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 Between 3.7 and 24 GHz	)	GN Docket No. 17-183

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 WORKS ASSOCIATION

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SUMMARY

The Commission should refrain from further expanding unlicensed operations in the 6 GHz band until such time that additional testing has been conducted to prove that unlicensed operations will not cause harmful interference to licensed microwave systems. Accordingly, the Commission should not allow "very low power" (VLP) operations or increase the power limits for "low power indoor" (LPI) devices at this time, and it should not permit the operation of mobile standard-power access point devices or increase the power limits for standard-power access systems that are configured as fixed point-to-point links using directional antennas. Moreover, all unlicensed operations in the 6 GHz band should be subject to automated frequency coordination (AFC).

The studies that have been submitted on the record have shown that interference from unlicensed operations will be widespread and significant, and there is every reason to believe that further expanding unlicensed use of the 6 GHz band will only increase the potential for interference to licensed microwave systems that utilities and others use to backhaul mission critical voice and data communications. Additionally, proponents of expanding unlicensed use of the 6 GHz band have failed to provide empirical data to show that expanded unlicensed use of the band will not result in harmful interference to these licensed microwave systems. In addition, many of the underlying assumptions upon which their models rely are general in nature and inaccurate in many cases. Accordingly, the Commission should proceed cautiously and not expand unlicensed use of the band until further tests have been conducted and show that unlicensed operations will not cause harmful interference and more experience is gained about the impact of unlicensed use of the band in actual deployments.

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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 comments in response to the Commission's Further Notice of Proposed Rulemaking (FNPRM) in the above-referenced proceeding.[1] UTC, APPA, NRECA, AWWA and AGA oppose allowing very low power devices (VLP) to operate without AFC, both indoors and outdoors across the entirety of the 6 GHz band (5.950-7.125 GHz), as proposed by the Commission. We also oppose the Commission's proposal to increase to 8 dBm/MHz power spectral density (PSD) the power limit for low power indoor (LPI) operations. The Commission should not authorize mobile standard-power access point operations in the 6 GHz. Nor should the Commission authorize higher power limits for standard-power access points when configured as point-to-point links using directional antennas.

I. Background and Overview

Two years have passed since the Commission initiated this rulemaking proceeding. Now, less than two months after adopting its Report and Order, the Commission proposes additional rules and invites comments on expanding unlicensed operations in the 6 GHz band. At best, this is premature without further experience in a real-world environment; at worst, it recklessly disregards the risk to critical safety and control systems that allow utilities to safely, reliably and securely deliver electric, gas and water services to 330 million Americans. Loss of energy and water utility services can have widespread effects on public safety, the economy, and national

[1] *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").

security. Moreover, it will affect not only utilities; it will affect any critical infrastructure industry and public safety agency that relies on the 6 GHz band for mission critical communications.

While the Commission finds that the potential for interference from LPI unlicensed operations is minimal, there are numerous studies and comments on the record that conclude that potential interference from LPI operations is a virtual certainty.[2] It will not be an isolated corner case. It will be widespread and significant, due to the millions of LPI devices that will blanket densely deployed areas with aggregate power levels hundreds of times greater than the receiver threshold of microwave systems. Moreover, because these LPI devices are not subject to automated frequency coordination (AFC), there is nothing to prevent them from operating in proximity to microwave systems and causing interference to them. Worse, there will be no way to trace LPI operations and, thus, no way for incumbent licensees to mitigate the interference or easily resolve it when interference occurs. By itself, LPI is a recipe for disaster.

Now the Commission proposes to go one step further and authorize without AFC unlicensed VLP operations both indoors and outdoors across the entire 6 GHz band. The principal basis for the FCC's rationale that there is minimal interference potential from LPI is, literally, out the window. Unlike LPI devices, which are restricted to indoor operation, VLP devices will be able to operate outdoors. There will not be any building entry loss (BEL) to limit the potential for interference from VLP. Instead, proponents of VLP claim "body loss" as much as 4.5 dB plus an additional loss of 14 dB from transmit power control.[3] They also claim that they need power levels of 14 dBm EIRP and -8 dBm/MHZ PSD EIRP to enable the applications they anticipate for these devices.[4] Not only is that nearly half the maximum authorized power of LPI, it is also nearly half the predicted

[2] Despite Commission assurances that interference will be minimal or insignificant, these microwave systems must maintain extremely high standards for reliability, and even intermittent interference can reduce a once reliable 6 GHz connection to being unreliable, which would be unacceptable for electric companies and CII providers. *See* Comments of the Utilities Technology Council, the Edison Electric Institute, the American Public Power Association, the National Rural Electric Cooperative Association, the American Petroleum Institute, and the American Water Works Association in ET Docket No. 18-295 at 6 and 11 (filed Feb. 15, 2019), *attaching* McGinnis, M. Douglas, RedRose Tele.com, "Spectrum and Utility Communications Networks: How Interference Threatens Reliability." (explaining that "depending on how the interference is manifested, it could result in the path going into a 'flapping state' where it is transient, up and down with a rapid period, too fast for the routing electronics to stabilize and thus could place the network in an indeterministic state resulting in a complete network failure.")

[3] *See* FNPRM at ¶239, n. 617.

[4] *Id.* at ¶243.

loss compared to LPI resulting from building entry under P.2109.[5] In short, it is a wash, and VLP poses just as much of an interference threat as LPI, if not more, considering that it will be used for portable use-case applications that will make the interference even more difficult to trace and mitigate than LPI. Finally, the Commission proposes to require VLP unlicensed devices in the 6 GHz band to incorporate integrated antennas and use a contention-based protocol to reduce the potential for interference. UTC, APPA, NRECA, AWWA, and AGA remain concerned that antenna restrictions can easily be circumvented and contention-based protocols will not prevent VLP devices from operating near microwave receivers and causing harmful interference.

Despite studies on the record showing widespread and significant interference using just the currently authorized 5 dBm/MHz PSD, the Commission is considering increasing the maximum power of an LPI device to 8 dBm/MHz PSD, with a maximum permissible EIRP of 33 dBm when it uses a bandwidth of 320 megahertz in the U-NII-5 through U-NII-8 bands. This is foolhardy without any real-world testing with prototype devices, or any experience with actual commercial deployments to assess the levels of interference from LPI devices on a mass market scale. There is every reason to believe that increasing the power limit to 8 dBm/MHz PSD will result in even greater interference to licensed microwave systems. The Commission's only basis for increasing the power is its view that doing so "would be useful for many indoor devices that require high data rate transmissions such as indoor access points communicating with clients like high-performance video game controllers, and wearable video augmented reality and virtual reality devices."[6] There is no analysis on the record suggesting that incumbent microwave systems would be protected against interference from LPI devices operating at increased power levels in the U-NII-5 through U-NII-8 bands. To the contrary, the studies by AT&T, which the Commission cites in the FNPRM, suggest that increasing power will make the potential for interference that much worse than AT&T already found based on 5 dBm/MHz PSD.

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[5]To compensate for the absence of any building entry loss (which ranges in probability between 18 dB -36 dB median value), it would be necessary to cut the maximum authorized power at least by half in order for the effective power of VLP outdoors to be at the same power level as LPI. Hence, the maximum power of VLP would need to be no more than 14 dBm operating outdoors to achieve the same effective power as LPI at 27 dBm, which perhaps uncoincidentally is what proponents are proposing for VLP power levels. Note that building entry loss is probabilistic and will vary depending on the type of building as well as the distance the device is placed from walls and windows. In the Report and Order, the Commission used a 70/30 percent mix of traditional and thermally efficient buildings to calculate the predicted building entry loss. Here proponents' claims of 18.5 dB from body loss and transmit power control may also need to be adjusted to account for the percentage of probability of these losses actually occurring.

[6] *Id*. at ¶244.

The Commission also is considering allowing mobile standard-power access devices, as well as higher-power standard-power access operations, on a point-to-point basis using directional antennas. It invites comment on whether the personal/portable white space device rules are an appropriate model to follow in developing rules for mobile standard-power access points, what power limits should apply for mobile standard-power access points, and what impact on AFC mobile standard power access devices would have.[7] It also invites comment on the appropriate power limits for point-to-point operations as well as any restrictions related to antenna gain, and it asks how AFC would need to consider antenna gain when calculating the exclusion zone for standard-power access devices, including related questions regarding the accuracy of antenna pattern and orientation information.[8] While the Commission would require these operations to be subject to AFC and suggests other limitations (e.g. restrictions on point-to-multipoint operations) designed to protect incumbent microwave systems against interference, UTC, APPA, NRECA, AWWA, and AGA are concerned that the complexity of coordinating mobile and fixed point-to-point unlicensed standard-power access devices and systems would diminish the effectiveness of AFC as a practical matter, thus increasing the potential of interference to microwave systems in the band, as more fully described below.

In general, UTC, APPA, NRECA, AWWA, and AGA recommend that prior to implementing any of these changes to the rules for unlicensed operations in the 6 GHz band, the Commission should require systematic testing between incumbent-licensed operations and unlicensed devices under the existing technical rules; require testing of new very low power prototype devices to gauge their effect on incumbent-licensed operations; and require completion of AFC efforts so that new unlicensed use of the 6 GHz band can be done without causing harmful interference to critical infrastructure systems. Furthermore, the Commission should not authorize without use of an AFC system so-called "very low power" operations that are not limited to indoor use. Nor should the Commission increase the power spectral density EIRP for low-power indoor operations from 5 dBm/MHz to 8 dBm/MHz, which will only increase the interference potential to licensed microwave systems, many of which are used to carry high capacity mission-critical communications across long distances.

[7] *Id.* at ¶¶248-250.
[8] *Id.* at ¶255.

Finally, the Commission should not permit mobile AFC-controlled standard-power access point operations or higher power levels for AFC-controlled standard-power access points used in fixed point-to-point applications at this time. Until the AFC methodology is defined and accepted 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, it is premature to permit mobile standard-power access point operations or permit higher power fixed point-to-point standard-power access point operations. Ultimately, the FCC may not authorize unlicensed operations if there is a significant potential of causing harmful interference to licensed operations, which is certainly the case here when the Commission proposes to allow unlicensed operations that are not subject to AFC, including higher power LPI devices and VLP devices.[9]

UTC, APPA, NRECA, AWWA, and AGA support the rapid establishment of the multi-stakeholder group and encourages the Commission to engage with the multi-stakeholder group to ensure equal representation, substantive discussions, transparent processes and the development of effective solutions for AFC to protect licensed microwave systems, resolve instances of interference, and to test low power indoor operations prior to commercial deployment to ensure that they will not cause interference to licensed microwave systems. We appreciate the opportunity to provide our comments on the Further Notice of Proposed Rulemaking and look forward to working with the Commission as it considers adopting additional rules for unlicensed operations in the 6 GHz band.

II. The Commission Should Refrain from Authorizing VLP Operations at this Time.

In the FNPRM, the Commission proposes to permit very low power devices to operate across the entirety of the 6 GHz band (5.925-7.125 GHz), both indoors and outdoors, without using an AFC.[10] UTC, APPA, NRECA, AWWA, and AGA oppose this proposal. The Commission should refrain from authorizing VLP operations until testing has been conducted and further experience has been gained regarding the real-world impact that unlicensed operations will have on licensed microwave systems. There is simply insufficient

[9] *American Radio Relay League, Inc. v. FCC*, 524 F.3d 227, 234-235 (D.C. Cir. 2008)).
[10] *Id.* at ¶235.

empirical data upon which to determine whether and how VLP operations could coexist with licensed microwave systems in the 6 GHz band. Moreover, the studies on the record analyzing VLP operations have found that VLP poses as much, if not more, interference potential as other unlicensed operations in the 6 GHz band.[11] In any event, the burden of proof rests on the proponents of unlicensed operations to show that VLP operations can coexist with licensed microwave systems, which they have yet to prove through empirical data.[12]

The Commission also invites comment on the use of antenna restrictions and contention-based protocols such as CSMA/CA to mitigate the interference potential of VLP.[13] UTC, APPA, NRECA, AWWA, and AGA do not believe that these mitigation techniques will prove effective in preventing interference. The antenna restrictions requiring an integrated antenna can be easily circumvented and antennas on 5 GHz unlicensed devices have been illegally modified in the past, which resulted in interference to FAA terminal doppler weather radar systems used to warn pilots of dangerous wind-shear conditions near airports. [14] There is every reason to believe that this will happen with VLP devices in the 6 GHz band. In addition, contention-based protocols will not protect microwave receivers. Because contention-based protocols are based on the ability of a device to "listen" before seizing a channel, and because proposed VLP devices would be unable to detect distant microwave transmissions, such a protocol will not offer any material protection to incumbent licensees. A

[11] *See e.g.* CII User Study and Southern Company Study (both studies finding that VLP operations pose a significant potential of causing harmful interference to licensed microwave systems in the 6 GHz band.) *See also* Letter from Michael V. Kuberski, Director, Utility Communications, Exelon Corporation to Marlene H. Dortch, Secretary, FCC in ET Docket No. 18-295 (filed Apr. 16, 2020)(attaching a study by Lockard & White entitled "Methodology Used to Predict Impact of Radio Local Area Networks (RLANS) on Exelon Microwave Network", which at pp 9-10 finds that AFC is necessary to prevent deep penetration of VLP from causing interference to its Cologne microwave link.).

[12] The Commission claims that "[t]he proponents for very low power unlicensed devices have made a compelling case for allowing such use," but it fails to cite any studies from proponents that shows that VLP will not cause harmful interference to licensed microwave systems in the band. *See Id.* at ¶235.

[13] *Id.* at ¶¶236-237.

[14] *See* Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band, Notice of Proposed Rulemaking, 28 FCC Rcd. 1769, 1775, para. 17 (2013) (stating that "we have seen an increase in interference incidences in U-NII bands that are caused by users unlawfully modifying and operating unlicensed devices that have not been certified to meet the required technical rules for these bands"). *See also* NTIA Technical Report TR-11-473, Case Study: Investigation of Interference into 5 GHz Weather Radars from Unlicensed Information Infrastructure Devices, Part 1 (Nov. 2010), available at http://www.its.bldrdoc.gov/publications/2548.aspx; NTIA Technical Report TR-11-479, Case Study: Investigation of Interference into 5 GHz Weather Radars from Unlicensed National Information Infrastructure Devices, Part II (July 2011), available at https://www.its.bldrdoc.gov/publications/2554.aspx; and NTIA Technical Report TR-12-486, Case Study: Investigation of Interference into 5 GHz Weather Radars from Unlicensed National Information Infrastructure Devices, Part III (June 2012), available at http://www.its.bldrdoc.gov/publications/2677.aspx.

contention-based protocol would be unable to sense the operations of fixed microwave systems.[15] Bottom line: use of an AFC system would be a better overall approach for ensuring no harmful interference to incumbent services.

The Commission also invites comment on other factors for consideration when evaluating the interference potential of very low power unlicensed devices, including body loss and transmit power control.[16] It is important to note at the outset that the Commission utilized a 20.62 dB value for building entry loss (BEL) when modeling potential interference from indoor low power devices (based on an estimate of 70% traditional construction/30% energy efficient construction).[17] As VLP devices will not be limited to indoors, this type of loss must be significantly decreased and/or outdoor VLP operations should be analyzed separately from indoor operations using zero BEL. Moreover, the analysis of VLP would need to be different from LPI in order to account for the different use cases, as the Commission itself recognizes when it refers to a use case such as a VLP on a bicycle handlebar and communicating with a body worn device with no body loss and little clutter.[18] In that regard, the calculation of clutter loss could vary significantly depending on the use case. For example, VLP devices may be outside and possibly mobile, and may vary in antenna height. Unlike LPI devices, which are typically modeled with a 1.5 meter antenna height, VLP devices could have any antenna height, but typically we would expect head level (worn device like headphones or eye glasses), vehicle carried (typically in a carrier on dash or windshield), or at hip level (in a cell phone or other carried device).

Body loss will be significantly less than BEL and clutter loss used to analyze LPI interference potential and transmit power control is not a reliable factor for loss either. Specifically, body loss would be 4.5 dB compared with a 20.62 dB BEL value factored by the FCC for LPI and the 10, 20, or 30 dB clutter loss estimated by the ITU-R for low, medium and high clutter conditions.[19] Moreover, transmit power control is an

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[15] A -62 dBm detect level is insufficient to detect a normal operating microwave signal. Microwave receivers rely on very high gain and highly directional antennas to resolve transmissions from tens of miles away. Proposed VLP devices would be likely to have very low gain antennas and are designed to detect and receive signals at very short ranges. Microwave signals are modeled by the Commission itself at -96 dBm (more than 30 dB weaker or more than 1000 times weaker than a VLP device would be able to sense).

[16] *Id.* at ¶239.

[17] *Id.* at ¶127, Table 4.

[18] *Id.* at ¶241.

[19] *See Report and Order* at ¶235, Table 4 (FCC value of 20.62 dB BEL used for LPI analysis. *See also* ITU-R P.2108 and P.452-16 (with values of 10, 20 and 30dB loss for low, medium and high clutter conditions).

unreliable factor for loss because, for example, it is very common for a cell phone to remain on the charger while the end user is doing normal house work or business work and wearing an audio or video accessory – that accessory is more likely to run high transmit power than low transmit power due to distance, wall/clutter loss, and body loss. Accordingly, the Commission should avoid incorporating general or faulty assumptions into its analysis that would tend to underestimate the interference potential of VLP devices. Overall, the link budget for VLP needs to account for a variety of factors including, antenna gain, antenna discrimination, RLAN/FS antenna mismatch, clutter, path loss, bandwidth mismatch, noise figure, polarization loss, feeder loss, and building entry loss, which may vary depending on certain use cases.

The Commission invites comment on the appropriate approach to use when modeling VLP operations, including "Monte Carlo analysis, link budget analysis, link-level simulations that take into account detailed physical layer implementations of unlicensed devices as well as incumbent devices, or a combination of these methods."[20] UTC, APPA, NRECA, AWWA, and AGA believe the analysis of a single unit as a noise source to the Fixed Site (FS) receiver using Path Loss calculated using the factors noted above is the appropriate way to model the interaction. Multiple units should be treated as multiple additive noise sources. Duty Cycle analysis (or Monte Carlo analysis applied to Duty Cycle) is pertinent for small numbers of units, but as unit deployments reach millions and billions, it will become irrelevant due to near 100% probability that enough units will be transmitting at the same time on the same channel to severely impact microwave receivers. Also, UTC, APPA, NRECA, AWWA, and AGA believe there is a high probability that RLANs will move from Time Division Duplex (TDD) to Frequency Division Duplex (FDD) in the 6 GHz bands, making Duty Cycle and Monte Carlo analyses completely irrelevant.

The Commission invites comment on the appropriate power level for VLP, and proposes to allow 14 dBm EIRP and -8 dBm/MHZ PSD EIRP based entirely upon claims by unlicensed proponents that this power level is necessary to enable the applications they anticipate for these devices.[21] UTC, APPA, NRECA, AWWA, and AGA oppose the Commission's adopting this proposed power level because it is unsupported by empirical

[20] *Id.* at ¶242.
[21] *Id.* at ¶243.

data by proponents of VLP, who bear the evidentiary burden of showing that such power levels will protect incumbent microwave systems from interference. As explained above, studies on the record have shown that VLP operations at these power levels will cause interference to microwave systems. Also, comments on the record have emphasized the importance of protecting these licensed microwave systems from interference because they provide high capacity, mission critical communications that ensure the safe, reliable and secure delivery of essential energy and water services. We applaud the Commission for encouraging commenters to conduct testing and measurements of protype devices to support their claims regarding the interference potential for VLP operations, and we support conducting such testing under an experimental license.[22] Furthermore, we request that proponents and the Commission make the results of these tests publicly available to the greatest extent possible. Therefore, the Commission should refrain from adopting these power levels as well as authorizing VLP operations unless and until thorough testing has been conducted and devices have been shown not to cause harmful interference to licensed microwave systems in the 6 GHz band.

III. The Commission Should Not Increase the Power Level for LPI Devices Operating with 320 Megahertz Bandwidth

The Commission is considering increasing the power limit to 8 dBm/MHz PSD for LPI devices operating with 320 megahertz of bandwidth.[23] UTC, APPA, NRECA, AWWA, and AGA oppose this proposal, because it would only increase the probability of interference to microwave receivers. To be sure, increasing the PSD to 8 dBm over 320 megahertz would result in roughly the same amount of power compared to the current limits when measured using a narrower bandwidth (e.g. a 30 MHz channel used by a microwave receiver). However, the power level would affect a wider bandwidth of the spectrum, making its potential impact on microwave systems more widespread. Given that studies on the record have already shown that the current limit of 5 dBm/MHz PSD will significantly impact microwave receivers, increasing the power to 8 dBm/MHz for LPI operating within 320 megahertz of bandwidth will just expand to more spectrum than before significant levels of interference. That is why UTC, APPA, NRECA, AWWA, and AGA oppose increasing the power limit to 8 dBm/MHz across 320 megahertz; it will cause more of the spectrum to be subject to harmful interference from

[22] *Id.*
[23] *Id.* at ¶244.

LPI.

The Commission invited specific comment regarding how a higher power spectral density limit would impact the Commission's analysis of certain use cases in AT&T's study, as well as how common those use cases are.[24] Taking these questions in reverse, the use cases in AT&T's study are very common; there are often links that extend into suburban and urban locations like those depicted in AT&T's study. In its study, AT&T predicted that RLAN interference would certainly exceed interference thresholds in each of the use cases. In its Report and Order, the Commission concluded that the use cases in AT&T's study failed to include probabilistic analyses that would reduce the potential for interference. It rejected the predicted interference levels in AT&T's study and determined that in all but one of the use cases that the power levels would not exceed a -6 dB I/N microwave receiver threshold.

UTC, APPA, NRECA, AWWA, and AGA disagree with the Commission's analysis of AT&T's study. The use cases in AT&T's study are very common, and utilities have many links that traverse suburban and urban areas like those in AT&T's study. For example, the 6 GHz microwave 'backbone' owned by PSEG (New Jersey's largest electric and gas utility) runs from downtown Newark, N.J. (surrounded by high rise residential and commercial properties) through Edison, N.J., through South Brunswick, N.J., through Lawrenceville, N.J., through Bordentown, N.J., through Moorestown, N.J., through West Deptford, N.J., through Woodstown, N.J., to the nuclear generating stations in Lower Alloways Creek, N.J. The system traverses intensely urban areas, commercial areas, mixed commercial/residential areas, rural areas, and farm areas across long distances, free from clutter loss, such that free space path loss would apply. In addition to overestimating clutter loss for these use cases, the Commission's calculation for bandwidth mismatch of the use cases also would have to be significantly revised so that losses would be further reduced to account for the use of wider 320 megahertz bandwidth. UTC, APPA, NRECA, AWWA, and AGA agree with AT&T's study, and the interference would only be worse if the Commission increases the power limit to 8 dBm/MHz PSD for LPI using 320 megahertz bandwidth. The AT&T study is also consistent with the conclusions in other studies on the record that addressed

[24] *Id.* at ¶245, *citing* Examples 1B, 4, and 5 from the *AT&T Study. See* Letter from Michael P. Goggin, AT&T Services, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 18-295, at 3 (filed Nov. 12, 2019), Exhibit A "Radio Local Area Network (RLAN) to Fixed Service (FS) Microwave Interference in the 6 GHz Band")(hereinafter, "*AT&T Study*").

the interference potential of VLP.[25] Accordingly, the Commission should reassess AT&T's study to reduce clutter loss and bandwidth mismatch, when considering increasing the power limit to 8 dBm/MHz PSD for LPI devices operating with 320 megahertz bandwidth.

IV. The Commission Should Not Authorize Mobile Standard-Power Access Points and/or Higher Power Levels for Standard-Power Access Points Used in Fixed Point-to-Point Applications.

The Commission invites comment on whether it should allow standard-power access points, under AFC control, to be used in mobile applications under rules similar to those for personal/portable white space devices; and whether to allow standard-power access points used in fixed point-to-point applications to operate at power levels greater than 36 dBm EIRP.[26] Specifically, the Commission asks whether it could use the existing TV White Space rules to mitigate the interference potential from mobile standard power access points. Similarly, the Commission asks whether potential interference from higher power levels for standard-power access points could be mitigated based on rules for unlicensed operations in the 5 GHz band.

A. Mobile Standard-Power Access Points

UTC, APPA, NRECA, AWWA, and AGA oppose allowing mobile standard-power access points generally. Although such operations would be under AFC control, mobile standard-power devices would increase the potential for interference to licensed microwave systems, because mobile operations create potentially strong interference levels based on location and line of site to microwave receivers (e.g. a road over high ground that has direct line of site to main lobe of receiving antenna with no intervening clutter or BEL). Moreover, it would significantly add to the complexity of AFC, raising significant questions regarding the

[25] *See generally*, Letter from The Edison Electric Institute, the American Gas Association, the American Public Power Association, the American Water Works Association, the National Rural Electric Cooperative Association, the Nuclear Energy Institute, and the Utilities Technology Council to Marlene H. Dortch, Secretary, Federal Communications Commission in ET Docket No. 18-295 (filed Jan. 13, 2020), *attaching* Roberson & Associates, LLC, "Impact of Proposed Wi-Fi Operations on Microwave Links At 6 GHz" (the "CII User Study"); and Letter from Coy Trosclair, Director of Telecom Services, Southern Company Services to Marlene H. Dortch, Secretary, Federal Communications Commission in ET Docket No. 18-295 (filed Feb 6, 2020) *attaching* Lockard & White, "FCC 6GHz NPRM Analysis for Southern Company Services." (hereinafter "Southern Company Study"); and Letter from Michael V. Kuberski Director, Utility Communications, Exelon Corporation to Marlene H. Dortch, Secretary, Federal Communications Commission in ET Docket No. 18-295 (filed Apr. 16, 2020) *attaching* Lockard & White, "Methodology Used to Predict Impact of Radio Local Area Networks (RLANS) on Exelon Microwave Network Study." (hereinafter Exelon Study") (all predicting interference from VLP).

[26] *FNPRM* at ¶¶246, 252.

relative costs and the benefits. AFC would need to be designed with mobility in mind and that proposed design would need to be analyzed and commented on, both from a fundamental AFC perspective and from a mobile AFC perspective.

If the Commission does allow mobile standard-power access points, it should establish more stringent power limits than the limits that currently apply to fixed standard-power access points. As noted above, mobile standard-power access points are inherently more likely to cause harmful interference than fixed operations. Lower power limits will help to reduce the potential of interference. This would be consistent with the TV White Space rules, which limit personal/portable devices to a lower power level than fixed white space devices.[27] Also, the Commission must require mobile standard-power access points to register and be controlled by AFC in order to avoid operating in geographic and spectral proximity to licensed microwave systems. In order to ensure that mobile standard-power access points update the AFC system regarding their operations, the Commission should require that they report their location at least every 15 seconds. Note that this is a relatively long period of time, considering that the microwave systems must meet latency performance requirements that are measured in milliseconds and that a mobile standard-power access device in a car traveling 60 miles an hour will have moved 1320 feet in the span of 15 seconds Alternatively, mobile standard-power access points should be required to preload a list of cleared channels over an area (e.g., create a geo-fenced area) and operate without updating location with the AFC system so long as they stay within the cleared area. Geofencing can prove effective at preventing interference but its effectiveness depends on the accuracy of the information in the database and the use of GPS so that the devices can determine when they are within a geofenced area. Therefore, if the Commission authorizes mobile standard-power access points, it should implement rules that limit the power and ensure that AFC effectively controls these operations and prevents them from causing interference when they operate in proximity to licensed microwave receivers.

B. Higher Power Standard-Power Access Points Operating on a Fixed Point-to-Point Basis Using Directional Antennas.

UTC, APPA, NRECA, AWWA, and AGA also oppose allowing standard-power access points operating

[27] *FNPRM* at ¶247.

on a point-to-point basis to use higher power levels than what is permitted for fixed standard-power access points generally (i.e. 36 dBm EIRP). The Commission itself recognizes that such operations pose a greater interference threat than other fixed standard-power access points and it rightfully discourages such operations except for certain targeted applications, such as backhaul. In this regard, UTC, APPA, NRECA, AWWA, and AGA support the Commission's proposal to prevent standard-power access points from operating at higher power limits for point-to-multipoint applications or as a scheme for providing more wide area service through multiple antennas aimed to cover larger areas, which would increase the potential for interference and congestion in the 6 GHz band.

If the Commission authorizes such operations, it should require compliance with the FCC's Part 101 rules for fixed services. This would be consistent with the Commission's regulation of point-to-point operations in other bands. Moreover, the Commission should impose power limits that would reduce the interference potential of such operations generally, and it should adopt additional rules for AFC to ensure that it accounts for the use of directional antennas, including the accuracy of the antenna pattern and the orientation information in the database. Such additional rules for AFC would be necessary to prevent interference and would impose costs and complexity to AFC that the Commission should carefully balance against the potential benefits of allowing higher power standard-power access points when operating on a point-to-point basis.

V. The Commission Should Engage with the Multi-Stakeholder Group and Host a Kick-off Event.

Although the Commission did not raise this issue in the FNPRM, UTC, APPA, NRECA, AWWA, and AGA urge the Commission to engage with the multi-stakeholder group to ensure equal representation, substantive discussions, transparent processes and the development of effective solutions for the implementation of AFC to protect licensed microwave systems and resolve instances of interference and to test low power indoor devices prior to commercial deployment to ensure that they will not cause interference to licensed microwave systems. UTC, APPA, NRECA, AWWA, and AGA support the concept of the multi-stakeholder group that the Commission outlined in the Report and Order; but are concerned it will not be established at all and/or in time to implement AFC and test LPI devices to prevent interference to licensed

microwave systems. Moreover, there are important security issues that need to be addressed within the multi-stakeholder group, and the Commission has stated that it expects that "the multi-stakeholder group will take the lead on this process and develop security protocols that AFC administrators may consider for their operation, subject to Commission review and approval."[28] Utilities are concerned about the security risks associated with AFC and unlicensed operations in the band, and UTC believes that Commission engagement would help to provide the appropriate attention from industry representatives to address this issue and develop effective solutions.

The Commission can promote the work of the multi-stakeholder group by convening the stakeholders to participate in a kick-off meeting of the multi-stakeholder group, and to provide guidance for the group to work productively on the topics that are most important for protecting microwave systems from interference. UTC, APPA, NRECA, AWWA, and AGA look forward to working with the Commission and the multi-stakeholder group in its formation and its activities.

[28] *Report and Order* at ¶80.

CONCLUSION

WHEREFORE, the premises considered, UTC, APPA, NRECA, AWWA, and AGA respectfully oppose the proposals to permit VLP and to increase the power limit for LPI unlicensed operations in the 6 GHz band, 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 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. 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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