited number of earth stations (*i.e.*, “SatPaq” user terminals) by communicating with certain U.S.-licensed fixed satellite service (“FSS”) satellites.² The Bureaus took action after more than a year-and-a-half of careful consideration and study that demonstrated that Higher Ground’s

¹ See APCO Application for Review (Feb. 17, 2017); EWA Application for Review (Feb. 17, 2017); FWCC Application for Review (Feb. 10, 2017); UTC Application for Review (Feb. 17, 2017) (collectively the “AFRs”). On February 22, 2017, the International Bureau granted Higher Ground’s motion for a one-week extension of its opposition to FWCC in order to consolidate its opposition to all of the AFRs. FWCC had filed one week in advance of the 30-day deadline for AFRs. See Public Notice, Satellite Communications Services Information re: Actions Taken, Report No. SES-01934, at 22 (Mar. 1, 2017).

² *Higher Ground LLC*, Order and Authorization, DA 17-80 (IB, WTB & OET, rel. Jan. 18, 2017) (“*Higher Ground Order*”).

proposed system “provides necessary safeguards against harmful interference” to Fixed Service (“FS”) microwave point-to-point operations, as well as to other satellite links, in the C-band frequencies at 5925-6425 MHz.³

The C-band frequencies involved here comprise a 500 megahertz swath that includes unoccupied frequencies across virtually the entire country. Higher Ground has developed technology to realize more intensive, non-interfering use of those frequencies to provide consumer messaging and Internet of Things (“IoT”) services via a satellite transceiver embedded in a protective case attached to a smartphone. Higher Ground will operate at very low power levels in 4- or 8-MHz channels, “us[ing] its Channel Master software to identify non-interfering frequencies for SatPaq terminal operation, taking into account all relevant [Universal Licensing System]-derived data for individual C-band point-to-point receivers as well as the SatPaq terminal’s location and orientation, and the use of frequency diversity and satellite choice.”⁴ Further, as the Bureaus found, Higher Ground’s “use of a single database that authorizes and manages the devices within a single network is relatively simple” and “should prevent or minimize the risk of harmful interference to FS operators in the 5925-6425 MHz frequency band.”⁵ The Bureaus therefore granted a waiver of the U.S. Table of Allocations and coordination rules to authorize SatPaq operations subject to a rigorous set of conditions and limits.

The Petitioners’ efforts to stop Higher Ground’s service – an offering that will facilitate more intensive use of spectrum and sharing between satellite and terrestrial operations under a

³ *Id.* ¶¶ 25, 37.

⁴ *Id.* ¶ 15.

⁵ *Id.* ¶¶ 29, 19.

rigorous interference protection regime – are unpersuasive. Some go so far as to argue that harmful interference to FS operations is certain to occur.⁶ Their arguments, taken together, are specious, based solely on “what if” speculation and a wholesale disregard of the record reflected in the *Higher Ground Order*.

As discussed below, the opposite is true – Higher Ground has developed a detailed interference protection regime that will avoid transmitting on an interfering signal, thereby preventing harmful interference to FS operations. The Bureaus imposed a series of license conditions to further minimize the risk of harmful to FS operations. Under these circumstances, the Bureaus’ decision to authorize Higher Ground’s operations with stringent conditions is a reasonable and prudent course of action. The AFRs fail to identify any errors of fact or procedure, and the Commission should act swiftly to deny them.

II. THE BUREAUS’ GRANT OF THE WAIVER IS SUPPORTED BY SUBSTANTIAL EVIDENCE AND THE LAW.

It is well established that the Commission may waive rules when waiver does not undermine the policy objective of the rule and would better serve the public interest than requiring strict rule compliance.⁷ The Bureaus rigorously applied these standards, finding that grant of the waiver will not undermine the U.S. Table of Allocations and applicable coordination rules “given that it is limited to a specific, unique type of operation and ... is being authorized under a carefully drawn set of conditions designed to minimize any risk of interference due to operations under the waiver.”⁸

⁶ See UTC Application for Review at 6 (claiming the Bureaus’ action “will result in widespread interference to utility microwave systems in the 6 GHz band).

⁷ See 47 C.F.R. §§ 1.3, 1.925(b)(3); *Northeast Cellular Tel. Co., L.P. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990); *WAIT Radio v. FCC*, 418 F.2d 1153, 1157 (D.C. Cir. 1969).

⁸ See *Higher Ground Order* ¶ 35.

A. Grant of the Waiver Does Not Undermine the Rules to Protect Point-to-Point Microwave Operations from Harmful Interference.

The Petitioners offer up little in support of their claims that Higher Ground will interfere with C-band FS stations. To the contrary, they overlook the record, ignore the conditions imposed on Higher Ground operations, and disregard the Bureaus' findings, as demonstrated below.

1. Higher Ground's Interference Protection Regime Will Safeguard Point-to-Point Microwave Operations.

Petitioners ignore the record evidence demonstrating that Higher Ground has developed a rigorous interference protection regime to prevent causing harmful interference to FS operations. In support of its application, Higher Ground submitted a detailed and extensive technical appendix and a declaration from Virginia Tech Professor Jeffrey H. Reed concluding that Higher Ground operations are highly unlikely to cause harmful interference to FS stations.⁹ Higher Ground submitted further technical filings in the record and engaged in multiple demonstrations of its Channel Master software to FCC staff and third parties, showing how it identifies available, non-interfering C-band frequencies in virtually all locations across the United States.¹⁰ All of this provides compelling evidence demonstrating that the Higher Ground interference protection regime will protect C-band FS stations from harmful interference.

The Higher Ground protection regime incorporates numerous interference avoidance techniques, "including a detailed analysis of potential interference to FS stations, taking into

⁹ See Higher Ground, Application, Technical Appendix & Declaration at 3 (June 16, 2015).

¹⁰ See Higher Ground, Consolidated Opposition, at 6-14 (Sept. 23, 2015); Letter from Adam D. Krinsky, Counsel to Higher Ground, to Marlene H. Dortch, FCC, at 4-5 (Apr. 20, 2016); Letter from Adam D. Krinsky, Counsel to Higher Ground, to Marlene H. Dortch, FCC, at 1-4 (Apr. 25, 2016); Letter from Adam D. Krinsky, Counsel to Higher Ground, to Marlene H. Dortch, FCC, at 1-3 (May 23, 2016); Letter from Adam D. Krinsky, Counsel to Higher Ground, to Marlene H. Dortch, FCC, at 1 (Dec. 19, 2016).

account the characteristics of the SatPaq transmitting station, the FS receiving stations, and the propagation environment between the stations, frequency agility, and satellite diversity.”¹¹

Higher Ground will maintain an updated database of point-to-point microwave receivers in the C-band, derived from the FCC’s Universal Licensing System (“ULS”) data of all C-band FS authorizations (including conditional authorizations). The database will include FS operations’ coordinate locations, orientations of the FS receiving antennas, the frequencies of the FS stations, and their antenna heights, heights above mean sea level, and receiving antenna polarizations. Higher Ground’s Channel Master software will incorporate this data into a look up table and, coupled with a SatPaq terminal’s geo-coordinates, will perform analysis of whether a SatPaq transmission from that specific location on a given frequency and to a given satellite could cause harmful interference to an FS receiver. It will incorporate daily ULS updates for “new” C-band point-to-point receiver information, and a SatPaq will not transmit unless either it is assigned a non-interfering frequency from the SatPaq Network Controller or it has the updated C-band information, or it is operating on a non-interfering “hailing frequency.”¹²

The Channel Master software will only authorize a SatPaq terminal to transmit on a certain frequency if the interference level at all FS receiver inputs is 6 dB (or more) below receiver thermal noise (*i.e.*, $I/N \leq -6$ dB).¹³ In other words, Higher Ground *must* keep SatPaq emissions 6 dB below the noise level of individual FS receivers. This fact alone will render any

¹¹ *Higher Ground Order* ¶ 19.

¹² *Id.* ¶ 15.

¹³ *Id.* ¶ 16.

potential interference effects of Higher Ground operations on FS stations “negligible,” as FWCC has previously acknowledged.¹⁴

Based on this evidence, which Petitioners do not refute in any tangible way, the Bureaus found:

Higher Ground’s automated coordination process, while unconventional and proprietary, provides necessary safeguards against harmful interference to users in the band. . . . Higher Ground has provided sufficient technical and operational parameters for its automated coordination system to support its application.¹⁵

But, the Bureaus did not end their analysis with requirements that Higher Ground *prevent* harmful interference to point-to-point microwave receivers; they also adopted a “cautious approach” to safeguard against unintended consequences if Higher Ground’s system, for any reason, does not perform as designed.¹⁶ Among these “accountability” conditions the Bureaus imposed are the following:

- Higher Ground must limit roll out of SatPaq terminals on a phased basis, up to 5,000 new terminals each quarter in the first year, and up to a maximum total of 50,000 terminals thereafter.¹⁷
- Higher Ground must maintain a 24/7 point-of-contact with capability to remotely control and shut down SatPaq terminal operations, and remedy any interference problems or terminate operations.¹⁸
- Higher Ground must cease activity in the event of a database outage.¹⁹

¹⁴ Letter from Cheng-yi Liu and Mitchell Lazarus, Counsel to FWCC, to Marlene H. Dortch, FCC, at 6 (June 8, 2016) (“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. If Higher Ground’s coordination methods are successful in achieving this goal, we agree the interference effects should be negligible.”).

¹⁵ *Higher Ground Order* ¶ 25.

¹⁶ *Id.* ¶ 36.

¹⁷ *Id.* ¶¶ 36, 40.

¹⁸ *Id.*

- Higher Ground must log the date, time, location, frequency, and satellite point of communication of each SatPaq terminal transmission, and this coordination data must be made available to an FS operator, FSS operator, or the Commission, upon request.²⁰
- The SatPaq Network Controller is required to maintain supervisory control at all times, with the ability to override a frequency selection or shut off SatPaq terminal operation.²¹
- The Commission may suspend or terminate deployment and operational authority at any time if it finds that the Higher Ground system causes unresolved harmful interference to protected users of the band.²²

And ultimately, Higher Ground is subject to the condition that it may not cause harmful interference to any current or future authorized station operating under an existing allocation and must immediately cease operations upon notification of harmful interference.²³ All of this shows conclusively that the Bureaus' grant of the Higher Ground waiver will not undermine existing Commission rules designed to protect FS operations from interference.

Petitioners fail to demonstrate any material error in the Bureaus' analysis or conclusions. FWCC's claim that these *post hoc* conditions are "[u]seless," for instance, is merely a reflection of the Petitioners overall "no way, now how" view regarding Higher Ground. FWCC explains that FS operations are extremely reliable and that, "[i]f an interruption occurs, the operator cannot tell what caused it, cannot tie the interruption to interference, and could never associate it

¹⁹ *Id.* ¶ 36.

²⁰ *Id.* ¶¶ 36, 40.

²¹ *Id.* ¶ 20.

²² *Id.* ¶ 36, 40.

²³ *Id.* ¶¶ 20, 40.

with Higher Ground's operations."²⁴ But this is precisely what the Bureaus' accountability provisions address. With few instances of interruptions, an FS operator that experiences an interruption can approach Higher Ground and seek information from its log as to whether there was a SatPaq transmission in the vicinity of the interruption at the time it occurred.

Other Petitioners suggest that the mere fact that the Bureaus' imposed these accountability conditions demonstrates that the Bureaus failed to protect FS operations. UTC asserts, for example, that "Higher Ground is only required to correct the interference that it causes after the fact."²⁵ That is not so. The Bureau's thorough and detailed analysis shows that Higher Ground's system employs a robust interference protection regime (discussed above) that will prevent SatPaq operations from transmitting on an interfering signal and avoids harmful interference in to FS operations. As the *Higher Ground Order* concludes, "there is little risk of harmful interference given the low power transmissions proposed and the comprehensive self-coordination safeguards developed by Higher Ground."²⁶

2. Petitioners' Few Technical Arguments Are Unavailing.

Only FWCC and UTC offer up any technical-related claims, and none of these contain any technical analysis or support. The Bureaus engaged in a robust analysis of the technical issues involved in the application, and nothing in the AFRs raises any questions about their findings.

²⁴ FWCC Application for Review at 10-11.

²⁵ UTC Application for Review at 20. *See also* EWA Application for Review at 3 ("... after-the-fact remediation will not be adequate should interference occur, even if that interference were traceable to Higher Ground's operations, which it may not be."); FWCC Application for Review at 10 ("The *Order* relies in large part on Higher Ground's addressing interference *after* it occurs, including operation logs and a point of contact for the resolution of any harmful interference.").

²⁶ *Higher Ground Order* ¶ 35.

FWCC repeats its adjacent channel interference argument about nearby SatPaq transmissions that could impact FS receiver operations on frequencies beyond the licensed signal, but it does not account for the Bureaus' findings on this issue. The Bureaus addressed FWCC's concerns and concluded that risk of interference is minimal "given the low signal strength at which the SatPaq terminals transmit and the small likelihood of having a SatPaq close to an FS station operating in the adjacent channel."²⁷ UTC appears to make a similarly unavailing claim in arguing that Higher Ground should search for FS stations within 8 or even 10 MHz of the hailing frequency, where Higher Ground will operate using 4 MHz emissions of the hailing channel.²⁸ FWCC and UTC offer no new evidence or technical support to alter the Bureaus' findings.

FWCC's argument is devoid of any technical support or analysis. Instead, it offers up a misleading graphic in which SatPaqs transmissions are portrayed at power levels that are *higher* than microwave point-to-point signals within the passband of the receiver, suggesting that SatPaqs will overpower point-to-point receivers.²⁹ In fact, the SatPaq transmit power levels are generally *100 times lower* than FS stations.³⁰ FWCC does not even mention Higher Ground transmit power levels in its argument, and it is not responsive to the Bureaus' finding that the risk of interference is "minimal" due in part to "the low signal strength at which the SatPaq

²⁷ *Id.* ¶ 22.

²⁸ UTC Application for Review at 12 n.27.

²⁹ Although the graphic notes it is "not to scale," FWCC Application for Review at 9, the facts here do not support a case in which Higher Ground transmit power levels are higher. The SatPaq is limited to a maximum EIRP of 39 dBm. A review of ULS data indicates that typical FS transmitters have EIRP of 60 dBm or better, which is two orders of magnitude higher.

³⁰ UTC Application for Review at 12-13.

terminals transmit.”³¹ It appears that UTC makes a similar argument with respect to Higher Ground’s “hailing frequency” operations. The *Higher Ground Order* also referenced the “small likelihood” that a SatPaq would operate nearby an FS receiver *and* in the adjacent channel.³² The Petitioners do not take on the Bureaus’ findings and the adjacent channel interference claims should be rejected.

In a series of footnotes, UTC makes a handful of other “technical” arguments that are either factually wrong or premised on faulty assumptions. First, UTC asserts there is a discrepancy in emission bandwidths where none exists. It points out that emission bandwidths for data channels and the hailing frequency differed in the application and were different than the emission bandwidth authorized in Higher Ground’s experimental license.³³ But this is of no significance. The *Higher Ground Order* permits SatPaq emissions using 8 MHz or 4 MHz bandwidths, and that is precisely how SatPaqs will operate.³⁴

Further, UTC’s claims about power density measurements are wrong. UTC asserts that Higher Ground’s effective power level calculations are based on power density levels used in the satellite industry, “which may not be correct for the digital microwave receivers used today in most terrestrial point-to-point systems.”³⁵ However, power density is calculated in units of Watts per square meter, and the measure of power density does not change based on the radiocommunications service in which the transmitter is operating, e.g. satellite or terrestrial.

³¹ *Higher Ground Order* ¶ 22.

³² *Id.* Higher Ground’s application provided a statistical analysis showing the minimal likelihood of any harmful interference even in an “uncoordinated” environment (which will not happen) and that analysis is instructive here as well in considering nearby operations in an adjacent channel. *See* Higher Ground Application, Technical Appendix § A.8.1.8.

³³ UTC Application for Review at 12 n.27.

³⁴ *Higher Ground Order* ¶ 39.

³⁵ UTC Application for Review at 12 n.27.

Power density is calculated for satellite services in the same manner as it is for terrestrial uses. UTC does not cite to any source of support for its concern, and the claim does not make sense.

Next UTC identifies two moot issues initially raised in September 2015 that Higher Ground subsequently addressed by adopting a more comprehensive interference protection solution which the Bureau incorporated in the *Higher Ground Order*. Specifically, UTC cited the application's dual "Receiver Acceptance Cone" ("RAC")/"Close Proximity Circle" ("CPC") protection method,³⁶ but Higher Ground modified that approach to provide an even more rigorous interference protection solution: the Channel Master, which provides a 360-degree assessment of all point-to-point FS receivers surrounding the SatPaq terminal and not limited by signal blockage of the earth (*i.e.* within line-of-sight).³⁷ The Channel Master analysis takes into account all relevant ULS data for each specific point-to-point receiver within line-of-site, including antenna patterns, antenna height, diffraction, and then considers SatPaq transmit power, polarization, diversity, orientation and satellite choice.³⁸ As noted above, the Channel Master will only permit a SatPaq to transmit if it operates at least 6 dB below thermal noise at any FS receiver within line-of-sight. UTC's argument has been superseded by events and is thus moot.

UTC also claims that objects in the environment may reflect microwave signals and that Higher Ground must account for all potential reflecting objects "whether or not the reflecting objects appear on any FCC license."³⁹ For man-made (intentional) reflection, these reflection

³⁶ *Id.* at 13 n.28.

³⁷ Letter from Adam D. Krinsky, Counsel to Higher Ground, to Marlene H. Dortch, FCC, at 1 (Dec. 17, 2016).

³⁸ *Id.*

³⁹ UTC Application for Review at 13 n.29.

panels are stipulated in ULS and are already incorporated into the Channel Master protection scheme. For non-intentional reflections, the geometry of the FS and satellite links are unlikely to result in any interference. Both the FS link and the satellite link use directional antennas and therefore must be pointed correctly in order to successfully close the link. In other words, the FS antenna must be pointed toward the FS receiver, and the SatPaq transmitter must be pointed toward the satellite in order to transmit. FS links are designed to use locations with direct views between the transmit and receive sites, and are not likely to be installed in a way that is vulnerable to non-intentional reflections. The SatPaq antenna, moreover, must be pointed toward the satellite overhead to transmit, and thus is not pointed toward the ground where objects can cause reflections. UTC's reflection scenario is not realistic, is raised without any evidentiary basis, and is not likely to cause interference.

UTC also asserts that “[o]ne of the biggest issues that could make microwave systems vulnerable to interference is differential fading, when the FS receive signal is weakened by certain atmospheric conditions, such as atmospheric ducting.”⁴⁰ UTC never addresses the Bureaus' finding that “the likelihood of interference from SatPaqs during differential fading is very small,” especially given the safeguards in the *Higher Ground Order*.⁴¹ This includes the limits the Bureaus impose on the number of SatPaq terminals entering the marketplace. In addition, the Channel Master software will only allow a SatPaq transmission if it operates 6 dB below receiver thermal noise for any FS receiver. Anomalous propagation characteristics such as ducting and fading impact the received desired signal level, but do not affect the thermal noise

⁴⁰ *Id.* at 13.

⁴¹ *Higher Ground Order* ¶ 31.

level of a receiver, thus fading would not change the protection levels afforded to the FS stations and the likelihood of interference is not changed during fading events.

UTC makes one further technical argument, citing an earlier claim in the record and alleging that Higher Ground's assumptions are flawed with regard to microwave systems.⁴² These assumptions, however, are unrelated to microwave systems, as the claim alleges. Rather, they formed part of a statistical analysis Higher Ground provided to show the minimal likelihood of interference even in a completely un-coordinated process (of course that will not occur).⁴³

Finally, Petitioners assert that Higher Ground operations have not been demonstrated "in a live setting" and there has been no testing to support the non-harmful interference evidence in the record.⁴⁴ But since 2014, Higher Ground has conducted experimental test operations of the SatPaq technology throughout various areas of the United States, providing notification of operations and 24/7 emergency contact information to potentially affected FS operations, and it has not received a single interference complaint to date.⁴⁵ And contrary to FWCC's comparison to testing in the TV white regime, Higher Ground is a far simpler, single database that authorizes and manages a limited number of devices operated within the same network, as the Bureaus

⁴² UTC Application for Review at 8 & n.17 (citing a filing by the American Association for American Railroads at 2 (Dec. 22, 2016)).

⁴³ Higher Ground Application, Technical Appendix § A.8.1.8.

⁴⁴ APCO Application for Review at 3; *see also* FWCC Application for Review at 3; UTC Application for Review at 8.

⁴⁵ *See* Higher Ground, Call Sign WH2XHP, ELS File Nos. 0443-EX-PL-2014 (granted June 20, 2014), 0124-EX-ML-2015 (granted Aug. 17, 2015), 0036-EX-ML-2016 (granted Mar. 18, 2016), 0233-EX-RR-2016 (granted May 10, 2016), 0093-EX-ML-2016 (granted June 3, 2016) & 0104-EX-CM-2016 (granted Feb. 3, 2017).

found.⁴⁶ As the Bureaus concluded, “Higher Ground has provided sufficient technical and operational parameters for its automated coordination system to support its application.”⁴⁷

B. The Public Interest Balance Favors Grant of the Waiver.

The Petitioners do not dispute the Bureaus’ finding that “Higher Ground’s ... system and operations ... would further the interest in ensuring the highest public benefit is derived from this finite spectrum resource.”⁴⁸ The Petitioners nonetheless argue that the Bureaus erred by failing to find that Higher Ground’s demonstrated public interest benefits are outweighed by FS interests.⁴⁹ Higher Ground recognizes the public interest benefits afforded by FS operations, but the concerns cited by Petitioners are nothing more than generalized and unsupported claims that Higher Ground’s operations will cause interference into microwave operations.

Higher Ground will fill a market void for affordable, truly ubiquitous consumer messaging service and data communications for IoT applications, particularly in areas that are outside cellular service coverage.⁵⁰ As Intelsat observed, Higher Ground’s proposed service

⁴⁶ *Higher Ground Order* ¶¶ 28-29. See also Letter from Adam D. Krinsky, Counsel to Higher Ground, to Marlene H. Dortch, FCC (July 21, 2016) (“Higher Ground July 21 Ex Parte”); Higher Ground, Consolidated Opposition, at 8-9.

⁴⁷ *Higher Ground Order* ¶ 25.

⁴⁸ *Id.* ¶ 11.

⁴⁹ See e.g., FWCC Application for Review at 14 (“Nothing in Higher Ground’s application suggests the public benefits from its proposed operations justify threatening the critical services carried on the FS.”); EWA Application for Review at 3-4; UTC Application for Review at 16 (“the public interest in reliable microwave systems in the 6 GHz band outweighs the more limited public interest in Higher Ground’s proposed operations.”).

⁵⁰ Higher Ground is also developing SatPaq solutions for use in IoT applications, allowing applications to communicate information from farmland that is not served by cellular networks, for example. Applications may include crop management (e.g., detecting prevalence of pests and monitoring temperature and soil moisture to optimize crop yields) and climate control in greenhouses (e.g., monitoring and controlling temperature, humidity, light intensity, and soil moisture), to name a few. Similarly, SatPaqs may be used to provide the connectivity required by new smart grid architectures designed to increase the efficiency of high-voltage power transmission lines. Such use would be well-suited particularly for many power transmission towers that are beyond cellular network coverage.

“will help satisfy consumer demand for affordable, ubiquitous messaging services offering universal connectivity across the United States.”⁵¹ The Bureaus concurred, finding that Higher Ground’s operations “would provide public interest benefits by making available to consumers a unique service in areas that may lack coverage.”⁵² FWCC and UTC themselves acknowledge there are public interest benefits associated with Higher Ground’s services.⁵³

Furthermore, as the Bureaus noted, “the Commission supports new, innovative and increasingly efficient ways of achieving spectrum sharing without harmful interference to others.”⁵⁴ Higher Ground’s system and operations will maximize the public benefits derived from this finite spectrum resource.

Petitioners’ unsubstantiated assertions are directly refuted by the evidence in the record and by the Bureaus’ own expert analysis. As such, Petitioners’ speculations are not adequate to overcome the certainty of the significant public interest benefits that will accrue from Higher Ground’s services. These substantial public interest benefits clearly support the Bureaus’ waiver decision.

III. PETITIONERS’ REMAINING ARGUMENTS ARE WITHOUT MERIT.

Petitioners’ other challenges to the *Higher Ground Order* are likewise unpersuasive and the Commission may quickly dispose of them.

⁵¹ Intelsat Comments, File No. SES-LIC-20150616-00357, at 1-2 (Aug. 27, 2015).

⁵² *Higher Ground Order* ¶ 11.

⁵³ See FWCC Application for Review at 14 (FWCC does “not question the value, in principle of a message service for areas that lack coverage, or the Commission’s interest in trying out new technologies that might increase the use of spectrum”); UTC Application for Review at 16 (“there are public interest benefits associated with Higher Ground’s proposed operations”).

⁵⁴ *Higher Ground Order* ¶ 25.

A. The Bureaus Acted Well Within Their Discretion in Proceeding by Waiver.

An agency has broad discretion to choose whether to proceed by adjudication (e.g., by waiver) or by rulemaking,⁵⁵ and here the Bureaus reasonably concluded that a waiver was warranted and a rulemaking was unnecessary.⁵⁶ As the Bureaus observed:

The rulemaking process is particularly appropriate for establishing a new category of spectrum use that is not tailored for one individual's operations, while the adjudicative process, like a waiver proceeding, generally functions as a more effective vehicle for addressing more individualized circumstances. In this case, Higher Ground proposes a specific, unique application of the C-band that does not warrant a rulemaking proceeding of general applicability.⁵⁷

Petitioners offer no basis to compel a rulemaking.⁵⁸ The Bureaus' decision to proceed by waiver is consistent with precedent, despite claims otherwise.⁵⁹ The International Bureau ("IB") and the Office of Engineering and Technology ("OET"), for example, have granted waivers to allow mobile earth terminals operating in the C- and Ku-bands aboard ships, subject to an

⁵⁵ *SEC v. Chenery Corp.*, 332 U.S. 194, 203 (1947) ("the choice made between proceeding by general rule or by individual, ad hoc litigation is one that lies primarily in the informed discretion of the administrative agency."); *FCC v. Schreiber*, 381 U.S. 279, 289 (1965) (Congress "has left largely to [the FCC's] judgment the determination of the manner of conducting its business which would most fairly and reasonably accommodate the proper dispatch of its business and the ends of justice") (internal quotation marks omitted)).

⁵⁶ *See Pfaff v. United States HUD*, 88 F.3d 739, 748 n.4 (9th Cir. 1996).

⁵⁷ *Higher Ground Order* ¶ 34.

⁵⁸ *See* APCO Application for Review at 3; EWA Application for Review at 2; FWCC Application for Review at 11-13; UTC Application for Review at 17-18. UTC's argument that Higher Ground's waiver request was controversial and thus should not have been acted on in the lead up to the new Administration is also without merit. UTC Application for Review at 20-21. There is no basis to suggest policymakers had the Higher Ground application in mind.

⁵⁹ *See* UTC Application for Review at 18 (asserting there is no precedent supporting spectrum reallocation or spectrum sharing absent a rulemaking is incorrect).

interference protection condition to protect point-to-point microwave operations.⁶⁰ IB and OET also have authorized mobile earth terminals operations on a secondary basis on Ku-band frequencies, subject to interference protection conditions to ensure no harmful interference to existing terrestrial systems and the Space Research Service.⁶¹

The reality is that a waiver granted solely to Higher Ground based on the Bureaus' review of its technology solution, rigorous conditions, and a regimented deployment schedule is a far more controlled outcome than industry-wide rules that would allow a multitude of providers offering mobile service to enter the C-band. By acting on a waiver, the Bureau was able to carefully limit the number of transmitters and the conditions under which service would be allowed in the band. Contrary to UTC's claim, the waiver does not establish a new licensing framework or open the floodgates to other parties that wish to offer mobile in the band.⁶²

Throughout the application process, Higher Ground has sought input and engaged with FWCC and other members of the point-to-point microwave community, and there is little reason to believe that a rulemaking would have promoted additional negotiation and collaboration between Higher Ground and FS interests, as FWCC and EWA suggest.⁶³ Higher Ground contacted FWCC prior to release of the Public Notice setting a pleading schedule, and on July 16, 2015 Higher Ground held a lengthy conference call with FWCC counsel and members to discuss the Application. After the pleading cycle closed, Higher Ground contacted FWCC

⁶⁰ See *Mobile Satellite-Based Communications Services by Crescomm Transmission Services, Inc., and Qualcomm Inc.*, 11 FCC Rcd 10944, ¶ 9 (IB & OET 1996) (granting allocations waiver for non-conforming ship-based MET use of FSS spectrum in C- and Ku-bands).

⁶¹ See *L-3 Communications Titan Corp.*, 24 FCC Rcd 3047, ¶¶ 11-12 & 30 (IB & OET 2009) (authorizing MET use of Ku-band FSS spectrum with interference protection conditions for fixed stations).

⁶² See UTC Application for Review at 9, 18.

⁶³ See FWCC Application for Review at 12; EWA Application for Review at 3.

counsel in an attempt to schedule a second conference call in January 2016, but FWCC counsel responded that its members were not interested in another meeting.⁶⁴ Higher Ground did have a meeting with petitioner CenturyLink in January 2016. Higher Ground visited CenturyLink in Denver, Colorado to explain SatPaq operations and provide a demonstration of the Channel Master software. CenturyLink characterized the meeting as “productive,”⁶⁵ and modified its request to condition the Higher Ground authorization (many of its modified conditions were adopted in the *Higher Ground Order*). And on May 18, 2016, Higher Ground was a featured presenter at the National Spectrum Management Association annual conference, demonstrating the Channel Master software and participating in a lengthy question-and-answer session with attendees, including FWCC counsel and members.

Petitioners have been afforded a full and fair opportunity to comment and have the agency evaluate their concerns.⁶⁶ Higher Ground’s application was placed on public notice in August 2015, and stakeholders thus had ample opportunity to file comments, reply comments,

⁶⁴ Higher Ground July 21 Ex Parte at 3.

⁶⁵ See Letter from Tiffany West Smink, CenturyLink, to Marlene H. Dortch, FCC, at 1 (Mar. 4, 2016).

⁶⁶ APCO asserts that it lacked notice of Higher Ground’s application because the application was not processed through the Public Safety and Homeland Security Bureau, APCO Application for Review at 2, but that is no basis to find any procedural error. In any event, any perceived error resulting from the Bureaus’ decision to proceed through waiver rather than rulemaking would be harmless error because there was no prejudice to FS stakeholders’ ability to advocate their positions before the Commission. The Bureaus began their processes by publishing a notice in the Federal Register and that notice “made the issue under consideration crystal clear.” *United States Telecom Ass’n v. FCC*, 400 F.3d 29, 41 (D.C. Cir. 2005); see also *City of Arlington v. FCC*, 668 F.3d 229, 243-44 (5th Cir. 2012) (“An agency’s failure to comply with the APA is harmless when the agency’s mistake ‘clearly had no bearing on the procedure used or the substance of decision reached.’” (quoting *U.S. Steel Corp. v. EPA*, 595 F.2d 207, 215 (5th Cir. 1979), *aff’d*, 133 S.Ct. 1863 (2013))); *Jicarilla Apache Nation v. United States DOI*, 613 F.3d 1112, 1121 (D.C. Cir. 2010) (“The harmless error rule applies to agency action because ‘[i]f the agency’s mistake did not affect the outcome, if it did not prejudice the petitioner, it would be senseless to vacate and remand for reconsideration.’” (quoting *PDK Labs., Inc. v. DEA*, 362 F.3d 786, 799 (D.C. Cir. 2004))).

and informal objections in response to that notice.⁶⁷ Ultimately, pursuit of a rulemaking, as Petitioners advocate, would serve no purpose other than to cause unnecessary delay and is not in the public interest.

B. Petitioners' Liability Arguments are Unsupportable.

Finally, UTC's claim that the Bureaus erred by not requiring Higher Ground to accept liability for interference is without merit.⁶⁸ Such action would be "unprecedented," as the Bureaus noted.⁶⁹ While the Commission has acknowledged that indemnification agreements between private parties may be reasonable, it has never sought to impose indemnification obligations in the absence of such an agreement.⁷⁰ Moreover, as the Bureaus acknowledge, such action is wholly "unnecessary given the conditions placed on Higher Ground's operations and the Commission's other enforcement tools."⁷¹

⁶⁷ See *Satellite Communications Services re: Satellite Radio Applications Accepted for Filing*, Public Notice, Rep. No. SES-01771, at 1-2 (Aug. 5, 2015).

⁶⁸ UTC Application for Review at 8-9.

⁶⁹ *Higher Ground Order* ¶ 30.

⁷⁰ See *XM Satellite Radio Holdings Inc. and Sirius Satellite Radio Inc.*, 25 FCC Rcd 14779, ¶ 41 (2010) ("AIR, Entravision, and Radio One assert that Sirius XM should be indemnified for its implementation of the Leasing Condition. We agree and conclude that Sirius XM should be permitted to require lessees to indemnify Sirius XM against liability arising from their conduct as lessees. We believe that private negotiation is the best means to implement the indemnification requirement in this context and therefore decline to adopt specific conditions or limits regarding the type of contractual indemnification agreement or the amount of coverage or the type of insurance policy that Sirius XM may require. Consistent with our approach in cable leased access, however, we will require that insurance and indemnification requirements be reasonable in relation to the equitable objective of limiting the liability of Sirius XM for conduct of lessees over which it will have little or no control."); *Comcast Corp., General Electric Co., and NBC Universal, Inc.*, 26 FCC Rcd 4238, ¶ 5 (2011) ("For claims to programming made under Section IV, if a reasonable dispute exists or arises regarding whether a C-NBCU Programmer has the right to grant an OVD the right to the Video Programming at issue, the C-NBCU Programmer may require the Qualified OVD to indemnify it and hold it harmless against any breach of contract, tort, copyright violation or other claim arising out of any lack of right of the C-NBCU Programmer to grant the OVD the right to Video Programming.").

⁷¹ *Higher Ground Order* ¶ 30.

IV. CONCLUSION.

In sum, the Bureaus' decision to authorize Higher Ground's operations with stringent conditions is a reasonable and prudent course of action. For these reasons, the Commission should uphold the *Higher Ground Order*.

Respectfully submitted,

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March 6, 2017

CERTIFICATE OF SERVICE

I, Marc D. Knox, an employee at Wilkinson Barker Knauer, LLP, hereby certify that on March 6, 2017, a copy of the foregoing CONSOLIDATED OPPOSITION TO APPLICATIONS FOR REVIEW was served by first-class mail, postage prepaid, on the following:

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