

**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 EDISON ELECTRIC INSTITUTE, THE AMERICAN PUBLIC POWER ASSOCIATION, THE NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION, THE AMERICAN PETROLEUM INSTITUTE, AND THE AMERICAN WATER WORKS ASSOCIATION**

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## SUMMARY

The comments on the record do not support allowing unlicensed operations in the 6 GHz band. There is widespread opposition from utilities and other critical infrastructure industries (CII), as well as public safety entities and large commercial communications providers – all of whom have demonstrated in detail the criticality of their communications and the unreasonable risk that interference from unlicensed operations poses to the operational reliability, safety and security of the essential services that they provide. By comparison, proponents of unlicensed operations have failed to provide empirical data to prove that potential interference can be mitigated, much less prevented; and they rely largely on general policy arguments to lay claim to the 6 GHz band.

The reality is that the 6 GHz band is already heavily used, and microwave systems are carefully coordinated such that instances of interference are exceedingly rare. There are literally thousands of microwave systems in the band, and they are designed, built, and maintained to meet extremely high standards in order to maintain reliability of 99.999% or higher. The 6 GHz band is uniquely suited to meet the needs of utilities and other CII, as well as other entities that rely on the band to support their mission critical communications. These entities lack reasonable alternatives to using the 6 GHz band, and many were forced to relocate to the 6 GHz band when the Commission reallocated the 2 GHz band for personal communications services and mobile satellite services. Allowing unlicensed operations in the 6 GHz band would likely force utilities and other CII to relocate again and strand the significant investments that they have made in their microwave systems in the band.

Permitting unlicensed operations in the 6 GHz band would threaten to undermine the reliability of these microwave systems. The record shows that the sheer multitude of unlicensed devices is likely to create aggregated interference by raising the noise floor and cutting into the fade margin that is built into the design parameters of microwave systems. In addition, the record shows that there is also an unreasonable risk of interference from individual unlicensed devices that would potentially operate in geographic and spectral proximity with any one of the thousands of microwave systems in the 6 GHz band. Finally, there is insufficient evidence on the record to show that the risk of interference can be

mitigated effectively by Automated Frequency Coordination (AFC).

AFC is still an unproven concept that has not been tested, and there are serious flaws that have been identified on the record which further draw into question its effectiveness to prevent interference to microwave systems in the 6 GHz band. Moreover, comments from proponents of unlicensed use of the 6 GHz band have failed to provide sufficient analysis, relying instead on models that underestimate the potential for interference and false assumptions about microwave systems. Most importantly, AFC needs to prevent interference to microwave systems, because it will be far too little too late to fix interference after the fact given the importance of these microwave systems and the mission critical communications that they carry. The only proven means of preventing interference in the 6 GHz band is prior coordination, and there is no evidence that AFC will prevent interference from occurring. For all of these reasons, the Commission should not allow unlicensed operations in the 6 GHz band.

If the Commission does decide to allow unlicensed operations in the 6 GHz band, it should adopt rules that would improve interference protection by AFC. Specifically, the Commission should require AFC for both indoor and outdoor unlicensed operations. The Commission should also require protection from adjacent channel and second adjacent channel interference, as well as co-channel interference. The Commission should also adopt an interference criteria of 1 dB fade margin degradation ( $I/N = -6$  dB). Additionally, the Commission should adopt a free-space propagation model for the exclusion areas using AFC, unless there is accurate data to justify adjusting for clutter in the area. Moreover, the AFC system should be centralized in order to assist with the remediation of instances of interference. In addition, the AFC system must be secure, particularly considering the potential threat of cyber-attacks to mission critical communications by utilities and other critical infrastructure. Finally, the system should be thoroughly tested and proven to protect against interference to microwave systems, prior to allowing any unlicensed operations in the 6 GHz band. Even then, the Commission should limit the number of unlicensed devices that should be allowed to be deployed, at least at the outset while the AFC system is in its early stages of deployment. In addition, the devices should be professionally installed as a further safeguard against improper installation by consumers or worse illegal tampering with the equipment.

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THE AMERICAN WATER WORKS ASSOCIATION**

The Utilities Technology Council (UTC), Edison Electric Institute (EEI), American Public Power Association (APPA), National Rural Electric Cooperative Association (NRECA), American Petroleum Institute (API), and American Water Works Association (AWWA) hereby file the following reply comments in response to the Commission’s Notice of Proposed Rulemaking (NPRM) in the above-referenced proceeding.<sup>1</sup>

The record reflects that there is strong opposition – particularly from utilities and other critical infrastructure industries, as well as public safety stakeholders and large commercial communications providers – to expanding the use of the 5.925-6.425 GHz and 6.525-6.875 GHz bands (collectively and hereinafter referred to as the “6 GHz band”) to permit unlicensed operations. Moreover, even those comments that support allowing unlicensed operations in the 6 GHz band also support the adoption of rules that will protect incumbents against interference from unlicensed operations in the 6 GHz band. Most comments urge the Commission to adopt automated frequency coordination (AFC) for both indoor and outdoor operations, and many comments support stronger measures to help identify unlicensed devices that cause interference and tougher enforcement mechanisms for operators responsible for causing interference. UTC, EEI, APPA, NRECA, API, and AWWA support these comments to require greater protection against interference from unlicensed operations, if the Commission decides to permit unlicensed operations at all.

Conversely, UTC, EEI, APPA, NRECA, API, and AWWA oppose comments that suggest reducing interference protections using AFC. Specifically, the Commission should not permit unrestricted low power

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<sup>1</sup> *Unlicensed Use of the 6 GHz Band*, Notice of Proposed Rulemaking, ET Docket No. 18-295 (rel. Oct. 24, 2018).

indoor (LPI) operations all across the band without AFC, as some have suggested.<sup>2</sup> Instead, the Commission should (consistent with the comments by UTC, EEI, APPA, NRECA, API, AWWA, and others suggesting an incrementally staged deployment of unlicensed operations,<sup>3</sup> and consistent with the Commission’s own proposal) restrict low power indoor access point operations in the 6.425-6.525 GHz and 6.875-7.125 GHz sub-bands, if it decides to permit unlicensed operations in the 6 GHz band at all.<sup>4</sup> Moreover, the Commission should require AFC for both indoor and outdoor operations, which has shown to be necessary to protect incumbent operations against potential interference from unlicensed operations. UTC, EEI, APPA, NRECA, API, and AWWA also oppose comments that suggest that the Commission permit higher power in rural areas and not place a height limit on standard power access points.<sup>5</sup> Increasing the power and the height of antennas for unlicensed operations will increase the potential for interference to mission critical microwave systems, which is unacceptable given the importance of these systems and the consequences that could result from interference to them. Therefore, UTC, EEI, APPA, NRECA, API, and AWWA oppose comments that would reduce interference protection for incumbent microwave systems.

As UTC, EEI, APPA, NRECA, API, and AWWA, as well as numerous other comments on the record have stated, the AFC system needs improvements before it can be expected to sufficiently protect incumbents

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<sup>2</sup> See e.g., Comments of Apple, Inc. Broadcom, Inc., Cisco Systems, Inc, Facebook, Inc., Google, LLC, Hewlett Packard Enterprise, Intel Corporation, Marvell Semiconductor, Inc., Microsoft Corporation, Qualcomm Incorporated, and Ruckus Networks, an Arris Company in WT Docket No. 18-295 at 14-35 (filed Feb. 15, 2019)(arguing that LPI devices should be permitted to operate all across the entire 6 GHz band without the need for AFC).

<sup>3</sup> See e.g., Comments of the Association of American Railroads in WT Docket No. 18-295 at 12-13 (filed Feb. 15, 2019) and the Comments of UTC, EEI, APPA, NRECA, API, and AWWA in WT Docket No. 18-295 at 13 (suggesting limiting the initial deployment of devices using an incrementally staged approach in order to mitigate against the potential of interference from an unlimited number of devices being deployed at a time when the AFC approach is still untested and the technology is still in development).

<sup>4</sup> See NPRM at ¶20 (stating that “[b]ecause the lack of location information on mobile stations makes an AFC approach impractical, we propose to allow only indoor “low-power access point” operation in these subbands—using lower, more restricted power levels applicable to operations in the U-NII-2 band.”).

<sup>5</sup> See e.g., Comments of Microsoft in WT Docket No. 18-295 at 19 (stating “[t]he Commission should not impose a height limit on standard-power access points.”). See also Comments of Open Technology Institute at New America Foundation, American Library Association, Consumer Federation of America, COSN—Consortium for School Networking, Public Knowledge, Access Humboldt (Collectively “Public Interest Organizations”) in WT Docket No. 18-295 at 21 (filed Feb. 15, 2019)(stating that “The Commission Should Authorize Higher Power Limits for Outdoor Operations Under the Control of an AFC to Promote Rural Broadband”).

against interference. The comments on the record universally recognize deficiencies that exist in the underlying data from the Universal Licensing System (ULS) database, upon which the effectiveness of the AFC system would rely in terms of its performance. The comments (including some by proponents of unlicensed access to the 6 GHz band) also recognize the deficiency of the AFC system because it does not use a three-dimensional assessment of the exclusion zone for protecting incumbent microwave systems.<sup>6</sup> Finally, the comments on the record echo the comments of UTC, EEI, APPA, NRECA, API, and AWWA that AFC is still in development and is completely untested, such that the Commission should not proceed in permitting unlicensed operations in the 6 GHz band until such time that AFC has been developed, tested, and demonstrated to perform in conformity with the adopted requirements to protect against harmful interference.

The reality is that AFC is still conceptual in its development, and it has yet to be tested in a real-world environment. If the Commission decides to open the 6 GHz band to unlicensed operations and it relies on AFC to mitigate the potential for interference, UTC, EEI, APPA, NRECA, API, and AWWA recommend certain improvements to the design of AFC, which are consistent with other comments on the record. Specifically, the Commission should adopt an interference criterion of 1 dB fade margin degradation ( $I/N = -6$  dB). In addition, the Commission should base AFC upon a free space loss propagation model that assumes line of sight for every link, as suggested by the Fixed Wireless Communications Coalition (FWCC). The Commission's model should be based on accurate data (not estimates) regarding unlicensed operations, and it should require unlicensed operations to update the AFC every day or more frequently regarding the location and other parameters of their operation, including height of above ground level. Furthermore, AFC should only allow the client devices to transmit when both the client devices and the master controllers are located outside the exclusion zones. Finally, AFC systems should be centralized and secured to promote the resolution of interference and to protect against cyber-attacks as described in more detail herein.

UTC, EEI, APPA, NRECA, API, and AWWA reiterate that the Commission must ensure that

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<sup>6</sup> See e.g., Comments of the Fixed Wireless Communications Coalition in WT Docket 18-295 at 4, 29-31 (filed Feb. 15, 2019) (hereinafter Comments of the FWCC) and Comments of Apple, Inc., Broadcom, Inc., Cisco Systems, Inc, Facebook, Inc., Google, LLC, Hewlett Packard Enterprise, Intel Corporation, Marvell Semiconductor, Inc., Microsoft Corporation, Qualcomm Incorporated, and Ruckus Networks, an Arris Company in WT Docket No. 18-295 at 56-58 (underscoring that “Three-Dimensional Interference Protection Calculations Will Ensure Accurate and Efficient AFC Operation”).

interference is prevented before it occurs, not remedied after the fact. The most effective, proven way of doing that is to require that unlicensed operations comply with prior coordination for both indoor and outdoor operations. Therefore, should the FCC move forward with this proposal, UTC, EEI, APPA, NRECA, API, and AWWA urge the Commission to require unlicensed operations to comply with prior coordination. In addition, as recommended by several comments on the record, the Commission should require that unlicensed devices operating in the 6 GHz band be professionally installed. Many unlicensed devices will be operated by consumers with little to no understanding of the significant consequences of interference to incumbent 6 GHz systems. Indeed, the comments on the record indicate that proponents of unlicensed operations in the 6 GHz band are unaware, misunderstand, or simply ignore the magnitude of the risk of interference to incumbent 6 GHz systems, and this only underscores the need for the Commission to put in place safeguards, such as requiring professional installation of unlicensed devices and prior coordination, as a means to effectively protect against the potential of interference.

Remediating interference after the fact will be far too little too late. As numerous electric companies and other CII commented, these incumbent microwave systems are used for a variety of mission critical voice and data applications, and any interference to them risks the safety of life, health, and property. Reliability and latency requirements for SCADA and protective relaying applications are exceptionally high, because these systems must be able to quickly detect and isolate electrical faults before they cause cascading and widespread outages. These systems must also remain operational for communications with electric utility and CII personnel, especially for emergency response. They often serve as the primary means of communication, particularly in rural areas where commercial communications networks and services are unavailable. Railroads and petroleum companies similarly rely on 6 GHz microwave systems to support other mission critical applications, such as positive train control and voice and data communications with manned and unmanned oil and gas platforms in the Gulf of Mexico, as well as infrastructure in other parts of the country. Public safety entities echo that they also rely on the 6 GHz band for various mission critical applications, and some of their microwave systems are used to support electric operations, as well as other governmental operations. While electric companies and other CII may use other spectrum bands, most of their microwave links use the 6 GHz band, and there are

literally thousands of these links across the country in both urban and rural areas. Moreover, utilities and other CII lack reasonable alternatives to using the 6 GHz band, and they have made and are continuing to make significant investments in these 6 GHz systems. These systems and investments would be threatened by the introduction of unlicensed operations and the potential for interference that would undermine system reliability and operational safety.

As the Commission is well aware, there have been enforcement issues associated with previous forays into sharing spectrum with licensed operations in other bands and the use of dynamic frequency selection (and similar technologies) designed to prevent interference. As several comments have observed, these past experiences underscore the need for better enforcement mechanisms if the Commission allows unlicensed operations in the 6 GHz band. Specifically, AFC systems must be required to identify the source of interference and quickly and effectively assist electric companies and other CII with resolving instances of interference. Moreover, AFC operators and unlicensed operators must be held responsible for remedying this interference, and they should be required to provide contact information that electric companies and other CII can use to investigate and resolve instances of interference.

Given the importance of these 6 GHz band microwave systems, if the Commission decides to allow unlicensed operations, AFC systems must be robust, secure, and transparent to protect against interference and strong enforcement mechanisms must be established to address instances of interference that occur. UTC, EEI, APPA, NRECA, API, and AWWA support comments that urge the Commission to establish security requirements for AFC systems, especially considering the need to prevent cyber-attacks that could threaten critical infrastructure communications. UTC, EEI, APPA, NRECA, API, and AWWA also support comments on the record that support stronger enforcement mechanisms to remedy interference that occurs.

#### **I. The Commission Should Not Permit Unlicensed Operations in the 6 GHz Band.**

Comments on the record oppose the introduction of unlicensed operations in the 6 GHz band because they represent an unreasonable risk of interference to mission critical infrastructure communications that poses a threat to safe, secure, and reliable delivery of essential electric, gas, and water services, as well other essential services including transportation and public safety services. As the comments explain, the risk of interference

cannot be sufficiently mitigated to prevent the potential of interference, and the consequences of interference to any one of the thousands of microwave links throughout the country are so great that remedying interference after the fact will be far too little too late.

Previous experience with spectrum sharing and the introduction of unlicensed operations in other bands has shown that unlicensed bands have become congested and subject to interference and that dynamic frequency selection and other database solutions similar to AFC have not prevented interference from occurring. There is every reason to believe that the result will be the same in the 6 GHz band, and none of the comments by proponents of unlicensed operations have proven otherwise.

Accordingly, the public interest would not be served by allowing unlicensed operations in the 6 GHz band. Although the proximity of the 6 GHz band to the 5.8 GHz band makes it convenient for unlicensed operations, on balance, the public interest in the reliability, safety, and security of incumbent microwave systems in the 6 GHz band outweighs the speculative commercial interests of unlicensed operators and equipment manufacturers that would be the primary beneficiaries of access to the 6 GHz band for unlicensed operations. Moreover, alternatives exist for unlicensed operations in other spectrum bands, whereas electric companies and other CII in the band lack reasonable alternatives to using the 6 GHz band where they have made significant investments and where they were forced to relocate after the 2 GHz band was reallocated by the Commission to make way for personal commercial services and mobile satellite services.<sup>7</sup>

**A. Existing utility and CII microwave systems rely on microwave systems in the 6 GHz band for mission critical communications and would face significant consequences if interference occurs.**

As electric companies and other CII have commented on the record, the 6 GHz band is heavily used by these entities, who must design, build, and maintain their microwave systems to extremely high standards of

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<sup>7</sup> See e.g., Comments of Xcel Energy in WT Docket No. 18-295 (filed Feb. 15, 2019) (stating that “Xcel Energy relocated to the 6 GHz band from the 2 GHz band after that band was reallocated for other wireless services. Xcel Energy lacks a realistic alternative to using the 6 GHz band. While Xcel Energy does utilize other frequency bands, including the 11 GHz band, the 6 GHz band provides the best option to achieve the necessary level of reliability because of the favorable propagation needed to communicate over long distances, often in rural and in mountainous areas, throughout Xcel Energy’s extensive footprint.”). In their comments, UTC, EEI, APPA, NRECA, API, and AWWA observed that when the 2 GHz band was reallocated in the 1990s many of the mobile satellite services were never fully commercially deployed by licensees and many of them are now trying to convert their licenses to be used for ancillary terrestrial services – raising questions whether the public interest was truly served by reallocating the 2 GHz band for these services and relocating incumbent microwave systems out of the band.

reliability, safety, and security. American Electric Power (AEP) commented that its microwave systems licensed in the 6 GHz spectrum “are and will continue to be mission critical systems for AEP” within its private telecommunications network, and “in fact AEP has several microwave system upgrades under way and has plans for several more over the next three years.”<sup>8</sup> Like AEP and several other utilities that commented on the record, Idaho Power Company uses its microwave systems in the 6 GHz band to support SCADA and protective relaying.<sup>9</sup> In its comments, Idaho Power Company emphasized that it lacks reasonable alternatives to its 6 GHz microwave systems because commercial systems are either unavailable or inadequate, and fiber is impractical and/or cost prohibitive to deploy in and around the federal lands in its service territory.<sup>10</sup>

The Critical Infrastructure Coalition (Coalition) similarly explains that, in addition to utilities, there are also oil and gas and mid-stream members of the Coalition that rely on 6 GHz microwave radio networks to provide communications links with critical infrastructure systems and for remote monitoring systems for oil and gas and chemical storage, and pipeline control that span thousands of miles.<sup>11</sup> The City of Los Angeles commented that the Los Angeles Department of Water and Power (LADWP) also relies on its extensive 6 GHz microwave network to support SCADA and protective relaying, and it explained that “[i]nterference with the operation of these 6 GHz microwave links could be disastrous,” because “potential interference could lead the relay system, which depends on reliable 6 GHz links, to malfunction and create instability” that could result in “cascading failures throughout the power grid, resulting in wide area blackouts.”<sup>12</sup>

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<sup>8</sup> Letter from Richard Harper, Transport Engineering Manager, American Electric Power to Marlene H. Dortch, Secretary, Federal Communications Commission in WT Docket No. 18-295 at 1 (filed Feb. 12, 2019).

<sup>9</sup> Comments of Idaho Power Company in WT Docket No. 18-295 at 3-6 (filed Feb. 14, 2019).

<sup>10</sup> *Id.*

<sup>11</sup> Comments of the Critical Infrastructure Coalition in WT Docket No. 18-295 at 3 (filed Feb. 15, 2019). *See also* Comments of Rignet Satcom LLC in WT Docket No. 18-295 at 2 (filed Feb. 15, 2019) (describing its microwave network in the Gulf of Mexico that spans 24,000 square miles and consists of 93 point-to-point links in the 6 GHz band that serve oil and gas providers).

<sup>12</sup> Comments of the City of Los Angeles in WT Docket No. 18-295 at 6 (filed Feb. 15, 2019) (adding that “[p]ower system failures endanger public safety, and create an extra layer of crises for law enforcement, fire rescue, and medical personnel.”).

Tucson Electric Power likewise commented that it is concerned that interference to its 6 GHz microwave systems could result in outages on the grid, and it added that “if the 6 GHz spectrum it uses becomes unreliable due to harmful interference, and thus, communications, are lost or degraded, the Company’s ability to provide electric service is immediately compromised, potentially impacting an area far beyond the Company’s service territory.”<sup>13</sup> Finally, Southern Company reported that it relies on its 6 GHz microwave systems to support a variety of applications, including AMI, wide area situational awareness, integration of distributed energy resources and storage, electric transportation, distributed grid management, outage detection, phasor measurement units, security monitoring, and field crew dispatch and monitoring.<sup>14</sup> Moreover, Southern Company underscores that interference with these 6 GHz systems could have serious consequences, owing to the critical nature of the underlying utility applications that they support.<sup>15</sup>

These comments by utilities and other CII agree with the comments of UTC, EEI, APPA, NRECA, API, and AWWA that it is paramount to protect these microwave systems against interference. They also agree that the risk of interference from unlicensed operations in the 6 GHz band is unreasonably high and cannot be sufficiently mitigated by using AFC. Several electric companies support the use of prior coordination to protect against interference from unlicensed operations.<sup>16</sup> Others suggest ways to improve the AFC system so that it more effectively protects against interference.<sup>17</sup> Others express their interference concerns based upon the

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<sup>13</sup> Comments of Tucson Electric Power Company in WT Docket No. 18-295 at 8 (filed Feb. 15, 2019).

<sup>14</sup> Comments of Southern Company Services, Inc. in WT Docket No. 18-295 at 7-8 (filed Feb. 15, 2019).

<sup>15</sup> Id. at 10, n 6 (citing a report by the Department of Energy requiring 10 milliseconds latency for utility critical protection circuits such as those supported by 6 GHz microwave systems). See also U.S. Department of Energy, *Communications Requirements of Smart Grid Technologies* (2010), at Appendix A (available at [https://www.energy.gov/sites/prod/files/gcprod/documents/Smart\\_Grid\\_Communications\\_Requirements\\_Report\\_10-05-2010.pdf](https://www.energy.gov/sites/prod/files/gcprod/documents/Smart_Grid_Communications_Requirements_Report_10-05-2010.pdf)).

<sup>16</sup> See e.g., Comments of Xcel Energy in WT Docket No. 18-295 at 6 (filed Feb. 15, 2019) (stating “Xcel Energy urges the Commission to require prior frequency coordination for standard power access point operations, including outdoor and indoor operations,” adding that several commenters, such as the FWCC, have demonstrated how ULS is unsuitable to protect fixed links against harmful interference from unlicensed devices.”).

<sup>17</sup> See e.g., Comments of Tucson Electric Power at 11 (recommending that AFC should include TSB-10 after “all protection criteria, alternate propagation models, and interference prediction models are presented to the TR-45 Working Group for evaluation and possible adoption into TSB 10.”) See also Comments of Southern Company Services at 14-22 (identifying a laundry list of issues with the proposed AFC system.).

difficulty they have experienced coordinating with WISPs.<sup>18</sup> Ultimately, though, all utilities agree that the Commission should not allow unlicensed operations in the 6 GHz band if the risk of interference cannot be eliminated entirely.<sup>19</sup> In this regard, utilities agree that remedying interference after the fact will do too little too late.<sup>20</sup>

**B. The public interest in reliability and safety outweighs the benefits of unlicensed access to the 6 GHz band.**

Given that the 6 GHz band is heavily and effectively used by utilities and CII in order to help to provide essential services, on balance, the public interest in protecting these services outweighs the potential benefits of opening the band to unlicensed operations. In addition to those systems that are licensed to electric companies and other CII, there are also other essential service providers, such as railroads and public safety, that use the band and have commented on the record in opposition to the Commission's proposal to allow unlicensed operations in the band.<sup>21</sup> These licensees all commented that they, too, rely on the 6 GHz band for a variety of mission critical voice and data applications that cannot tolerate interference from unlicensed operations. Railroads commented that they use the 6 GHz band for positive train control, and public safety entities commented that they need their 6 GHz systems for backhauling mission critical voice and data to police, fire, and rescue units. Other entities commented that they also rely on the 6 GHz band to provide critical

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<sup>18</sup> See Comments of Chelan County Public Utility District No. 1 in WT Docket No. 18-295 at 1 (raising concerns that WISPs will cut costs and reduce interference protection to improve return on investment).

<sup>19</sup> See *e.g.*, Comments of Southern Company at 22-24 (stating that “The 6 GHz Band is Not Suitable for Unlicensed Devices if the Interference Risk Cannot be Eliminated”)

<sup>20</sup> *Id.* (stating that “Once these devices are in the marketplace and found to be causing interference it will be too late to impose new conditions.”)

<sup>21</sup> See *e.g.*, Comments of the Association of American Railroads in WT Docket No. 18-295 at 2 (filed Feb. 15, 2019)(stating “Given incumbent licensees’ need for reliable service in these frequency bands, the AAR opposes introducing new unlicensed services in the 6 GHz band.”) See also Comments of APCO at 4 (filed Feb. 15, 2019) (underscoring that “Public Safety Spectrum Bands are Unsuitable for Unproven Spectrum Sharing Methods,” and adding that “APCO remains concerned that expanding unlicensed use in the 6 GHz band will cause harmful interference to public safety operations”). See also Comments of the National Public Safety Telecommunications Council (NPSTC) in WT Docket No. 18-295 at 6 (stating “NPSTC seriously questions whether opening the heavily used 6 GHz band to millions of unlicensed devices at this time is sound spectrum policy, given the band serves as the foundation for critical microwave links relied upon by public safety, critical infrastructure entities, commercial carriers and broadcasters.”).

communications for other government operations.<sup>22</sup> Finally, the band is heavily used by commercial telecommunications carriers and broadcasters, who have also commented on the record and expressed their significant concerns about the threat of interference to their operations.<sup>23</sup>

While the public interest benefits that these incumbents provide are tangible and significant, the benefits promised by unlicensed operators are speculative and proprietary. As UTC, EEI, APPA, NRECA, API, and AWWA explained in the initial comments, allowing unlicensed operations in the 6 GHz band would result in *less* efficient, not more efficient, use of the 6 GHz band, because it is likely to discourage any further investment among microwave licensees, and it is unclear whether and to what extent that unlicensed operations will be successfully deployed in the band. UTC, EEI, APPA, NRECA, API, and AWWA are deeply concerned that the Commission has failed to adequately consider the record evidence and these practical realities in proposing to open the 6 GHz band for unlicensed operations.

It is inequitable to effectively displace incumbent microwave licensees from the 6 GHz band just because the band is located in proximity to the 5.8 GHz unlicensed band and would enable unlicensed operators and manufacturers to leverage the existing equipment that is commercially available from that band. Instead, if the proponents of unlicensed access to the 6 GHz band truly believe that they can share without causing harmful interference to incumbent microwave systems, the Commission must require them to prove that they can do so

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<sup>22</sup> See Comments of the City of Los Angeles at 10 (underscoring that “Highly Sensitive Operations In The 6 GHz Band Serve The Public Good and Must be Protected.”). See also Comments of the City of New York in WT Docket No. 18-295 at 3 (stating that “This band is utilized by many public safety and critical infrastructure entities to provide microwave Fixed Service (“FS”) point to point connectivity in support of their mission critical land mobile radio systems not only in New York City but systems nationwide.”) and Comments of CORF in WT Docket No. 18-295 (requesting AFC protection of microwave systems in certain subbands of the 6 GHz band that are used for radio astronomy).

<sup>23</sup> Comments of AT&T in WT Docket No. 18-295 at 6 (filed Feb. 15, 2019) (underscoring that “6 GHz Supports Critical Licensed Facilities And Services, and the Proposed Unlicensed Uses Would Likely Introduce Harmful and Irremediable Interference.”) And see Comments of GCI Communications in WT Docket No. 18-295 (filed Feb. 15, 2019) (explaining that GCI “operates the largest wireless network in Alaska, utilizing the 6 GHz band to deliver critical and important services throughout the State” and underscoring that “Incumbent Operations Must Remain the Primary Operation in the 6 GHz Band and Be Sufficiently Protected Through Robust Coordination.”). “See also Comments of the National Association of Broadcasters in WT Docket No. 19-295 at 2 (stating that “NAB urges the Commission not to permit unlicensed operations in the U-NII-6 and U-NII-8 bands unless a robust, reliable mechanism is developed to coordinate these operations with licensed BAS [broadcast auxiliary systems] uses – including mobile uses.”).

by thoroughly testing this equipment without any interference occurring. This solution would be a far more equitable and reasonable approach than displacing incumbent microwave systems and stranding the investments to cater to demands for increased flexibility and relaxation of restrictions on unlicensed operations. More importantly, it would reduce the risk of interference to mission critical communications on incumbent microwave systems, thereby protecting and fairly balancing the public interest in ensuring the reliability, safety, and security of essential electric, gas, and water services as well as other critical services.

**C. Utilities and CII lack alternatives to using the 6 GHz band.**

While there are alternative bands that would be suitable for unlicensed operations besides the 6 GHz band, there are no reasonable alternative spectrum bands for electric companies and other CII to use for microwave systems that would provide the same favorable propagation characteristics as the 6 GHz band. As the Coalition explained, “[t]he 6 GHz communications systems used by the Coalition are deployed across state lines and cover vast swaths of the country. The propagation characteristics of these systems allow users to create long-haul systems. If unlicensed user interference threatened the integrity of these networks, Coalition members would have no viable alternative to their existing 6 GHz networks.”<sup>24</sup> Similarly, the Association of American Railroads also stated that “[a]lternatives are unavailable,” explaining that railroads like BNSF have upgraded their entire 6 GHz networks to support PTC and are working to comply with the statutory deadline to implement PTC industry-wide by December 2020.<sup>25</sup> As such, the record reflects that electric companies and other CII lack reasonable alternatives to using the 6 GHz band for their fixed microwave systems, thereby making it all the more important that the Commission ensure that allowing unlicensed operations does not interfere with these microwave systems.

**II. If the Commission Allows Unlicensed Operations in the 6 GHz, It Must Ensure That Microwave Systems Are Protected from Interference.**

The comments on the record all agree that incumbent microwave systems must be protected from interference from unlicensed operations, if the Commission decides to allow such unlicensed operations in the 6

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<sup>24</sup> Comments of the Critical Infrastructure Coalition in WT Docket No. 19-295 at 9.

<sup>25</sup> Comments of the Association of American Railroads in WT Docket No. 18-295 at 4.

GHz band.<sup>26</sup> Unlicensed operations would be required to accept interference from and not cause harmful interference to licensed operations in the band, in accordance with Section 15.5(b) of the Commission's rules.<sup>27</sup> The question is really how to prevent harmful interference from unlicensed operations. Comments on the record generally support the use of AFC to prevent unlicensed operations from interfering with licensed microwave systems in the band, and several comments, including those by UTC, EEI, APPA, NRECA, API, and AWWA, support the use of prior coordination.<sup>28</sup> Many of the comments support the use of AFC and/or prior coordination for both outdoor and indoor operations.<sup>29</sup> In addition, many comments support interference protection from adjacent (and second adjacent) channels, as well as co-channel interference.<sup>30</sup> Some comments, including those

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<sup>26</sup> See *e.g.*, Comments of Comsearch in WT Docket No. 18-295 at 8 (filed Feb. 15, 2019) (stating that “The AFC and other rules developed in this proceeding must be designed to provide proper protection for incumbent licensees from interference from unlicensed devices.”).

<sup>27</sup> See 47 C.F.R. §15.5b (stating that “Operation of an intentional, unintentional, or incidental radiator is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical (ISM) equipment, or by an incidental radiator.”). See also 47 C.F.R. §15.3(m) (defining harmful interference as “Any emission, radiation or induction that endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunications service operating in accordance with this chapter.”).

<sup>28</sup> See Comments of UTC, EEI, APPA, NRECA, API, and AWWA at 12; Comments of the Critical Infrastructure Coalition at 11; and Comments of Idaho Power Company at 7 (stating “Prior coordination of unlicensed operations, particularly outdoor operations, will help alleviate both interference and the substantial time it takes to identify interference by avoiding it from the outset.”).

<sup>29</sup> See Comments of Comsearch at 7 (underscoring that “All Unlicensed Device Operation in the 6 GHz Band Must Use AFC in Order to Prevent Interference in the Microwave Services.”); Comments of CTIA at 20 (underscoring that “The Automated Frequency Control System Must Extend to Indoor Access Points.”); Comments of the National Spectrum Management Association (NSMA) in WT Docket No. 18-295 at 32 (stating that “All U-NII-5 and U-NII-7 operation must be under the control of an AFC [including indoor operations] and Comments of the City of New York at 7 (stating “the City urges the Commission to require that both outdoor and indoor access points operating in the 6GHz band be required to register with and query the AFC to obtain authorization to operate on a particular frequency and location”). There are other comments that support indoor unlicensed operations without AFC. See *e.g.*, Comments of NCTA -- The Internet & Television Association in WT Docket No. 18-295 at 16 (filed Feb. 16, 2019) (underscoring that “The Commission Should Permit Indoor, Low-Power Access Point Operations in the U-NII-5 and U-NII-7 Bands without AFC.”).

<sup>30</sup> See *e.g.*, Comments by the Association of American Railroads at 10-11 (explaining that out of band emission limit limits alone will be insufficient to protect incumbent operations because microwave receivers can experience interference even when transmitters in adjacent channels have no out-of-band emissions.); Comments of Comsearch at 4 (stating that “The coordination system must control transmissions by unlicensed devices that are co- or adjacent frequency to a microwave receiver.”); and Comments of the FWCC at 25-27 and Attachment B “Need for Adjacent Channel Interference Protection and Attachment C “RLAN/FS Guard Band Analysis”; Comments of Southern Company Services at 15 (stating that “[t]here is no reason why an automated process should not consider adjacent channel systems. Consideration of adjacent channel systems is simply an additional step in the AFC algorithm and requires no additional data.”).

by UTC, EEI, APPA, NRECA, API, and AWWA, urge the Commission to restrict the number of unlicensed devices deployed in the band at least during the initial stages of development to minimize the potential for interference. Finally, many comments recommend ways to improve AFC, including adopting the appropriate interference criteria and propagation model, using accurate data about microwave systems from ULS or a third-party coordinator, centralizing the AFC system, securing it against cyber-attacks, and performance testing of the AFC. These issues are described in more detail in the following subsections.

**A. Prior coordination should be required to prevent interference to microwave systems.**

UTC, EEI, APPA, NRECA, API, and AWWA support the comments on the record that urge the Commission to require prior coordination as the most effective way to protect microwave systems in the 6 GHz band against interference. Prior coordination is well understood and has been proven effective at preventing interference from occurring and has resulted in the effective use of the 6 GHz band. As Comsearch stated,

“[p]rior coordination procedures have a long history of enabling successful frequency sharing among a wide variety of services. In particular, coordination procedures have been tailored to address the specific challenges presented by sharing in the point to point microwave services, Advanced Wireless Services (“AWS”), 70-90 GHz, Wireless medical telemetry service, TV White Spaces and most recently, the Citizen Band Radio Service (“CBRS”).”<sup>31</sup>

As UTC, EEI, APPA, NRECA, API, and AWWA previously explained, prior coordination also takes into account sources of passive reflection and atmospheric conditions that can greatly affect the interference environment in which microwave systems are located.<sup>32</sup> Moreover, prior coordination would account for microwave systems that are operating under conditional authority, which is another reason that some comments oppose using AFC.<sup>33</sup> These factors would not be taken into account using AFC.

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<sup>31</sup> Comments of Comsearch at 8, n. 7.

<sup>32</sup> Comments of UTC, EEI, APPA, NRECA, API, and AWWA at 12.

<sup>33</sup> Comments of Xcel Energy at 6-7 (stating “Relying on ULS data alone would also fail to take into account situations where microwave systems may be deployed under conditional authority prior to obtaining a grant of authorization or where they are authorized by blanket operation. Instead of relying solely on ULS data, Xcel Energy urges the Commission to require prior frequency coordination for standard power access point operations, including outdoor and indoor operations.”)

**B. AFC for indoor and outdoor operations is necessary to protect against interference.**

Comments on the record have shown that indoor as well as outdoor unlicensed operations pose a significant threat of interference to microwave systems in the 6 GHz band. For example, Nokia conducted testing, and its report concluded that co-channel and adjacent channel interference can be an issue for both indoor and outdoor unlicensed operations. Specifically, Nokia recommended that “[f]or the sub-bands most heavily used by fixed links, i.e., 5.925-6.425 GHz (U-NII-5) and 6.525-6.875 GHz (U-NII-7), the Commission should indeed allow indoor and outdoor access point operations under the control of an Automated Frequency Coordination (AFC) system to mitigate potential interference from the U-NII devices to the fixed links.”<sup>34</sup> These findings are consistent with numerous other comments on the record that also support requiring AFC for both indoor and outdoor unlicensed operations.<sup>35</sup> Accordingly, the Commission should require that unlicensed operations comply with AFC requirements for both indoor and outdoor operations.

**C. Adjacent channel interference protection is necessary.**

UTC, EEI, APPA, NRECA, API, and AWWA support the comments that recommend requiring protection against interference from unlicensed operations on adjacent channel and second adjacent channels, as well as co-channel frequencies. As the FWCC explained in its comments, the Commission misapprehends the problem when it proposes to rely on out-of-band emission limits alone to protect against adjacent channel interference.<sup>36</sup> The AFC system must not only block unlicensed operations whose signal would overlap a microwave system, but it must also block unlicensed operations whose transmit signal is close to a fixed service receiver channel even though there is no overlap. The FWCC recommends adopting a guard band on either side of the fixed service receive channel in order to protect against interference, and it estimates that the size of the guard band would need to be equal to half the nominal FS channel in order to offer adequate interference

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<sup>34</sup> Comments of Nokia, Technical Appendix at 9 (filed Feb. 15, 2019).

<sup>35</sup> See e.g., Comments of the FWCC, Attachment A “Determining the Impact of Non-Coordinated Indoor 6 GHz RLAN Interference on Fixed Service Receivers” (filed Feb. 15, 2019) (finding that “Even indoor RLANs at very low power pose an unacceptable interference threat to FS receivers unless they operate under control of a coordination system.”).

<sup>36</sup> Comments of the Fixed Wireless Communications Coalition at 25.

protection in most cases.<sup>37</sup> The Association of American Railroads recommends an alternative approach that would exclude unlicensed operations on adjacent channels and second adjacent channels using successively smaller and smaller geographic exclusion zones. UTC, EEI, APPA, NRECA, API, and AWWA support either of these recommended approaches for protecting against adjacent channel interference.

**D. Incremental deployment of unlicensed operations, professional installation of unlicensed operations, and thorough testing of the AFC system should be required to mitigate potential interference from unlicensed operations.**

UTC, EEI, APPA, NRECA, API, and AWWA support the comments on the record that request that the Commission limit the deployment of unlicensed operations in the 6 GHz band, at least initially, while the AFC system is still being developed and interference scenarios are being better understood. As the Association of American Railroads explained, “[t]his will limit the potential for interference in the 6 GHz band by providing a ‘trial run’ to conduct real world testing to ensure that the AFC can protect incumbent users from unlicensed devices before such devices are deployed more widely.”<sup>38</sup> Moreover, this would be consistent with Commission precedent, where the Commission decided to limit the number of unlicensed devices deployed during the initial stages of development in order “to allow [a] service to rollout in a controlled manner in order to minimize any potential negative impact on primary users.”<sup>39</sup>

Another common-sense approach to limiting the potential for interference to microwave systems in the band would be to require professional installation of unlicensed devices. Many comments on the record support this requirement.<sup>40</sup> As Motorola explained, “[t]he certified professional installer approach employed in the CBRS band can be utilized in the 6 GHz band to ensure that installation data (e.g., transmit power levels,

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<sup>37</sup> *Id.*

<sup>38</sup> Comments of the Association of American Railroads at 12.

<sup>39</sup> *Id.*, citing *Higher Ground LLC Application for Blanket Earth Station License*, Order and Authorization, 32 FCC Rcd 728, ¶ 20 (2017).

<sup>40</sup> *See e.g.*, Comments of Motorola Solutions Inc. at 6 (stating that it “recommends that unlicensed devices operating in these bands either be required to access an AFC function, and/or be professionally installed (in fixed configurations)” because of concerns about tampering with the equipment by consumers); and Comments of the National Spectrum Managers Association at 31 (stating that “NSMA endorses a ‘professionally installed’ requirement for standard-power access points,” and that the installer should be independent so there is no incentive to “cut corners”).

antenna height, patterns, pointing angles, etc.) is accurate, and there is an accountability chain if there are problems observed in the field.”<sup>41</sup> APCO also supported requiring professional installation of standard power access points, explaining that “[i]n addition to assisting with accurate location information, this could help to minimize the risk that members of the general public could defeat any of the numerous protections the Commission ultimately adopts to prevent interference to public safety operations.”<sup>42</sup> Further, El Paso Electric Company recommended that professional installation should be conducted by manufacturers to certify that the equipment will not be detrimental to the operation of Licensed Systems and will not pose a threat to Critical Infrastructure.<sup>43</sup> UTC, EEI, APPA, NRECA, API, and AWWA support these comments that recommend limiting the deployment of unlicensed operations in order to mitigate the potential interference from unlicensed operations to microwave systems in the 6 GHz band.

**E. Recommended improvements to the AFC system should be adopted.**

UTC, EEI, APPA, NRECA, API, and AWWA also echo the comments on the record that recommend improvements to the AFC system. As described in the following subsections, the Commission should establish I/N as an interference protection criteria and a limit of no more than -6 db; it should improve the accuracy of the ULS data that will be used by the AFC and also refer to third party database information; it should adopt a free-space propagation model that assume line-of-sight and zero ground clutter; it should centralize the AFC systems; it should ensure the security of AFC systems against cyber-attacks and it should thoroughly test the AFC systems and show that they will prevent interference before allowing any unlicensed operations in the 6 GHz band.

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<sup>41</sup> Comments of Motorola Solutions Inc. at 6.

<sup>42</sup> Comments of APCO International at 14.

<sup>43</sup> Comments of El Paso Electric Company in WT Docket No. 18-295 at 6 (filed Feb. 15, 2019).

## 1. Interference criteria

Comments on the record support the adoption of an interference criteria of 1 dB fade margin degradation ( $I/N = -6$  dB) consistent with the comments of UTC, EEI, APPA, NRECA, API, and AWWA.<sup>44</sup> Comsearch recommends that the interference criteria should account for aggregative effects of multiple unlicensed devices as well.<sup>45</sup> As Comsearch explained, “[i]n a real world deployment there may be many unlicensed U-NII devices operating in close proximity to fixed service microwave receivers, and implementing an IPC that evaluates these interfering signals in isolation could result in aggregate levels of interference that would render the 6 GHz band unusable. An effective IPC also needs to include and aggregate the interference that enters microwave receivers from adjacent-channel unlicensed devices.”<sup>46</sup> Tucson Electric Power also recommends incorporating the threshold-to-interference (T/I) in the latest version of TSB-10-F as the default criterion for digital radio systems, and then also using a single exposure limit of  $I/N = -6$  dB as the inter- and intra-system interference criterion (equivalent to a 1 dB receiver threshold degradation).<sup>47</sup> Tucson also notes that the RKF Engineering Study upon which the proponents rely to support unlicensed operations in the 6 GHz band was based upon the -6 dB exposure limit. El Paso Electric Power added that “[m]anufacturers’ receiver specifications normally include Carrier to Interference (C/I) for Co-channel and Adjacent- channel and are available for inclusion in analysis. One important factor in this analysis is systems that employ Automatic Transmitter Power Control (ATPC) to manage the link and compensate for fading. Marginal interference to the receiver could result in link failure and reduced reliability when the receiver is fooled by an unlicensed system transmitter.”<sup>48</sup> UTC, EEI, APPA, NRECA, API, and AWWA support these comments and accordingly urge the Commission should adopt an

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<sup>44</sup> See e.g., Comments of Xcel Energy at 7 (stating “Xcel Energy concurs with the FWCC that it would be necessary to adopt a frequency coordination system with adequately conservative interference protection criterion of 1 dB fade margin degradation ( $I/N$  ratio = -6 dB).”).

<sup>45</sup> Comments of Comsearch at 20-21.

<sup>46</sup> *Id.* at 21.

<sup>47</sup> Comments of Tucson Electric Power Company at 11.

<sup>48</sup> Comments of El Paso Electric Power at 5.

interference criteria of 1 dB fade margin degradation ( $I/N = -6$  dB) and account for additional suggestions (e.g., TSB-10-F and ATPC) referenced in these comments.

## **2. ULS data and the need to frequently update the AFC with information on unlicensed operations**

Comments on the record universally agree that the data in the ULS is inaccurate and insufficient to enable AFC to prevent interference from occurring.<sup>49</sup> Comsearch stated that “[d]ata in ULS is incomplete, sometimes inaccurate, and not sufficient for AFC use necessary to protect primary microwave users [because] it: 1) does not include antenna parameters (model only); 2) it does not include information on radios; and 3) contains errors.”<sup>50</sup>

Further, comments on the record support requiring unlicensed operators to frequently update their information in the AFC. Tucson Electric Power recommends updating the information at least once every 24 hours. As other comments explain, microwave systems may commence operations under conditional authority as soon as they file the application with the Commission.<sup>51</sup> Moreover, unlicensed operations may move from one location to another, further underscoring the need to update location information frequently, which must include the height above ground level as well as the coordinates in order to provide a three-dimensional approach to coordination. Accordingly, the AFC must be updated daily in order to avoid unlicensed operations interfering with new microwave systems that may be operating.

## **3. Modelling**

UTC, EEI, APPA, NRECA, API, and AWWA reiterate that AFC should use a free space loss model generally, and comments on the record also widely support using this model.<sup>52</sup> As the FWCC stated, “free space

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<sup>49</sup> See e.g., Comments of National Spectrum Managers Association 4 (stating that “As with many large databases, the ULS is plagued with inaccuracies or lacks critical data. When data is missing or clearly in error, each user will “fill in the blanks” differently. This will undoubtedly cause confusion and misunderstanding among the participants.”).

<sup>50</sup> Comments of Comsearch at 17.

<sup>51</sup> See e.g., Comments of the National Spectrum Managers Association at 16-17 (stating that “Stations that are eligible for conditional authority have already filed with the FCC and provided the relevant data. These paths should be accounted for in the AFC database since they may already be operational.”).

<sup>52</sup> See e.g., Comments of National Spectrum Managers Association at 25; and Comments of Xcel Energy at 7.

path loss model should be used for every link because line-of-sight assumptions will be required unless the AFC incorporates terrain and/or building information that identifies line-of-sight cases with an extremely high degree of reliability.”<sup>53</sup> Accordingly, UTC, EEI, APPA, NRECA, API, and AWWA urge the Commission to require the AFC system to use a free space model that assumes line of sight without clutter, unless there is actual data showing otherwise. The Commission should not allow the AFC to incorporate assumptions into the modeling that may not be accurate and may lead to interference.

#### **4. Centralized AFC**

UTC, EEI, APPA, NRECA, API, and AWWA reiterate their support for a centralized AFC system, which will promote the resolution of instances of interference, and other comments on the record echo their support for a centralized approach as well. As Tucson Electric Power explained in its comments, “[t]he AFC system must be centralized to ensure the accuracy of information for Part 15 unlicensed frequency assignments. If multiple AFC systems exist, individual systems would conceivably have inconsistent information, diverging databases, and perhaps even employ different protection criteria – any of which could result in harmful interference to incumbent Part 101 users.”<sup>54</sup> Verizon also supported centralization of the AFC system stating “the AFC system should be a positive, centralized controller able to select the appropriate channel allocation and/or power level for a requesting access point so as to protect incumbent service licensees from harmful interference.”<sup>55</sup> The Association of American Railroads agreed and explained that “a centralized system architecture will minimize the number of data points regarding licensed use in the 6 GHz band that must be continually updated and maintained,” adding that it also “will limit the number of functions that an unlicensed

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<sup>53</sup> See FWCC June 25, 2018 Ex Parte, at 5. See also Comments of the FWCC at 24 (stating “A hill or an office building in the database can be included in the calculation. Where such data are not available, then the only way to avoid risk of interference is to assume free-space propagation. It would be foolhardy to rely on the existence of clutter just because a statistical model assumes it, without knowing whether the clutter in fact is there.”).

<sup>54</sup> Comments of Tucson Electric Power at 17.

<sup>55</sup> Comments of Verizon at 5.

device must perform, thereby reducing device complexity and, by extension, the number of ways unlicensed devices may malfunction and cause harmful interference to licensed operators.”<sup>56</sup>

## **5. Security for AFC**

Comments on the record support implementing security as part of the AFC. As Southern Company explained in its comments, security is critical given “growing concerns about physical and cyberattacks on the power grid, and pursuant to the Critical Infrastructure Protection (CIP) Standards of the Federal Energy Regulatory Commission (FERC),” as well as the proliferation of smart grid devices.<sup>57</sup> Tucson Electric Power added that security in the AFC is needed to prevent a critical microwave system from being maliciously compromised by interference.<sup>58</sup> UTC, EEI, APPA, NRECA, API, and AWWA support these comments and accordingly urge the Commission to develop security requirements for the AFC.

## **6. Performance testing**

As UTC, EEI, APPA, NRECA, API, and AWWA stated in the initial comments, the AFC is still conceptual and has yet be developed, let alone tested, to ensure that it is actually capable of protecting against interference. Other comments on the record echo this fundamental concern that allowing unlicensed operations in the 6 GHz band without adequate testing of the AFC system poses an unreasonable risk of potential interference, particularly given the critical nature of the communications services that are carried over microwave systems. Accordingly, UTC, EEI, APPA, NRECA, API, and AWWA urge the Commission to defer from allowing any unlicensed operations in the 6 GHz band unless and until the AFC has been tested and proven to protect against interference from unlicensed operations in the band.

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<sup>56</sup> Comments of the Association of American Railroads at 17.

<sup>57</sup> Comments of Southern Company Services at 8

<sup>58</sup> Comments of Tucson Electric Power at 26-27 (reporting “Cybersecurity Concerns”).

## CONCLUSION

**WHEREFORE**, the premises considered, UTC, EEI, APPA, NRECA, API, and AWWA respectfully oppose the proposal to permit unlicensed operations in the 6 GHz band, because doing so poses a significant risk of interference to microwave systems that electric companies and CII uses to ensure the safe, reliable, and effective delivery of essential utility, electric, water, oil, and gas operations. The potential for interference cannot be effectively mitigated using AFC, as proposed by the Commission. Improving the reliability, resilience and efficiency of the electric grid has been a priority at all levels of government and within the utility sector for years, and much progress has been made. However, allowing for unlicensed use of the 6 GHz band and the corresponding interference with CII operations it would cause runs counter to that national goal. Accordingly, UTC, EEI, APPA, NRECA, API, and AWWA urge the Commission not to permit unlicensed operations in the band. Alternatively, if the Commission does authorize unlicensed operations in the band, it should protect against interference by requiring prior coordination of outdoor and indoor operations essential for electric companies and CII, notwithstanding the adoption of other interference protections that ensure the reliability of 6 GHz microwave systems.

Respectfully,

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