

**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	)	

**COMMENTS OF THE UTILITIES TECHNOLOGY COUNCIL, THE EDISON ELECTRIC INSTITUTE, THE AMERICAN PUBLIC POWER ASSOCIATION, THE NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION, THE AMERICAN GAS ASSOCIATION, THE AMERICAN PETROLEUM INSTITUTE, THE AMERICAN WATER WORKS ASSOCIATION, APCO INTERNATIONAL, AND THE INTERNATIONAL ASSOCIATION OF FIRE CHIEFS**

**UTILITIES TECHNOLOGY COUNCIL**

Brett Kilbourne  
Vice President, Policy, and General Counsel  
Utilities Technology Council  
2550 South Clark Street, Suite 960  
Arlington, VA 22202  
202-872-0030

**EDISON ELECTRIC INSTITUTE**

Aryeh B. Fishman  
Associate General Counsel, Regulatory Legal  
Affairs  
Edison Electric Institute  
Washington, D.C. 20004  
(202) 508-5023

**AMERICAN PUBLIC POWER ASSOCIATION**

Corry Marshall  
Senior Government Relations Director  
American Public Power Association  
2451 Crystal Dr., Suite 1000  
Arlington, VA 22202  
202-467-2959

**NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION**

Brian O'Hara  
Senior Director Regulatory Issues – Telecom &  
Broadband  
National Rural Electric Cooperative Association  
4301 Wilson Blvd.  
Arlington, VA 22203  
703-907-5798

**AMERICAN GAS ASSOCIATION**

Matthew J. Agen  
Assistant General Counsel  
American Gas Association  
400 North Capitol Street, NW  
Washington, DC 20001  
202-824-7090

**AMERICAN PETROLEUM INSTITUTE**

Suzanne Lemieux  
Manager Operations Security &  
Emergency Response Policy,  
Corporate Policy  
American Petroleum Institute  
200 Massachusetts Ave. NW  
Washington, D.C. 20001-5571  
(202) 682-8000

**AMERICAN WATER WORKS ASSOCIATION**

G. Tracy Mehan, III  
Executive Director, Government Affairs  
American Water Works Association  
1300 Eye Street, NW Suite 701W  
Washington, DC 20005  
202-326-6124

**INTERNATIONAL ASSOCIATION OF  
FIRE CHIEFS**

Government Relations Manager  
International Association of Fire Chiefs  
4795 Meadow Wood Lane, Suite 100  
Chantilly, VA 20151

**APCO INTERNATIONAL**

Jeffrey S. Cohen  
Chief Counsel and Director of Government  
Relations  
APCO International  
1426 Prince Street  
Alexandria, VA 22314  
571-312-4400 ext. 7005

February 22, 2021

**TABLE OF CONTENTS**

**SUMMARY ..... i**

**I. Background and Overview..... 2**

**II. The Commission Should Not Permit 6 GHz U-NII Client-to-Client Operations..... 7**

**III. The Suggested Restrictions on Client-to-Client Operations are Insufficient to Prevent Interference to Licensed Microwave Systems. .... 9**

**IV. If Client-to-Client Operations are Permitted, Each Client Must Access the Same Access Point. .... 11**

## SUMMARY

Client-to-client operations will increase the potential for interference to licensed microwave systems that utilities, oil and gas pipeline companies and public safety agencies use for mission-critical communications. The use of an enabling signal from the access point will not effectively mitigate the interference potential from client-to-client operations, particularly if the signal strength need only be -99 dBm/MHz to permit client devices to communicate directly with each other. This will expand the effective range over which client devices will be able to support broadband traffic, thereby increasing the radiated power of each unlicensed 6 GHz system. As each client device communicates with other client devices, the duty cycle of the system will increase as well. That will increase the probability that these transmissions will affect microwave receivers, and it will also increase the noise floor which will also increase the potential for interference to licensed microwave systems, particularly during certain environmental conditions, such as rain, fog, and atmospheric ducting that reduce fade margins. Finally, these client devices may be able to communicate with different client devices receiving enabling signals from different access points in neighboring rooms or buildings, which only further increases the potential for interference, as well as the difficulty of mitigating against it. As many of these client devices would be portable, the interference would be intermittent and transient, making the interference difficult to identify and resolve as a practical matter.

Proponents of client-to-client operations have failed to provide sufficient technical information to demonstrate that such operations will not cause harmful interference to 6 GHz licensed microwave systems. The Commission was right to prohibit such operations, and it should not be expanding unlicensed operations in the 6 GHz band at this time. Real-world tests that have been submitted on the record have shown that even a single unlicensed LPI device can cause interference to microwave systems as far as 9 kilometers away. Further testing should be conducted and must prove that unlicensed operations will not cause interference to licensed microwave systems in the band. Congress has expressed its concern about the potential for interference from unlicensed operations to licensed

microwave systems in the band, and it has directed the Commission to report its progress on rigorous testing to protect against interference. As such, the Commission should not consider client-to-client unlicensed operations at least not until rigorous tests have been conducted and have proven that such operations will not cause harmful interference to licensed microwave systems in the band. Alternatively, if such operations are permitted, the Commission should establish safeguards to reduce their interference potential, including reducing the range of the enabling signal and limiting client-to-client operations so that client devices only communicate with other client devices that are receiving an enabling signal from the same access point.

..

**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 EDISON ELECTRIC INSTITUTE, THE AMERICAN PUBLIC POWER ASSOCIATION, THE NATIONAL RURAL ELECTRIC COOPERATIVE ASSOCIATION, THE AMERICAN GAS ASSOCIATION, THE AMERICAN PETROLEUM INSTITUTE, THE AMERICAN WATER WORKS ASSOCIATION, APCO INTERNATIONAL, AND THE INTERNATIONAL ASSOCIATION OF FIRE CHIEFS**

The Utilities Technology Council (6 GHz Incumbent Stakeholders), the Edison Electric Institute (EEI), the American Public Power Association (APPA), the National Rural Electric Cooperative Association (NRECA), the American Petroleum Institute (API), the American Gas Association (AGA), the American Petroleum Institute, the American Water Works Association (AWWA), APCO International, and the International Association of Fire Chiefs (collectively, “6 GHz Incumbent Stakeholders”) hereby file the following comments in response to the Office of Engineering and Technology’s Public Notice in the above-referenced proceeding.<sup>1</sup> 6 GHz Incumbent Stakeholders oppose unlicensed client-to-client operations because such operations would exponentially increase the risk of interference to licensed 6 GHz microwave systems and make it even more difficult to resolve interference complaints. There is insufficient evidence to support claims that such risk of interference can be mitigated. Moreover, the public interest in avoiding risk of harmful interference to wireless networks supporting critical infrastructure clearly weighs against any benefits of allowing such operations. Furthermore, the requested relief impermissibly seeks reconsideration of the Commission’s *Report and Order*, which already prohibited such operations.<sup>2</sup> Therefore, the Commission should

---

<sup>1</sup> *The Office of Engineering & Technology Seeks Additional Information Regarding Client-to-Client Device Communications in the 6 GHz Band*, Public Notice, ET Docket No. 18-295, DA 21-7, 86 Fed. Reg. 6644 (rel. Jan. 11, 2021), available at <https://docs.fcc.gov/public/attachments/DA-21-7A1.pdf> (hereinafter “Public Notice”).

<sup>2</sup> The 6 GHz Incumbent Stakeholders support the Fixed Wireless Communications Coalition (FWCC), which opposes allowing client-to-client communications, based on both substantive and procedural grounds. See Letter from Donald Evans and Seth Williams, Counsel for the Fixed Wireless Communications Coalition to Marlene H. Dortch, Secretary, Federal Communications Commission in ET Docket No. 18-295 (filed Dec. 3, 2020), available at [https://ecfsapi.fcc.gov/file/1203114519697/fl.2020.12.02%2018-295%20Exp%206%20GHz%20\(01487763xB3D1E\).pdf](https://ecfsapi.fcc.gov/file/1203114519697/fl.2020.12.02%2018-295%20Exp%206%20GHz%20(01487763xB3D1E).pdf). As the FWCC has explained, the relief requested by Broadcom, Intel and Microsoft in their October 22, 2020 *ex parte* letter is “procedurally deficient and substantively without support.” Moreover, “instead of seeking reconsideration of the 6 GHz Order as required by Commission rules, the authors of the October 22 Letter now seek to collaterally attack the 6 GHz

continue to prohibit client-to-client unlicensed operations in the 6 GHz band.

## I. Background and Overview

In the Report and Order, the Commission correctly decided to prohibit client-to-client operations. It recognized that “[p]ermitting a client device operating under the control of an access point to authorize the operation of additional client devices could potentially increase the distance between these additional client devices and the access point and increase the potential for harmful interference to fixed service receivers or electronic news gathering operations.”<sup>3</sup> The Commission further explained that it could lead to standard-power devices in the U-NII-5 and U-NII-7 bands transmitting in locations where the AFC otherwise would prevent operation to protect incumbent service operations, and it could also lead to low-power indoor devices being used outdoors, contrary to the FCC’s restrictions on LPI devices that were designed to prevent outdoor operations.<sup>4</sup> Finally, the Commission agreed that client-to-client operations could also make identifying and resolving interference more difficult.<sup>5</sup>

Undaunted, Apple, Broadcom and other unlicensed proponents now urge the FCC to revise its decision to prohibit client-to-client operations, arguing that lifting the prohibition would enable additional types of innovative unlicensed operations in the band.<sup>6</sup> They claim that the potential for interference can be reduced by preventing client-to-client operations beyond the range of the access

---

Order’s conclusion regarding client-to-client communications.” *See also Unlicensed Use of the 6 GHz Band*, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd 3852 (2020) (“*Report and Order*” and alternatively “*Further Notice of Proposed Rulemaking*”). *See also* Letter from Christopher Szymanski, Broadcom Inc., et. al., to Marlene H. Dortch, Secretary, Federal Communication Commission, ET Docket No. 18-295, GN Docket No. 17-183 (Oct. 22, 2020) (October 22 Letter), *available at* [https://ecfsapi.fcc.gov/file/1022320205247/Ex%20Parte%20Enabling%20Portable%20Operations%20Oct2020%20\(with%20attachment\).pdf](https://ecfsapi.fcc.gov/file/1022320205247/Ex%20Parte%20Enabling%20Portable%20Operations%20Oct2020%20(with%20attachment).pdf).

<sup>3</sup> Report and Order, 35 FCC Rcd 3852, 3926 at ¶200.

<sup>4</sup> *Id.*

<sup>5</sup> *Id.*

<sup>6</sup> *See e.g.* Apple, Broadcom, Google, and Microsoft Comments in ET Docket No. 18-295 at 13-14 (filed June 29, 2020); Wi-Fi Alliance Comments in ET Docket No. 18-295 at 19-20 (June 29, 2020); Qualcomm Comments in ET Docket No. 18-295 at 7 (filed June 29, 2020); Dynamic Spectrum Alliance Comments in ET Docket No. 18-295 at 19-20 (filed June 29, 2020); Broadcom, Microsoft Reply Comments in ET Docket No. 18-295 at 3-4 (filed June 29, 2020); and Broadcom, Intel, and Microsoft Oct. 22, 2020 Ex Parte Letter in ET Docket No. 18-295 at 1-2; Apple, Broadcom, et al. Nov. 6, 2020 Ex Parte Letter in ET Docket No. 18-295 at 1-2.

point. Specifically, they claim that client devices would not be permitted to communicate with each other unless they receive an enabling signal (*i.e.* beacon) from an access point within the preceding four seconds. Further, they suggest that the minimum strength of the beacon signal from the access point should be -99 dBm/MHz in order to permit client-to-client operations. They claim that this will ensure each individual client participating in client-to-client communications is safely inside the area where a client device is authorized to communicate with an access point.

In the Public Notice, the Office of Engineering and Technology invites comment on whether the Commission should permit 6 GHz U-NII client devices to directly communicate when they are under the control of or have received an enabling signal from a low-power indoor (LPI) access point.<sup>7</sup> More specifically, the Office of Engineering and Technology asks parties to describe how the enabling signal from the access point is similar or different from signals, such as beacons, that access points already use to connect with client devices, as well as the degree to which an enabling signal would tether a client device not under the control of an access point to that access point.<sup>8</sup> In addition, the Office of Engineering and Technology invites comment on how client-to-client operations would enable applications that otherwise could not be accomplished by communications through an access point.<sup>9</sup> In terms of power, the Office of Engineering and Technology invites comment on whether to use the current power limits (*i.e.* as much as 24 dBm EIRP over 320-megahertz channels (or -1 dBm/MHz)) or establish lower power limits on client-to-client operations in order to reduce the potential for harmful interference to incumbent operations.<sup>10</sup>

The Office of Engineering and Technology recognizes that client-to-client operation may make it possible for a client device to receive an enabling signal from an access point even when the enabling

---

<sup>7</sup> Public Notice at 2.

<sup>8</sup> *Id.*

<sup>9</sup> *Id.*

<sup>10</sup> *Id. at 3.*

signal is too weak to enable the client device to conduct communications with the access point.<sup>11</sup> In turn, the weak received signal level would make it more likely that the client device could be operating outdoors, contrary to the rules for LPI operations and thereby increase the potential for interference to licensed microwave systems. The Office of Engineering and Technology recognizes that limiting the signal strength of the enabling signal could help to avoid this scenario. In that context, the Office of Engineering and Technology invites comment on the appropriate signal strength for the enabling signal from the low-power indoor access point to be received by the client device. Further, the Office of Engineering and Technology asks how to correlate the signal level with the current requirement that the client device be under the control of an access point, so that client-to-client operations will not cause instances of harmful interference that the Commission sought to avoid when it prohibited client-to-client operations altogether in the Report and Order.<sup>12</sup>

The Office of Engineering and Technology also recognizes that client-to-client operations could involve different access points, citing Apple, Broadcom et al.'s suggestion to permit two client devices to communicate with each other even if they receive enabling signals from two different access points.<sup>13</sup> It invites comment on how both devices could be required to use the enabling signal from the same access point. Alternatively, it asks if other configurations should be permitted, such as one standard power access client device communicating directly with an LPI client device. Similarly, it asks whether client-to-client operations should be permitted when both devices are controlled by a standard power access point, and if so, whether any changes are needed to AFC systems. Finally, it asks whether the enabling signal channel should be the same for each device operating on a client-to-client basis.<sup>14</sup>

---

<sup>11</sup> *Id.* at 3.

<sup>12</sup> *Id.*

<sup>13</sup> *Id.*

<sup>14</sup> *Id.*

6 GHz Incumbent Stakeholders have been active participants throughout the Commission's 6 GHz proceeding and even in related proceedings prior to the current one. As 6 GHz Incumbent Stakeholders have explained throughout this proceeding, utilities, oil and gas pipeline companies, and public safety licensees rely on the 6 GHz band in order to operate microwave systems that provide mission-critical communications in support of electric, gas and water operations, pipeline operations, and police, fire and rescue services. These microwave systems carry voice and data communications, and they are designed, built and maintained to extremely high standards for reliability and availability, as well as low latency. Any interference to these microwave systems from unlicensed operations in the 6 GHz band can have serious consequences for utility and oil and gas pipeline operations, as well as public safety.

Consistent with their comments in response to the *Further Notice of Proposed Rulemaking* in this proceeding, 6 GHz Incumbent Stakeholders strongly oppose any further unlicensed operations in the 6 GHz band – including and especially client-to-client operations – until rigorous testing in a real-world environment has proven that unlicensed operations will not cause harmful interference to licensed microwave systems. The only real-world tests that have been conducted and submitted on the record have shown exactly the opposite – that even a single unlicensed LPI device can cause harmful interference to a licensed microwave system from a distance as far away as 9 kilometers (km).<sup>15</sup> Allowing client-to-client operations would only increase the probability and exacerbate the severity of interference to licensed microwave systems. Moreover, it is not at all clear that the safeguards that have been suggested by proponents of client-to-client operations would be sufficient to prevent interference from occurring.

Procedurally, proponents bear the evidentiary burden of showing that client-to-client operations

---

<sup>15</sup> Letter from Jennifer L. Oberhausen, Director, Regulatory Affairs, CTIA to Marlene H. Dortch, Secretary, Federal Communications Commission, ET Docket No. 18-295 (Nov. 13, 2020).

will not cause interference, which they have not come close to demonstrating. They have failed to produce any technical analyses to support what they have suggested; instead, they have only made vague claims that client-to-client operations would enable additional innovative use cases for unlicensed operations.

Energy companies, public safety and other 6 GHz incumbent stakeholders have made numerous good-faith efforts – both formally through the 6 GHz multi-stakeholder group and informally -- to invite unlicensed proponents to work with them on testing. Unfortunately, the reply from unlicensed proponents has either been no or silence. Now, Congress has intervened, requesting that the Commission report on progress towards “ensuring rigorous testing related to unlicensed use of the 6 gigahertz band.”<sup>16</sup>

6 GHz Incumbent Stakeholders and other incumbent stakeholders in the band have urged the Commission to refrain from any further equipment certification of unlicensed devices operating in the 6 GHz band until rigorous testing has been conducted and has shown that unlicensed operations will not cause interference to 6 GHz microwave systems.<sup>17</sup> 6 GHz Incumbent Stakeholders also urged the Commission to exercise its authority under Section 2.945 of the Rules to require equipment manufacturers to provide sample devices for such testing. 6 GHz Incumbent Stakeholders take this opportunity to reiterate the interest of the incumbent stakeholders in participating in any tests that the Commission conducts using sample equipment from the equipment manufacturers. 6 GHz Incumbent Stakeholders also reiterate their interest in working with the FCC to develop the FCC’s report to

---

<sup>16</sup> Consolidated Appropriations Act, 2021, Joint Explanatory Statement – Division E, at p. 32, *available at* <https://docs.house.gov/billsthisweek/20201221/BILLS-116RCP68-JES-DIVISION-E.pdf> (emphasis added).

<sup>17</sup> Letter from Utilities Technology Council, Edison Electric Institute, American Public Power Association, American Petroleum Institute, National Public Safety Telecommunications Council, National Rural Electric Cooperative Association, American Water Works Association, International Association of Fire Chiefs, American Gas Association and APCO International to Marlene H. Dortch, Secretary, Federal Communications Commission in ET Docket No. 18-295 (filed Jan. 26, 2021), *available at* [https://ecfsapi.fcc.gov/file/101261430830862/6%20GHz%20Incumbent%20Interference%20Testing%20Letter%20\(final\).pdf](https://ecfsapi.fcc.gov/file/101261430830862/6%20GHz%20Incumbent%20Interference%20Testing%20Letter%20(final).pdf).

Congress on the results of the testing.

## **II. The Commission Should Not Permit 6 GHz U-NII Client-to-Client Operations.**

Proponents of client-to-client operations play a very risky shell game, focusing on the potential benefits while attempting to distract from the risk of interference. The request for the Commission to allow 6 GHz U-NII client-to-client operations lacks any meaningful limiting principle that would sufficiently mitigate the risk of interference in terms of location, frequency or duration. Proponents claim they could limit daisy chaining by preventing client devices that are beyond the -99 dBm/MHz signal strength of the access point's enabling signal for more than four seconds, but the reality is that a daisy by any other name is still a daisy. It still means the signal strength at the edge of the range of the system is going to be stronger, which will increase the potential for interference from the unlicensed system. Moreover, using the -99 dBm contour of the enabling signal would significantly increase the broadband coverage of the system overall, and would likely result in exactly the kind of interference from non-compliant operations (*e.g.* LPI operations in outdoor environments) the Commission sought to prevent when it established the prohibition on client-to-client operations.

Not only would permitting client-to-client operations increase the signal strength and the coverage of the system overall, but it would exponentially increase the number of times unlicensed signals are transmitted. In addition to communicating with the access point, each client device would be able to communicate with every other client device within range of the enabling signal of the access point. As the number of these signal transmissions increases, the overall duty cycle of the system also increases. The net effect of this would saturate the area with interference, effectively preventing any other competing application from using the spectrum in the area that is covered by the system. In turn, the noise floor would increase, thereby reducing the interference margins and link budgets of microwave receivers and drowning out weaker signals, especially when interference from unlicensed operations coincides with naturally occurring events such as fog, rain or atmospheric ducting that

reduce reception of microwave signals.

Finally, client-to-client operations would enable portable devices, making it even more difficult to identify, report and resolve instances of harmful interference as a practical matter. As proponents of client-to-client operations stated on the record, they envision a variety of different portable use applications that would be enabled through client-to-client communications. They claim that client-to-client communications would allow devices to seamlessly access different access points without having to associate with a new access point before initiating a session for things such as AR/VR/MR applications. “Devices would not need to be onboarded to an existing infrastructure network to serve consumer needs—portable clients could intercommunicate independently even if they are not credentialed with the local fixed network in their user’s location.”<sup>18</sup> In short, proponents propose that client-to-client operations enable portable devices to migrate from access point to access point and have an added level of flexibility to be able to access the system through other client devices in the system, rather than through the access point.

As 6 GHz Incumbent Stakeholders have previously explained in this proceeding, the impact of transient and intermittent sources of interference from portable devices can be worse than source of interference coming from fixed devices.<sup>19</sup> Intermittent interference brings an element of uncertainty that makes it more difficult to mitigate against. It can also cause microwave systems to repeatedly resynch, resulting in extended periods of time when microwave system performance can be degraded. Moreover, it is difficult to trace the source of intermittent and transient interference because it may be gone by the time the licensee begins to search for it. Finally, microwave systems are not designed to detect interference. Interference may only become evident when the performance of microwave

---

<sup>18</sup> Comments of Apple, Inc. Broadcom, Inc. Google, LLC. and Microsoft Corp. in ET Docket No. 18-295 at 13 (filed June 29, 2020).

<sup>19</sup> Comments of UTC, EEI, NRECA, APPA, API and AWWA in ET Docket No. 18-295, Appendix A “Douglas McGinnis, “Spectrum and Utility Communications Networks: How Interference Threatens Reliability” (2019)” (filed Feb. 19, 2019), available at [https://ecfsapi.fcc.gov/file/10215631615474/FINAL\\_6%20GHz%20Comments\\_with\\_addendum.docx](https://ecfsapi.fcc.gov/file/10215631615474/FINAL_6%20GHz%20Comments_with_addendum.docx).

systems begins to degrade, and by that time an intermittent or transient source of interference may no longer be in the same location or occurring anymore. As a result, incumbent licensees may experience greater impacts and expend more effort resolving intermittent and transient interference from portable devices operating on a client-to-client basis.

### **III. The Suggested Restrictions on Client-to-Client Operations are Insufficient to Prevent Interference to Licensed Microwave Systems.**

The Commission was correct in the *Report and Order* to prohibit client-to-client operations because such operations will increase the potential for interference, and proponents have not suggested restrictions that are sufficient to prevent harmful interference from occurring. While proponents claim that using the enabling signal from the access point will limit the extent to which client devices could operate outdoors or otherwise increase the potential for harmful interference, the opposite is true.

They claim that the interference potential could be mitigated by requiring the devices to receive the enabling signal within the last four seconds, but that would only prevent client-to-client operations when they are out of range of the access point, and then only when the client loses reception of the enabling signal of *any access point* for more than four seconds. This proposed mitigation does not even account for a foreseeable use case in which a portable device could be carried outside, and it would continue to operate as long as it continued to receive the enabling signal. In this case, even if the device lost reception with the enabling signal, it could continue to communicate with another client device for another four seconds or less; and if it connected with another access point in another building or room, it would continue to communicate with other client devices and it could still be outside or otherwise closer to a microwave system or directly in the boresight of a microwave receiver. Thus, this time restriction would not prevent interference.

The Office of Engineering and Technology is correct to invite comment on the appropriate power level of the enabling signal because that is even more important for purposes of mitigating the

interference potential of client-to-client operations.<sup>20</sup> While proponents suggested -99 dBm/MHz, as a practical matter that would extend the effective range of the client devices to transmit broadband communications with each other than would otherwise be the case if the client devices communicated directly with the access point. By comparison, -70 dBm is considered a sufficiently strong signal for a Wi-Fi device to provide simple applications, such as emails, web-browsing, and scanning barcodes. Higher bandwidth applications such as streaming video require -65-67 dBm signal strength, depending on whether the device is fixed or mobile.<sup>21</sup> As a result, client-to-client operations would extend the effective range of a 6 GHz unlicensed system to provide broadband by another 30 dB, which is significant.<sup>22</sup> Given such a significant increase in the effective broadband range using client-to-client operations, it is reasonable to expect that there is a significant increase in harmful interference potential posed by client-to-client operations.

As noted above, the increased interference potential of client-to-client operations in terms of range and power is compounded by the increase in the number of times that a signal will be transmitted between client devices as well as with the access point. The duty cycle of the system as a whole will increase substantially as client devices increasingly communicate with each other. As the duty cycle increases, the probability of interference with a microwave signal increases as well. Not only does it increase interference probability, but the increase in the duty cycle also increases the noise floor, potentially drowning out reception of utility communications by licensed microwave systems, particularly weak signals during events such as rain, fog, and atmospheric ducting which cut into the fade margin of a microwave system.

The Office of Engineering and Technology asks how to correlate the signal level with the

---

<sup>20</sup> Public Notice at 2.

<sup>21</sup> MetaGeek, “Understanding WiFi Signal Strength” available at <https://www.metageek.com/training/resources/wifi-signal-strength-basics.html>.

<sup>22</sup> This 30 dB differential would result in a 30X increase in the effective range of a system’s broadband coverage.

current requirement that the client device be under the control of an access point, and in response 6 GHz Incumbent Stakeholders recommend that there needs to be a 1:1 correlation as near as possible between the range of the enabling signal compared to the range with the current requirement that the client device be under the control of an access point.<sup>23</sup> Otherwise, client-to-client operations may greatly exceed the range of unlicensed operations – and hence the interference potential -- compared to what the Commission intended when it authorized LPI and standard power access operations.

**IV. If Client-to-Client Operations are Permitted, Each Client Must Access the Same Access Point.**

The Office of Engineering and Technology asks if client devices should be limited to receiving an enabling signal from the same access point or from any authorized access point. In that context, the Office of Engineering and Technology notes that Apple, Broadcom et al.’s suggestion would potentially permit two client devices to communicate even if they receive enabling signals from two different access points. The Office of Engineering and Technology also recognizes the potential complexities this would involve. Specifically, it asks how different configurations could be implemented, including the extent to which standard power access points could be permitted to communicate with a client device controlled by a low power indoor access point. Further, it asks whether the AFC would need to be changed to account for client-to-client operations. More importantly, the Office of Engineering and Technology asks how different configurations would protect incumbent operations from harmful interference. Finally, it asks whether there are any alternative methods or necessary rule changes not considered within the Public Notice.<sup>24</sup>

6 GHz Incumbent Stakeholders continue to oppose any client-to-client operations, but if such operations are permitted, they should be tethered to the one access point that is controlling the client devices that are communicating with each other. As such, both client devices should be receiving their

---

<sup>23</sup> Public Notice at 3.

<sup>24</sup> Public Notice at 3.

enabling signal from the same access point. This would limit the potential for interference that would result from devices roaming from access point to access point. It would not represent an undue burden to restrict client-to-client communications to a single access point on the same channel because portability would still be enabled, albeit the client would need to associate with a different access point when it moves within range of that access point. Once the portable device had associated with another access point, it would automatically reassociate with the access point in the future without any need for manual association. As more experience is gained with client-to-client operations, additional flexibility could be permitted to allow client devices to access different access points. At present, however, the Office of Engineering and Technology should limit client devices to accessing the same access point that is controlling them, otherwise it would pose an unreasonable risk of harmful interference.

## **CONCLUSION**

6 GHz Incumbent Stakeholders appreciate the opportunity to provide their comments on client-to-client operations and respectfully request that the Office of Engineering and Technology refrain from permitting such operations, at least at this time. 6 GHz Incumbent Stakeholders believe that the Commission's decision to prohibit client-to-client operations was correct in order to prevent interference to licensed microwave systems. Further, 6 GHz Incumbent Stakeholders do not believe that the restrictions suggested by proponents of client-to-client operations would prevent interference to licensed microwave systems. Specifically, using the enabling signal from the access point to restrict client-to-client operations will not prevent client devices from being used out of compliance/outdoors, and in fact it would clearly expand the effective range of the system, which would in turn increase the interference potential to licensed microwave systems, including through outdoor operations. Secondly, client-to-client operations will increase the duty cycle of the system as a whole which will further increase the interference potential to licensed microwave systems. Finally, client-to-client operations would support portable operations, which would make it more difficult to identify and resolve

interference from intermittent and transient sources. For all these reasons, 6 GHz Incumbent Stakeholders respectfully request that the Office of Engineering and Technology refrain from authorizing unlicensed client-to-client operations the 6 GHz band.

Respectfully,

**UTILITIES TECHNOLOGY COUNCIL**

/s/ Brett Kilbourne

Brett Kilbourne  
Vice President Policy and General Counsel  
Utilities Technology Council  
2550 South Clark Street, Suite 960  
Arlington, VA 22202  
202-872-0030

**EDISON ELECTRIC INSTITUTE**

/s/ Aryeh Fishman

Aryeh Fishman  
Associate General Counsel, Regulatory  
Legal Affairs  
Edison Electric Institute  
Washington, D.C. 20004  
(202) 508-5000

**AMERICAN PUBLIC POWER  
ASSOCIATION**

/s/ Corry Marshall

Corry Marshall  
Senior Government Relations Director  
American Public Power Association  
2451 Crystal Dr., Suite 1000  
Arlington, VA 22202  
202-467-2939

**NATIONAL RURAL ELECTRIC  
COOPERATIVE ASSOCIATION**

/s/ Brian M. O'Hara

Brian M. O'Hara  
Senior Director Regulatory Issues –  
Telecom & Broadband  
National Rural Electric Cooperative  
Association  
4301 Wilson Blvd.  
Arlington, VA 22203  
703-907-5798

**AMERICAN GAS ASSOCIATION**

/s/ Matthew Agen

Matthew J. Agen  
Assistant General Counsel  
American Gas Association  
400 North Capitol Street, NW  
Washington, DC 20001  
(202) 824-7090

**AMERICAN PETROLEUM  
INSTITUTE**

/s/ Suzanne Lemieux

Suzanne Lemieux  
Manager Operations Security &  
Emergency Response Policy, Corporate  
Policy  
American Petroleum Institute  
200 Massachusetts Avenue NW  
Washington, DC 20001-5571  
(202) 682-8000

**AMERICAN WATER WORKS  
ASSOCIATION**

/s/ G. Tracy Mehan, III

G. Tracy Mehan, III  
Executive Director – Government Affairs  
American Water Works Association  
1300 Eye St. NW Suite 701  
Washington, DC 20005-3314  
202-628-8303

**INTERNATIONAL ASSOCIATION OF  
FIRE CHIEFS**

/s/ Ryan Woodward

Government Relations Manager  
International Association of Fire Chiefs  
4795 Meadow Wood Lane, Suite 100  
Chantilly, VA 20151

**APCO INTERNATIONAL**

/s/ Jeffrey Cohen

Jeffrey S. Cohen  
Chief Counsel and Director of Government  
Relations  
APCO International  
1426 Prince Street  
Alexandria, VA 22314  
571-312-4400 ext. 7005

February 22, 2021