



July 6, 2021

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 - 12th Street, S.W.
Washington, D.C. 20554

Re: Notice of Ex Parte Presentation, 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.

Dear Ms. Dortch:

On July 1, 2021, Brett Kilbourne and Rob Thormeyer from the Utilities Technology Council (“UTC”), and Aryeh Fishman from the Edison Electric Institute (“EEI”), as well as Kasey Chow, and Michael Rosenthal from Southern Company, and Tom Dombrowsky from DLA Piper on behalf of Southern Company and David Rines outside counsel to Southern Company met with Umair Javed, Acting Chief Counsel and Ethan Lucarelli, Acting Legal Advisor, Wireless and Public Safety in the Office of Acting Chairwoman Jessica Rosenworcel of the Federal Communications Commission (“Commission” or “FCC”) to discuss matters related to the above-referenced proceedings. The purpose of the meeting was to review and discuss the findings from recent field-testing of commercially available, FCC-certified unlicensed low power indoor (“LPI”) devices on an actual typical 6 GHz fixed service microwave link, which was conducted by Southern Company together with Lockard & White (“L&W”) and the Electric Power Research Institute (“EPRI”).¹

These recent interference tests are the latest in a series of real-world tests that Southern and other 6 GHz licensee stakeholder organizations have conducted to determine the interference potential of unlicensed operations to licensed microwave systems in the 6 GHz band. As early as July 2020, real-world interference tests have been conducted using actual licensed microwave systems, and these tests have shown that unlicensed devices operating in compliance with the

¹ The report documenting the results of these interference tests was previously provided to the staff of the FCC’s Office of Engineering and Technology. See Letter from Larry Butts, Manager, Telecom Engineering, Southern Company Services, Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission in ET Docket No. 18-295 and GN Docket No. 17-183 (filed June 23, 2021); and see Attachment A: Test Report on the Effects of 6 GHz Unlicensed RLAN Units on Fortson to Columbus Microwave Link June 21, 2021, available at <https://www.fcc.gov/ecfs/filing/106231367519302> (“6 GHz Interference Report”).

Commission's rules caused harmful interference to licensed microwave receivers from distances of several kilometers away where they were in line of sight with each other, and even at closer distances (less than 1 km away) interference was detected, despite antenna mismatch between the unlicensed device that was operating at 6 meters above ground level ("AGL") and the microwave system that was 59.4 meters AGL.² Moreover, these tests detected interference even when the unlicensed device was off-axis in the sidelobes of the microwave receiver – and importantly, using low duty cycles and high building entry loss factors that the Commission used as the basis for its rules. These test results were brought to the Commission's attention as part of the record in this proceeding in comments that were filed in support of a petition for reconsideration that also cited an interference study in a laboratory environment showing significant potential interference to licensed microwave systems from unlicensed devices.³

In the fall of 2020, CTIA and Southern Company conducted additional interference tests using a programmable vector signal generator to represent the transmission of a single LPI device. Southern met with the FCC's Office of Engineering & Technology ("OET"), as well as the staff for the various commissioners and the Chairman of the FCC to review the results of these tests.⁴ These tests were conducted in a real-world environment which clearly accounted for building entry loss, as well as other factors such as bandwidth and duty cycle, which were both conservatively factored compared to the larger channel sizes (*i.e.*, 80 MHz versus 180 or 320 MHz channels) that equipment manufacturers plan to use and the duty cycle that would be expected from high bitrate applications such as video streaming (*i.e.*, .4% duty cycle versus 30% or 100% duty cycles).⁵ These tests showed that a single LPI device caused interference to a

² Electric Power Research Institute "Unlicensed Use in the 6 GHz Band: Field Interference Test Results", Document No. 3002019712 (Jul. 2020), *available at* <https://www.epri.com/research/products/000000003002019712?src=mail>.

³ Letter from Brett Kilbourne, Vice President & General Counsel, Utilities Technology Council to Marlene H. Dortch, Secretary, Federal Communications Commission, ET Docket No. 18-295, GN Docket No. 17-183 (filed Jul. 29, 2020)(citing to the preliminary results of the study by EPRI, which had recently been published). *See also* Fixed Wireless Communications Coalition Petition for Reconsideration in ET Docket No. 18-295 (Jun. 25, 2020) *and see* Attachment A, Aviat Networks, "FAS WiFi Testing Summary Laboratory Testing Observations and Conclusions (May 27th, 2020)."

⁴ Letter from Coy Trosclair, Director of Telecom Services, Southern Company Services to Marlene H. Dortch, Secretary, Federal Communications Commission in ET Docket No. 18-295 and GN Docket No. 17-183 (filed Jan. 15, 2021). *See also* Letter from Larry F. Butts, Manager Telecom Engineering, Southern Company Services to Marlene H. Dortch, Secretary, Federal Communications Commission in ET Docket No. 18-295 and GN Docket No. 17-183 (filed Mar. 26, 2021)(informing the Commission of its plans to conduct further field testing and inviting OET input and participation from equipment manufacturers of 6 GHz unlicensed devices).

⁵ *See* Letter from Danielle J. Piñeres, Vice President & Associate General Counsel, NCTA – The Internet & Television Association to Marlene H. Dortch, Secretary, Federal Communications Commission, ET Docket No. 18-295 (filed Jan. 11, 2021). *But see* Letter from Jennifer L. Oberhausen, Assistant Vice President, Regulatory Affairs, CTIA to Marlene H. Dortch, Secretary, Federal Communications Commission in ET Docket No. 18-295 (filed Feb. 12, 2021)(disputing the claims made by NCTA in its letter by explaining that the tests were conducted in a real-world environment which clearly accounted for building entry loss, as well as other factors such as bandwidth and duty cycle, which were both conservatively factored compared to the larger channel sizes (*i.e.* 80 MHz versus 180 or 320 MHz channels) that equipment manufacturers plan to use and the duty cycle that would be expected from high bitrate applications such as video streaming (*i.e.* .4% duty cycle versus 30% or 100% duty cycles)).

licensed fixed microwave link several kilometers away.⁶ These tests further demonstrated that the probability of interference from any one of the hundreds of millions of these devices that are expected to become commercially available is a virtual certainty, and the interference from multiple devices will be additive (*i.e.*, cumulative), thereby further increasing the potential for interference to licensed microwave systems in the band. Despite CTIA and Southern Company having invited equipment manufacturers to participate in the testing and to contribute equipment for these tests, none of the manufacturers accepted the invitation to participate and they all refused to provide equipment for the tests.⁷

Given the implication that unlicensed LPIs are virtually certain to cause harmful interference to incumbent microwave systems that support mission critical voice and data communications with utility personnel and are used to monitor and control electric power delivery to ensure the safe, reliable and secure generation, transmission and distribution of electric services to the public, EEI and UTC as well as other incumbent stakeholders emphasized to the Commission that further testing under real-world conditions using actual unlicensed devices is critical to be certain that harmful interference will not occur before the Commission issues additional equipment certification approvals for 6 GHz LPI devices. We indicated that pausing further equipment certification of devices at this stage when equipment is still in development – before it becomes commercially available – would not pose an undue burden that would materially adversely impact equipment manufacturers or the public interest.⁸ EEI and UTC and other incumbent stakeholders also indicated interest in collaboration with the Commission and all stakeholders on the necessary rigorous real-world testing to soundly assess the operating parameters and mitigation technologies that unlicensed LPI devices will rely upon.⁹

Despite that none of the equipment manufacturers were willing to participate in the testing or to contribute actual unlicensed devices to the effort, in April 2021, Southern Company, L&W, and EPRI, conducted the most recent interference tests, this time testing commercially available LPIs obtained on the open market near a typical existing licensed 6 GHz fixed

⁶ See Letter from Jennifer L. Oberhausen, CTIA, to Marlene H. Dortch, Secretary, Federal Communications Commission, ET Docket No. 18-295, GN Docket No. 17-183 (filed Nov. 13, 2020).

⁷ See Letter from Coy Trosclair, Director of Telecom Services, Southern Company Services to Marlene H. Dortch, Secretary, Federal Communications Commission in ET Docket No. 18-295 and GN Docket No. 17-183 (filed Feb. 11, 2021)(explaining how manufacturers and proponents of unlicensed use have consistently ignored or rejected repeated requests to participate in field testing and continue to decline to provide any prototype or sample devices that could be used in such testing, even though some parties have already received certification for unlicensed 6 GHz devices and many have already begun marketing of these devices.)

⁸ See Letters from Brett Kilbourne, Vice President Policy & General Counsel, Utilities Technology Council to Marlene H. Dortch, Secretary, Federal Communications Commission in ET Docket No. 18-295 and GN Docket No. 17-183 (filed Mar. 3-4, 2021).

⁹ See Letter from Utilities Technology Council, et al., to Marlene H. Dortch, Secretary, Federal Communications Commission, ET Docket No. 18-295, GN Docket No. 17-183 (filed Jan. 26, 2021); Letter from Jennifer L. Oberhausen, CTIA to Marlene H. Dortch, Secretary, Federal Communications Commission, ET Docket No. 18-295, GN Docket No. 17-183 (filed March 5, 2021).

microwave link between Fortson and Columbus, GA. During the meeting representatives from DLA Piper underscored that the new testing, in addition to examining the normal data communications from unlicensed LPI devices, also measured the effect associated with beacon transmissions by testing actual commercially available LPI devices. Significantly, this testing of off-the-shelf LPI devices revealed that the beacon signals alone from these devices will cause harmful interference, which will occur as soon as they are powered up and will be ongoing as the beacons continuously transmit at least every 104 milliseconds, irrespective of any broadband data transmissions from the devices. In addition, the new test results confirmed the results from the testing from the fall of 2020, which indicated that broadband data transmissions from LPI devices will also cause harmful interference to licensed microwave systems.

During the meeting, DLA Piper explained that by itself the beacon signal resulted in interference that exceeded the FCC's -6 dB I/N threshold at five of the thirteen test configurations. We discussed that this significant finding was discovered unexpectedly during the testing, which raises questions regarding the completeness and accuracy of the information and studies provided by the proponents of unlicensed operations, who knew or should have known about the beacons yet failed to mention or account for their interference potential at any point during the multi-year course of the proceeding. Moreover, this interference case has therefore never been considered or vetted by the Commission or any other affected incumbent licensee and reveals substantial flaws in the simulations and analyses relied on by the Commission in its decision to authorize unlicensed LPI operations. Apart from the power of the beacons which is high, the duty cycle of their transmissions was nearly continuous. Instead of a 0.4% duty cycle as assumed by simulations relied upon by the Commission, the tests showed that the LPI duty cycle from the beacon signals alone is actually 2.2% and the measured duty cycle with low-speed data streams (100 Mbps or less) was over 50%. This is also a significant discovery, because the near constant duty cycle of the beacons undermines the fundamental basis for the Commission's determination that LPI devices did not pose a significant risk of interference to licensed microwave systems. Interference from the beacons is not some "corner case" or isolated occurrence, it is constant and will occur pervasively across signaling channels all over the 6 GHz band.

In addition, broadband data transmissions from LPI devices sending low speed data (*i.e.*, 100 Mbps or less) produced interference that exceeded the FCC's threshold for eleven of the thirteen configurations, including a site more than 4.5 km from the microwave receiver. Testing with LPI devices operating at higher data rates (*i.e.*, 750 Mbps or less) produced more interference, which could be measured as far as 9 km away from the licensed microwave path. Before and after measurements of the 30 dB fade margin of the microwave link show that the fade margin was reduced between approximately 14-26 dB for five of the thirteen configurations tested, which rendered the link too unreliable to use under these test scenarios. These measurements accounted for naturally occurring fading, thus removing any doubt that interference from the LPI device was the sole cause of the impact on the microwave fade margins. In fact, if testing occurred during the measured fades during fog, the microwave link would have been taken off the air entirely.

In sum, we reiterated our heightened concern that this latest testing demonstrates that LPI

devices will cause harmful interference to licensed microwave systems and again emphasized our industry's willingness to further engage with the FCC to further understand the new information presented and to expeditiously examine the best mitigation solutions towards co-existence of unlicensed LPIs with incumbent fixed microwave licensees in the 6 GHz band. This collaboration is particularly urgent as actual commercial devices are already in the market with more to come, which will only compound the risk to the public. In that regard, the participants underscored that these unlicensed devices represent an imminent threat to the reliability of microwave systems that ensure the safe, reliable and secure operation of electric infrastructure and the safety of utility personnel, as well as a variety of other licensed microwave communications operations, including public safety.

Given the imminent harm that these unlicensed devices pose to critical infrastructure communications, the participants reiterated their previous request that the Commission should immediately pause any further equipment certification, pending further testing that proves how unlicensed devices can coexist with licensed microwave systems in the 6 GHz band. The probability of interference to licensed microwave systems and the risk to the safety, security, and reliability of critical infrastructure energy and water utilities, as well as public safety and commercial communications systems which rely on 6 GHz microwave systems is simply too great. Conversely, pausing further equipment certification of devices at this stage when equipment is still in development – before it becomes widely commercially available – will not pose an undue burden that would adversely impact equipment manufacturers or the public interest. Far better to prevent these devices from becoming commercially available where they could threaten the safety of life, health, and property, and fix the interference now – if it can be fixed -- before it is too late. Accordingly, during the meeting the participants requested that the Commission address this matter urgently and reiterated the prudence of pausing any further equipment certification given the clear implication from real-world testing that interference from unlicensed operations will adversely impact licensed microwave systems in the 6 GHz band to the detriment of the public.

Thank you for your help in this matter. If there are any questions, please contact the undersigned.

Sincerely

UTILITIES TECHNOLOGY COUNCIL

s/ Brett Kilbourne

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cc: FCC participants