

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

|   |   |                      |
|---|---|----------------------|
| In the Matter of                            | ) |                      |
|   | ) |                      |
| Unlicensed Use of the 6 GHz Band            | ) | ET Docket No. 18-295 |
|   | ) |                      |
| Expanding Flexible Use in Mid-Band Spectrum | ) | GN Docket No. 17-183 |
| Between 3.7 and 24 GHz                      | ) |                      |

**REPLY COMMENTS OF THE UTILITIES TECHNOLOGY COUNCIL, THE AMERICAN  
PUBLIC POWER ASSOCIATION, THE NATIONAL RURAL ELECTRIC COOPERATIVE  
ASSOCIATION, THE AMERICAN GAS ASSOCIATION, AND THE AMERICAN WATER  
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## SUMMARY

The Commission should refrain from authorizing any further unlicensed operations in the 6 GHz band at this time. There is still insufficient empirical data and real-world experience to support allowing very low power (VLP), increasing the power limit for low power indoor (LPI) to 8 dBm/MHz EIRP PSD, permitting mobile standard power access devices to operate, and authorizing higher power standard power access systems that are configured for fixed point-to-point operations using directional antennas. If anything, the Commission should reduce the power of these unlicensed operations and/or require them to be controlled using automated frequency coordination (AFC). The comments on the record overwhelmingly oppose the proposals in the Further Notice of Proposed Rulemaking (FNPRM), and proponents have utterly failed to prove that further unlicensed use of the band will not cause interference to licensed microwave systems. Accordingly, the Commission should decline to authorize any further unlicensed operations or at least defer from doing so at this time.

The FNPRM runs counter to overarching policy initiatives by the President, numerous federal agencies (including this Commission), and industry organizations to secure the nation's critical infrastructure. It threatens to exacerbate the interference to mission critical communications systems essential to the safety, reliability and security of utility and public safety operations that is certain to occur from unlicensed operations. Real-world testing has been conducted that confirms that unlicensed operations will cause harmful interference to microwave systems. To authorize additional unlicensed operations would fly in the face of these tests and the data that suggest the Commission should refrain from authorizing any further unlicensed operations, or at least reduce the power limits and/or require AFC for all licensed operations. Accordingly, the Commission should not authorize any further unlicensed operations until additional testing of LPI, VLP and AFC has been completed and shown to prevent interference to licensed microwave systems. This testing can and should be carried out by independent laboratories under the direction of the multi-stakeholder group, which should, in turn, be overseen by the Commission and its Office of Engineering and Technology and representatives of all licensed incumbents in the band.

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The Utilities Technology Council (UTC), American Public Power Association (APPA), National Rural Electric Cooperative Association (NRECA), America Gas Association (AGA), and American Water Works Association (AWWA) hereby file the following reply comments in response to the Commission’s Further Notice of Proposed Rulemaking (FNPRM) in the above-referenced proceeding.<sup>1</sup> The comments on the record overwhelmingly oppose any further expansion of unlicensed operations in the 6 GHz band until real-world testing has been conducted and has proven that low power indoor (LPI) devices will not cause harmful interference and that AFC will effectively prevent standard-power access systems from causing interference to licensed microwave systems in the band. Conversely, proponents for expanding unlicensed use of the band have utterly failed to provide any empirical data to prove that VLP, higher power LPI or mobile/higher power fixed standard power access operations will not cause harmful interference to licensed microwave systems in the band. Accordingly, the Commission should refrain from adopting any of the proposals in the FNPRM, at least and until such time that additional studies have been conducted and prove that unlicensed operations will not cause interference to licensed microwave systems in the band.

As UTC, APPA, NRECA, AWWA and AGA have explained throughout this proceeding, electric, gas and water utilities and other critical infrastructure industries (CII) rely on 6 GHz microwave systems to ensure the safety, reliability and security of their operations. The importance of

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<sup>1</sup> *Unlicensed Use of the 6 GHz Band*, Report and Order and Further Notice of Proposed Rulemaking, ET Docket No. 18-295 35 FCC Rcd 3852 (2020) (rel. Apr. 24, 2020)(hereinafter, “Report and Order” or “FNPRM”).

protecting the security of the nation’s critical infrastructure has been recognized by the President<sup>2</sup>, Congress<sup>3</sup>, the Department of Homeland Security (DHS)<sup>4</sup>, the Department of Energy (DOE)<sup>5</sup>, the Federal Energy Regulatory Commission (FERC)<sup>6</sup>, the North American Electric Reliability Corporation (NERC)<sup>7</sup> and this Commission<sup>8</sup>. The FNPRM runs counter to such overarching national policy objectives by threatening to undermine the security of utility, public safety other CII microwave communications that are essential to protecting the nation’s critical infrastructure. It is at best premature and at worst reckless to expand unlicensed operations in the band; and the proponents have failed to provide empirical data that would prove that such operations will not cause interference to licensed incumbent microwave systems that are essential to the nation’s critical infrastructure security. Moreover, the studies that have been put forward have serious deficiencies. Therefore, the Commission should refrain from adopting any of the additional unlicensed operations as contemplated

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<sup>2</sup> Exec. Order No. 13,920, *Securing the United States Bulk-Power System*, 85 Fed. Reg. 26595 (May 1, 2020); Exec. Order No. 13,913, *Executive Order on Establishing the Committee for the Assessment of Foreign Participation in the United States Telecommunications Services Sector*, 85 Fed. Reg. 19643 (Apr. 4, 2020).

<sup>3</sup> Fixing America’s Surface Transportation (FAST) Act., 215a, 16 U.S.C. § 824o–1, et. seq., Pub. L. No.114-94 (2015)

<sup>4</sup> Department of Homeland Security, Cybersecurity and Infrastructure Security Agency (“CISA”). CISA is responsible for protecting the Nation’s critical infrastructure from physical and cyber threats. This mission requires effective coordination and collaboration among a broad spectrum of government and private sector organizations. It covers Comprehensive Cyber Protection, Infrastructure Resilience, Emergency Communications, and National Risk Management., *available at* <https://www.cisa.gov/>

<sup>5</sup> The Department of Energy, Office of Cybersecurity, Energy Security, and Emergency Response (“CESER”) addresses the emerging threats of tomorrow while protecting the reliable flow of energy to Americans today by improving energy infrastructure security and supporting the DOE’s national security mission. CESER’s focus is preparedness and response activities to natural and man-made threats, ensuring a stronger, more prosperous, and secure future for the Nation., *available at* <https://www.energy.gov/ceser/about-us>. See also DOE commissioned report, *Cyber Threat and Vulnerability Analysis of the U.S. Electric Sector*, Idaho National Laboratory, Jun. 19, 2017.

<sup>6</sup> News Release, *FERC Staff Identifies Key Cybersecurity Program Priorities*, Nov. 21, 2019, *available at* <https://www.ferc.gov/news-events/news/ferc-staff-identifies-key-cybersecurity-program-priorities>.

<sup>7</sup> North America Electric Reliability Corporation Critical Information Protection Reliability Standards

<sup>8</sup> Proposed Record of Proceeding, *Process Reform for Executive Branch Review of Certain FCC Applications and Petitions Involving Foreign Ownership*, IB Docket No. 16–155, DA 20–452, FRS 16720, 85 Fed. Reg. 29914, (Published May 19, 2020); *Process Reform for Executive Branch Review of Certain FCC Applications and Petitions Involving Foreign Ownership*, IB Docket No. 16-155, FCC 16-79, 81 FR 46870 (2016)

in the FNPRM. Accordingly, UTC, APPA, NRECA, AWWA and AGA agree with comments on the record that recommend the Commission refrain from authorizing any further unlicensed operations in the 6 GHz band until additional testing has been completed, and such testing shows that LPI, VLP and other unlicensed operations will not cause interference to licensed microwave systems and that AFC is effective at preventing interference to licensed microwave systems from occurring and immediately resolving instances of interference that may occur.<sup>9</sup>

**I. Very Low Power Unlicensed Operations Should Not Be Authorized by the Commission.**

As UTC, APPA, NRECA, AWWA and AGA and others commented in response to the FNPRM, it is too early to consider allowing VLP. Moreover, there is every reason to believe that the interference potential from VLP is greater than other unlicensed uses of the band, due in large part to the fact that such devices would be permitted to operate outdoors as well as indoors and such operations would not be controlled by AFC. Given the criticality of 6 GHz microwave communications and the unreasonable risk of interference from VLP, the Commission should refrain from allowing VLP operations at this time.

**A. Proponents Underestimate Interference Potential and Overestimate Body Loss and Effectiveness of Transmit Power Control, Antenna Restrictions, Contention-based Protocols and Other Mitigating Factors.**

The factors listed by the Commission in the FNPRM -- including body loss, use of transmit power control, antenna type and radiation pattern, use of a contention-based protocol and projected activity factor -- all point towards power levels for VLP lower than 14 dBm EIRP and 1 dBm/MHz

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<sup>9</sup> See e.g. Comments of Southern Company Services in ET Docket No. 18-295 at iii (filed Jun. 29, 2020)(opposing any further unlicensed use of the band until: “(1) systematic testing between incumbent licensed operations and unlicensed devices, including low power indoor (“LPI”) devices, has been completed under the existing technical rules that were adopted just two months ago; (2) the testing of prototype very low power (“VLP”) devices has been undertaken to evaluate their effect on incumbent licensed operations (as the Commission itself suggests in the FNPRM); and (3) the AFC development process has been completed and agreed to by all affected stakeholders.”)See also Comments of Alliant Energy in ET Docket No. 18-295 at 3 (filed Jun. 29, 2020)(stating “there must be a functioning AFC system that has been thoroughly tested under real world conditions using tests conducted by the multi-stakeholder group and including representatives of all licensed incumbents in the band.”)

PSD EIRP.<sup>10</sup> Specifically, body loss and use of transmit power control will not significantly reduce emissions from VLP that are seen by microwave receivers, certainly not to the degree that proponents of VLP are claiming. Similarly, antenna limitations and contention-based protocols are unlikely to protect against interference, because antenna restrictions can be (and have been) easily circumvented by unlicensed device operators. Contention-based protocols will not be able to detect the presence of nearby microwave receivers that must be able to receive signal levels of -6 dB I/N or lower. Also, the projected activity factor for these VLP devices is likely to be much higher than predicted in proponents' studies, and the models they use are based on a statistical Monte Carlo analysis, which portrays the probabilistic average interference potential rather than more accurately representing the actual interference from particular use cases or even a weighted median of the interference potential probability.

Taken together, these factors point towards reducing the power limits for VLP. Yet proponents claim that the power limits can be increased without increasing the interference potential to licensed microwave systems in the 6 GHz band, and they also make the dubious claim that the interference potential will not increase if the power spectrum density increases as well, such that VLP should be permitted to operate at the maximum EIRP regardless of whether it operates using a 20 MHz, 40 MHz,

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<sup>10</sup> *But see* Comments of Apple Inc., Broadcom Inc., Cisco Systems, Inc., Facebook, Inc., Google LLC, Hewlett Packard Enterprise, Intel Corporation, Microsoft Corporation, NXP Semiconductors, Qualcomm Incorporated, Ruckus Networks, a Business Segment of CommScope in ET Docket No. 18-295 at 22 (filed June 29, 2020)(claiming that “the Commission can authorize VLP operation at 14 dBm EIRP, with a 1 dBm/MHz PSD limit, without increasing the risk of harmful interference to incumbent services.”)(hereinafter “Comments of Apple et al.” or “Comments of 6 USC”). *See also* 6 USC Comments, Attachment A, RKF Engineering Solutions, LLC, “Frequency Sharing for Very Low Power Radio Local Area Networks in the 6 GHz Band” (concluding that VLP devices operating at 14 dBm EIRP using varying channel sizes (20, 40, 80, 160 MHz) would not cause microwave systems’ channel availability to increase above the 10% unavailability target or channel sensitivity to increase above the 1% unavailability threshold, including when the effects of hourly fade statistics and VLP interference are considered independent from each other at different times of the day.)(hereinafter “RKF VLP Study”). *See also* Attachment B: Wireless Research Center of North Carolina Report On-Body Channel Model and Interference Estimation at 5.9 GHz to 7.1 GHz Band (predicting 26 to 96 dB body loss associated with VLP placed at various places (handheld, waist, back pocket, and backpack))(hereinafter “Wireless Research Center of North Carolina VLP Study”).

80 MHz, and 160 MHz channel width.<sup>11</sup> Proponents overreach in their claims, and they base their claims largely on two studies that also overstate estimated losses and understate the effective power of VLP emissions to support unfounded conclusions that VLP won't cause interference to licensed microwave systems.

As described in more detail in the comments by Southern Company, the RKF VLP Study is fundamentally flawed because it makes erroneous underlying assumptions that skew the results, and these errors not only undermine the conclusions in the VLP study, but also the conclusions that were made in the 2018 study that served as the basis for the Commission's decision to authorize LPI and standard power access devices.<sup>12</sup> First, the RKF VLP Study undercounted the quantity of RLAN units modeled; their LPI count was 394,958 for all of the CONUS and their VLP count was 4,417 for all of the CONUS. By comparison, when the European Conference of Postal and Telecommunications Administrations ("CEPT") Electronic Communications Committee ("ECC") modeled RLAN potential interference, it used 1,317,034 LPI units in a smaller geographic area.<sup>13</sup> Second, the RKF VLP Study used an RLAN duty cycle that is an order of magnitude less (0.2% versus 1.97%) than the duty cycle that was used in the ECC model. Third and most importantly, the RKF study only ran just 10 iterations of the full Monte Carlo analysis. By comparison, the ECC model used 250,000 iterations for each EU country's full list of fixed service sites. In other words, the ECC model gave every potential RLAN combination 250,000 opportunities to randomly occur and be counted. By comparison, the RKF study

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<sup>11</sup> Comments of Apple, Inc. Broadcom, Inc. Cisco Systems, Inc., Facebook, Inc., Google, LLC, Hewlett Packard Enterprise, Intel Corporation, Microsoft Corporation, NXP Semiconductors, Qualcomm Incorporated, and Ruckus Networks, a business segment of CommScope in ET Docket No. 18-295 at 31 (filed Jun. 29, 2020)(stating that "statistical analysis demonstrates that the Commission can certainly authorize VLP devices at a power limit of 14 dBm EIRP regardless of whether the bandwidth the device is transmitting at is 20 MHz, 40 MHz, 80 MHz, 160 MHz, or 320 MHz.")

<sup>12</sup> See Reply Comments of Southern Company Services in ET Docket No. 18-295 at Attachment A, "Lockard & White: Technical Review of RKF Analysis for Southern Company Services, July 27, 2020" (filed Jul. 27, 2020).

<sup>13</sup> See "CEPT ECC Report 302 Sharing and compatibility studies related to Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) in the frequency band 5925-6425 MHz.", available at <https://www.ecodocdb.dk/download/cc03c766-35f8/ECC%20Report%20302.pdf>.



gave each RLAN only 10 opportunities to be present and therefore 10 opportunities to be on an overlapping frequency – so there is very little probability of multiple RLANs on overlapping fixed service channels. For outdoor VLP, the RKF study did increase the iterations to 100,000, but that is still far less than the EU study, which used 30,000,000. Accordingly, there are serious deficiencies in the RKF VLP Study, which not only cast doubt on the conclusions for VLP, but also the conclusions from the 2018 RKF report upon which the FCC relied in authorizing LPI and standard power access devices.

In addition, and as described in further detail in the comments by Southern Company, the study by the Wireless Research Center of North Carolina (WRCNC) regarding body loss also raises questions about the conclusions drawn by Apple et al. regarding the interference potential of VLP and the appropriate power limits that should apply. While the WRCNC study is very well done and interesting, the significant link loss and body loss findings suggest the RLAN units would be using little or no Transmit Power Control most of the time, maximizing the impact on FS links. Also, the finding that body worn RLAN gear can have higher gain outward from the body than the antenna's isotropic gain increases concerns that the mobile RLAN devices can pose a greater risk to FS links.<sup>14</sup> Thus, the use of 4dB body loss as previously suggested by RLAN proponents is likely too high, and VLP units should be simulated at full EIRP with no body loss and no TPC.<sup>15</sup> The WRCNC Study also incorrectly applies its statistics, such that it assumes the median gain for the RLAN device antenna and uses a 95% and -174dB/Hz as success criteria.<sup>16</sup> By comparison, the record in this proceeding uses a -6 dB I/N, which would equal -180dB/Hz. Moreover, the 95% success criteria is problematic given the fixed service links are designed for 99.999% availability at a minimum (315 seconds/year outage) and

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<sup>14</sup> WRCNC study at 8.

<sup>15</sup> See Apple, Broadcom et al. Nov. 12, 2019 *Ex Parte*, at 8; Apple, Broadcom et al. Dec 9, 2019 *Ex Parte*, at 8.

<sup>16</sup> WRCNC study at 10

95% represents 1,576,800 seconds (18 days, 6 hours) outage per year, which is totally unacceptable for utility microwave performance requirements. Accordingly, the WRCNC raises additional questions and concerns that the interference impact from VLP to microwave systems may be unacceptably high.

**B. VLP Poses an Increased and Unreasonable Risk of Interference Because of Outdoor and Portable/Intermittent Operations, and VLP Should be Controlled by AFC.**

UTC, APPA, NRECA, AWWA and AGA reiterate that VLP and any other unlicensed operations should be subject to AFC, and that AFC systems must be thoroughly tested and demonstrated to be effective before VLP and any other unlicensed operations are authorized by the Commission to operate in the 6 GHz band. Given that the various factors such as body loss, transmit power control, and activity factors point towards *reducing* power limits below 14 dBm EIRP and 1 dBm PSD that proponents claim as the *minimum* power levels necessary to support effective VLP operations, it is reasonable for the Commission to conclude that the only way to balance the need to protect against interference while enabling VLP systems to operate will be to require VLP systems to be controlled by AFC. The fact that VLP devices will operate outdoors and the interference they cause will be difficult to mitigate further underscores the need to require VLP to be controlled by AFC, if VLP is permitted at all.

The FNPRM fundamentally fails to protect licensed microwave systems against potential interference as required by law, particularly when it comes to VLP, because such devices will be able to operate outdoors, where there will be no building entry loss (BEL) and likely insufficient clutter loss to prevent VLP from interfering with nearby microwave receivers. Comments by proponents of VLP predict that a significant percentage of the VLP devices will be operated outdoors, which will increase the likelihood of interference to microwave systems. Although proponents argue that interference potential will be reduced if VLP devices are operated at ground level, there is still a significant percentage of possible use cases that would place these devices in close proximity to microwave receivers and/or at higher elevations where the interference potential would be much greater than what

proponents of VLP would lead the Commission to believe.

Not only do VLP devices pose a greater potential of interference, they also raise much more difficult challenges in terms of mitigating and resolving the interference that they cause to licensed microwave systems in the 6 GHz band. By their very nature, they will be used for portable communications, and the interference that they cause may occur unpredictably and without warning. Moreover, the interference that they cause will be difficult to trace, due to their intermittent and/or portable operations. As fast as a microwave licensee may be able to identify a VLP device that is causing interference, the device may stop transmitting and move to an entirely different location and begin causing interference there. Moreover, these devices will be operated by consumers who may not be aware of the interference that they cause and/or their obligations to resolve such interference. It is impractical to expect microwave licensees to police the airwaves against the multitude of VLP devices that may cause interference anytime, anywhere, particularly considering the wide areas that are covered by microwave systems.

**C. The Risk of Interference to Mission Critical Communications Outweighs the Marginal Benefits from VLP.**

Comments on the record underscore the critical nature of the communications that are carried over 6 GHz microwave systems, which further underscores the need to refrain from authorizing VLP or otherwise further expanding unlicensed use of the 6 GHz band. Proponents of VLP and other unlicensed operations fail to appreciate the need to prevent interference from occurring and assume that instances of interference will either be sporadic/isolated/unlikely to occur, or can be resolved after the fact. Contrary to these assertions, the studies on the record have shown that interference from unlicensed operations, such as VLP, will be widespread and significant. Moreover, it will be far too late to undo the damage that interference will cause to safety, reliability and security of essential electric, gas and water services provided by utilities, as well as the personnel who rely on these communications to protect their own safety. The Commission should not put at risk these mission critical communications by authorizing unlicensed devices to be marketed to consumers for use indoors and outdoors on a mobile or fixed basis anywhere, anytime, anyplace. There is simply no rational basis, no balance of the costs/benefits, and no extraordinary circumstances that justifies authorizing VLP or other further unlicensed use of the band without sufficient evidence in the form of empirical data from additional testing and

real-world experience with unlicensed operations that proves that such operations will not cause interference to licensed microwave systems in the 6 GHz band.

**D. The Commission Should Refrain from Authorizing VLP, Particularly at Higher Power Levels.**

To make matters worse, some comments suggest that the Commission adopt a higher power spectrum density limit for VLP of 1 dBm/MHz.<sup>17</sup> They claim these power limits are necessary in order to provide enough throughput to support certain video and gaming applications. There is no analysis of the impact on fixed service links nor is there any empirical data to show that such a power increase would not cause interference to microwave systems in the band.<sup>18</sup> This “I want it, I got it” argument may work in pop music, but it should not work here. As numerous parties on the record have commented, RLAN proponents bear the evidentiary burden of proving that unlicensed operations will not cause interference to microwave systems, and RLAN proponents have failed to do so. Moreover, numerous parties have commented that it is premature at this time to authorize VLP and other additional forms of unlicensed operations in the 6 GHz band, when there has been no real-world testing or experience with regard to the impact of unlicensed operations to 6 GHz microwave systems. Others have concluded that VLP power limits would need to be reduced in order to prevent interference to microwave systems.<sup>19</sup> Accordingly, UTC, APPA, NRECA, AWWA and AGA reiterate and echo the

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<sup>17</sup> See Comments of Apple, et al at 14 (“the Commission should adopt a PSD limit of 1 dBm/MHz to avoid unnecessarily constraining power (and therefore decreasing throughput and increasing latency) in narrower channel sizes, particularly in higher on-body loss scenarios.”)

<sup>18</sup> Comments of Alliant Energy in ET Docket No. 18-295 at 3 (filed Jun. 29, 2020)(stating “At present there is simply not enough empirical engineering data to determine whether and how the FNPRM’s proposals could safely coexist with licensed microwave systems in the 6 GHz band.”)

<sup>19</sup> See Comments of AT&T in ET Docket No. 18-295 at 7 (stating that “if VLP devices are to be authorized to operate everywhere without AFC control—and they should not—the power should be limited to levels consistent with the existing Part 15 Rules for Ultra-Wideband (“UWB”) devices.”); And See Comments of Nokia in ET Docket No. 18-295 at 3 (filed Jun. 29, 2020)(stating that “The numerical analyses performed for the described three interference scenarios indicate potential for co-channel interference to an FS receiver due to transmissions of a single VLP U-NII device at power spectral density level of -8 dBm/MHz. Adoption of a power limit for VLP U-NII device operation on the lower side of the power range considered by the Commission, e.g. 4 dBm EIRP (-18 dBm/MHz PSD EIRP), would minimize the potential for cochannel interference to a FS receiver due to such devices.”)

comments on the record that urge the Commission to refrain from authorizing VLP operations at this time.

## **II. Low Power Indoor Devices Should Not be Permitted to Operate at Higher Power Levels.**

Comments on the record also overwhelmingly oppose the Commission's proposal to allow LPI at higher power levels, when LPI devices use 320 megahertz channel widths. As the American Petroleum Institute observed, "[w]hile scaling the EIRP at a constant PSD as one increases the channel bandwidth seems to make engineering sense, the use of a contiguous 320 MHz channel is over 25% of the entire UNII-5 through UNII-8 bandwidth [and] will create other challenges that should lower the PSD and EIRP, not increase it."<sup>20</sup> Not only does this increase the probability of overlap between unlicensed and licensed microwave frequencies, the interference potential is further increased considering the likelihood that a microwave system using a 6-foot reflector antenna with a 1.8-degree half-power beam width over a 7-mile path will illuminate a half-power cone of about 1200 feet in diameter at the receive point.<sup>21</sup> As AT&T explains, increasing the power of LPI would be fundamentally at odds with the approach that is being taken in the draft ECC Decision "[o]n the harmonized use of the frequency bands 5945 to 6425 MHz for the implementation of Wireless Access Systems including Radio Local Area Networks (WAS/RLAN)".<sup>22</sup> Specifically, the draft ECC Decision permits deployment of LPI devices only at a maximum power of 200 mW (23 dBm), one quarter of the power permitted under the Order.<sup>23</sup> Comments on the record recommend that the Commission require AFC for LPI, particularly if the Commission authorizes increased power using wider channel widths.<sup>24</sup> UTC, APPA, NRECA, AWWA and AGA support

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<sup>20</sup> Comments of the American Petroleum Institute in ET Docket No. 18-295 at 4 (filed Jun. 29, 2020)

<sup>21</sup> *Id.*

<sup>22</sup> Comments of AT&T in ET Docket No. 11-12 (filed June 29, 2020), *citing* "On the harmonised use of the frequency bands 5945 to 6425 MHz for the implementation of Wireless Access Systems including Radio Local Area Networks (WAS/RLAN)" ("Draft ECC Decision"); available at: [https://cept.org/Documents/wg-fm/59049/fm-20-070annex2\\_draft-eccddecision-6ghz-was-rlan](https://cept.org/Documents/wg-fm/59049/fm-20-070annex2_draft-eccddecision-6ghz-was-rlan) (last visited June 25, 2020).

<sup>23</sup> Comments of AT&T at 12.

<sup>24</sup> *See* Comments of the Edison Electric Institute in ET Docket No. 18-295 at 3 (filed Jun. 29, 2020)(stating "The Commission should not increase the power level for VLP unlicensed devices; and AFC remains the best solution to supporting such operations at current power limits.")*See also* Comments of Nokia at 4 (stating "We recommend that if the Commission determines to increase the PSD EIRP limit to 8dBm/MHz, then an AFC should be used.")

these comments on the record, which underscore that increasing the power limit for indoor low power unlicensed operations will only compound the potential for interference. Accordingly, the Commission should not authorize LPI devices to operate at higher power levels.

UTC, APPA, NRECA, AWWA and AGA also take this opportunity to refer the Commission to the results of tests that were conducted by the Electric Power Research Institute (EPRI) regarding the interference potential of unlicensed operations on utility microwave systems in a real-world environment.<sup>25</sup> These tests found that harmful interference was caused to utility microwave systems by unlicensed operations when operating co-channel to an incumbent FS link at locations that would presumably be inside an AFC exclusion zone (demonstrating that incumbent FS links will be critically reliant on accurate and reliable AFC operation to provide and maintain protection from harmful interference). The interference levels ranged from severe to very severe and the impact of the interference caused the microwave links to fail completely. Interference from unlicensed devices was found several kilometers from the microwave receivers where line-of-sight (LOS) exists, and at close distances (less than 1 km) antenna mismatch between the interferer 6m above ground level (AGL) and FS (59.4m AGL) did not protect the FS link. Finally, interference occurred when the unlicensed device was located in front of the receiver, as well as when the device was located off-axis in the sidelobes of the microwave receiver. It should also be noted that the EPRI study factored for building entry loss values that were used by the FCC when it authorized LPI devices to operate without AFC, and the EPRI study did use the activity factor similar to what would occur with video streaming. The results of the study validate the conclusions from several studies that were submitted on the record, which also predicted widespread and significant interference to microwave systems from unlicensed operations in the 6 GHz band.<sup>26</sup> Therefore, the results of the EPRI study

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<sup>25</sup> Electric Power Research Institute “Unlicensed Use in the 6 GHz Band: Field Interference Test Results”, Document No. 3002019712 (Jul. 2020), available at <https://www.epri.com/research/products/000000003002019712?src=mail>.

<sup>26</sup> See e.g. “Impact of Proposed Wi-Fi Operations on Microwave Links at 6 GHz by Roberson and Associates, LLC (Critical Infrastructure Industry (CII) User Study) (Attachment to Ex Parte Comments Received Jan. 13, 2020, Letter from the Edison Electric Institute, National Rural Electric Cooperative Association, American Gas Association, Utilities Technology Council, American Public Power Association, Nuclear Energy Institute, and American Water Works Association to Marlene H. Dortch, Secretary, Federal Communications Commission in ET Docket No. 18-295 (filed Jan. 13, 2020). See also Impact of Proposed Wi-Fi Operations on 6 GHz Microwave Links by Roberson and Associates, LLC (Attachment to Ex Parte Comments Received Jan. 24, 2020, Letter from Emily Fisher, General Counsel, Edison Electric Institute, Brett Kilbourne, VP Policy and General Counsel, Utilities Technology Council, and Corry Marshall, Director, American Public

show that the Commission should *reduce* LPI EIRP power limits (as well as standard power access power limits), not increase them.<sup>27</sup>

### **III. Standard Power Access Devices Should Not be Permitted to Operate on a Mobile Basis.**

Comments on the record are also vehemently opposed to allowing mobile standard power access device operations. As these comments explain, the introduction of mobile unlicensed operations would add a layer of complexity to AFC that is far greater than what is necessary to coordinate fixed operations. It would require an extremely high degree of location accuracy and the AFC would need to protect microwave systems based on the worst case at any given time.<sup>28</sup> The cost-benefit analysis alone weighs in favor of refraining from authorizing mobile unlicensed operations, given the cost and complexity of implementing this capability as well as the potential risk of interference to mission critical communications compared to the marginal and speculative benefit of authorizing mobile unlicensed operations.<sup>29</sup> Moreover, AFC has not even been proven to effectively prevent interference from fixed unlicensed operations, let alone mobile. Even comments that support the mobile unlicensed use of the band suggest that the Commission should defer from considering mobile operations until AFC has proven its capabilities.<sup>30</sup> Accordingly, UTC, APPA, NRECA, AWWA and AGA echo the comments on the record and reiterate that the Commission should refrain from authorizing mobile unlicensed operations in

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Power Association to Marlene H. Dortch, Secretary, Federal Communications Commission in ET Docket No. 18-295 (filed Jan. 24, 2020)).

<sup>27</sup> See also Comments of AT&T in ET Docket No. 18-295 at 11-13 (filed June 29, 2020)(underscoring that “the power limit for unlicensed LPI devices should be lowered, not raised,” and explaining that “because a sound engineering analysis demonstrates significant potential for harmful interference at 5 dBm/MHz, operation at twice that power is a substantially greater threat and should be rejected.”)

<sup>28</sup> See e.g. Comments of the Association of American Railroads in ET Docket No. 18-295 at 10-12 (observing that “An AFC would need to have the capability to monitor the location of a mobile device with an extremely high level of accuracy,” and that “whatever the challenges of relying on the AFC for fixed devices, those challenges multiply considerably for sharing the spectrum between mobile devices and a point-to-point microwave.”) See also Comments of AT&T at 13-14 in ET Docket No. 18-295 (filed Jun. 29, 2020)(stating that “ At 55 mph, and with coordination every two seconds, the AFC would have to consider worst-case positioning with respect to all FS microwave systems with beams intersecting an area approaching the size of two football fields.”)

<sup>29</sup> See Comments of AT&T at 15.

<sup>30</sup> Comments of CTIA in ET Docket No. 18-295 at 8 (filed Jun. 29, 2020)(stating that “The Commission should refrain from adding this additional complexity into the AFC system at this time and defer consideration of mobile operations until “AFC systems can build an operating history that demonstrates fixed service links are being protected.”)

the 6 GHz band.

**IV. Standard Power Access Devices Should Not be Permitted to Operate at Higher Power Levels When Configured for Fixed Point-to-Point Operations Using Directional Antennas.**

Comments on the record generally agree with UTC, APPA, NRECA, AWWA and AGA that the Commission should not authorize standard power access devices to operate at higher power levels when they are configured as point-to-point systems using directional antennas.<sup>31</sup> As they explain, permitting such operations would only increase the potential of interference to licensed microwave systems, and AFC is not designed to coordinate these types of configurations. These concerns are shared by other parties besides utilities.<sup>32</sup> Moreover, the Commission's rules already provide for point-to-point operations under Part 101. Accordingly, the Commission should refrain from authorizing any higher power standard power access devices when configured for point to-point operations; and instead should authorize these operations if at all under its existing Part 101 rules.-

**V. The Commission Should Engage with the Multi-Stakeholder Group to Ensure it Effectively Addresses Technical Solutions and Processes for Preventing and/or Resolving Interference, Fairly Represents All Stakeholders and Reaches Consensus Based Decisions.**

UTC, APPA, NRECA, AWWA, and AGA support Commission engagement with the multi-stakeholder group in order to ensure that it addresses the key issue of preventing interference to licensed microwave systems and immediately resolving instances of interference that may occur.<sup>33</sup> Commission engagement will help to

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<sup>31</sup> See e.g. Comments of Alliant Energy in ET Docket No. 18-295 at 4 (filed June 29, 2020)(stating that “the Commission should not authorize mobile standard power access point operations in the 6 GHz band, or authorize higher power limits for standard power access points of operations when configured as point-to-point links using directional antennas at least until a comprehensive AFC methodology is established and agreed to by all parties in the multi-stakeholder group, and unlicensed proponents have provided detailed technical information on how such enhanced unlicensed use of the 6 GHz band would protect incumbent licensed operations from harmful interference.”); Comments of the Edison Electric Institute in ET Docket No. 18-295 at 20 (filed Jun. 29, 2020)(stating that “The Commission should not allow standard power access points used in fixed point-to-point applications to operate at power levels greater than 36 dBm EIRP,” adding that “If the link is going to be in the U-NII-5 and U-NII-7 bands, the operator should be required to license the link” and the Commission should regulate the link under Part 101.)

<sup>32</sup> See Comments of the Alliance for Automotive Innovation in ET Docket No. 18-295 at 10 (filed Jun. 29, 2020)(stating that “Although some indoor point-to-point installations do not pose a direct threat to V2X, other indoor and outdoor point-to-point installations have signal paths that can substantially interfere with V2X signals. For example, point-to-point installation signal paths may cross streets and roads, thereby increasing the chance that such signals interfere with both V2X OBUs and RSU transmissions.”)

<sup>33</sup> Comments of Alliant Energy in ET Docket No. 18-295 at 3 (filed Jun. 29, 2020)(“ Alliant Energy respectfully requests that the Commission coordinate the multi-industry efforts in both areas to ensure that incumbents will be protected against harmful interference from unlicensed devices.” See also *Id.* (stating “Alliant Energy also joins other commenters in



promote the development of best practices and processes to protect against interference, including testing to ensure that LPI, VLP and standard power access devices do not cause interference and that AFC is effective at preventing interference and resolving it in the event that it does occur. Moreover, Commission engagement should help to ensure fair representation of the stakeholders, including those representing the interests of incumbent microwave licensees. Finally, Commission engagement should encourage the parties to work in good faith, and ensure that all viewpoints are considered and that decisions are reached through consensus. Therefore, UTC, APPA, NRECA, AWWA, and AGA encourage Commission engagement in the formation and activities of the multi-stakeholder group.

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supporting the establishment of the AFC multi stakeholder working group as quickly as possible and requests that the Commission actively coordinate with the working group to ensure a fair, substantive, and transparent processes by a truly representative group. The Commission’s oversight and participation should aid the development of both viable solutions for the implementation of AFC to protect licensed microwave systems and of proper mitigation for resolving instances of interference, as well as ensure rigorous testing of low power indoor operations prior to any commercial deployment to guarantee that they will not cause interference to licensed microwave systems.”)

## VI. CONCLUSION

**WHEREFORE**, the premises considered, UTC, APPA, NRECA, AWWA, and AGA echo the comments that overwhelmingly oppose the proposals to permit VLP and to increase the power limit for LPI unlicensed operations in the 6 GHz band. The Commission should refrain from authorizing these operations at least until such time that more experience can be gained about the impact on licensed microwave systems of unlicensed operations through testing in a real-world environment prior to mass market commercial deployment. Similarly, UTC, APPA, NRECA, AWWA, and AGA also join the vast majority of comments that oppose allowing mobile standard-power access points and allowing standard-power access points that are configured for point-to-point operations to operate at higher power using directional antennas. As the comments have clearly shown, these mobile standard-power access points would increase the potential for interference to licensed microwave systems unless they are subject to more stringent power limits than fixed standard-power access points and, most importantly, they are controlled by AFC and the database is improved so that location information is more accurate and more frequently updated. Similarly, the Commission should not authorize standard-power access points configured for point-to-point operations to use higher power and directional antennas, unless AFC is redesigned to improve the accuracy of the data and account for the antenna pattern and the orientation of the antenna. Finally, the Commission should engage with the multi-stakeholder group to get it established and operational in a timely manner and to ensure equal representation among the stakeholders, as well as to provide guidance regarding the substantive issues and to ensure transparent processes for AFC and testing of LPI devices.

Respectfully,

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