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
	)	

To: The Commission

COMMENTS OF AT&T SERVICES, INC.

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AT&T Services, Inc., on behalf of the subsidiaries and affiliates of AT&T Inc. (collectively, "AT&T"), hereby submits the following comments in response to the Federal Communications Commission's ("Commission" or "FCC") Notice of Proposed Rulemaking ("NPRM") in the above-captioned proceedings.[1] As a leading provider of wireless services currently engaged in the roll-out of the United States' first mobile 5G network, AT&T fully appreciates the need for additional spectrum for many kinds of uses that will support the Nation's rapidly growing data communications demand.[2] Consequently, AT&T has long and often advocated for increases in the amount of commercial spectrum available for both licensed and unlicensed applications. Yet, in doing so, AT&T emphasizes that the Commission must not imperil the critical services supported by licensed incumbent users.

[1] *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Proposed Rulemaking, FCC 18-147, ET Docket No. 18-295, GN Docket No. 17-183 (Oct. 24, 2018) ("NPRM"), https://docs.fcc.gov/public/attachments/FCC-18-147A1.pdf.

[2] *See, e.g.*, Cisco, VNI Forecast Highlights Tool, United States, 2021 Forecast Highlights, https://www.cisco.com/c/m/en_us/solutions/service-provider/vni-forecast-highlights.html# (last visited Feb. 15, 2019); NPRM at ¶¶4, 6.

I. INTRODUCTION AND SUMMARY

The 6 GHz band (*i.e.*, 5.925–7.125 GHz) is allocated exclusively for, and densely populated by, licensed operations that support vital services, such as public safety, utility operations, and wireless backhaul. Because carriers like AT&T rely on point-to-point microwave to interconnect cell sites, use of the 6 GHz band will continue to increase with the introduction of fifth generation ("5G") technology and the associated need for further network densification. Despite this heavy and crucial use by licensed incumbents, the NPRM seeks comment on a proposal to permit in the very same 6 GHz band: (i) unlicensed outdoor standard-power access point devices operating under an automated frequency coordination ("AFC") system, and (ii) unlicensed indoor, low-power access point devices operating free of any AFC system.

Given the present state of the record,[3] AT&T remains highly doubtful that unlicensed uses could, under those or any circumstances, harmlessly coexist with the critical licensed uses in the 6 GHz band. These essential services operate, by necessity, with a miniscule margin for error and are therefore highly vulnerable to harmful interference.[4] Those seeking to introduce potentially disruptive, unlicensed uses into the 6 GHz band ("RLAN advocates") should therefore bear the burden of demonstrating, by clear and convincing evidence, that the proposed uses would cause no harmful interference.

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[3] The record presently consists mainly of pleadings and *ex parte* submissions responding to the Commission's Notice of Inquiry in this proceeding. *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Inquiry, 32 FCC Rcd 6373 (2017) ("NOI"), https://docs.fcc.gov/public/attachments/FCC-17-104A1_Rcd.pdf.

[4] *See, e.g.*, Letter from Cheng-yi Liu and Mitchell Lazarus, Counsel, Fixed Wireless Communications Coalition, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183, ET Docket No. 18-295 at 3 (Oct. 2, 2018) ("FWCC *Ex Parte*").

A review of the underlying NOI record demonstrates, however, that RLAN advocates have failed thus far to meet their high burden of proof. Indeed, RLAN advocates have derived their interference and margin analysis from a single RKF study that was prepared at the behest of RLAN advocates.[5] Yet, this RKF study has drawn significant criticism regarding its methodology, assumptions, conclusions, and completeness.[6] Accordingly, before adopting any rule allowing unlicensed use in the 6 GHz band, the Commission must insist that the record contain comprehensive and expertly crafted analyses detailing whether and what robust and near-perfect protections for preexisting licensed operations could be implemented to protect incumbent users. The Commission's proposed AFC system must be just the beginning of an ongoing dialog among stakeholders.

Although skeptical, AT&T is open to examining reasonable, technically-grounded proposals to integrate unlicensed use into the 6 GHz band, provided that the FCC assures incumbents that they will be protected and that the costs of such an integration will be fully borne by the unlicensed users, including mitigation costs arising from any—presumably rare—interference events. AT&T looks forward to engaging with a meaningful record as it develops.

[5] Frequency Sharing for Radio Local Area Networks in the 6 GHz Band January 2018, attached to Letter from Paul Margie, Counsel, Apple Inc., *et al*. to Marlene Dortch, Secretary, FCC (filed Jan. 26, 2018) ("RKF Study").

[6] *See, e.g.*, Letter from Patrick McFadden, Associate General Counsel, National Association of Broadcasters, to Marlene H. Dortch, Secretary, Federal Communications Commission, ET Docket No. 18-295 (filed Oct 10, 2018); Letter from Cheng-yi Liu and Mitchell Lazarus, Counsel, Fixed Wireless Communications Coalition to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183 (filed Aug. 28, 2018); Letter of Ultra Wide Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183 at 4 (filed Oct. 18, 2018).

II. 6 GHZ SUPPORTS CRITICAL LICENSED FACILITIES AND SERVICES, AND THE PROPOSED UNLICENSED USES WOULD LIKELY INTRODUCE HARMFUL AND IRREMEDIABLE INTERFERENCE.

A. As the NPRM Recognizes, Licensed 6 GHz Microwave Facilities and Services Are Key Components of the Nation's Communications Networks, Encompassing Public Safety and Critical Infrastructure Operations, As Well As Important Commercial Deployments.

Before permitting unlicensed users into the densely-populated 6 GHz band, the FCC must first fully protect the interests of the tens of thousands of existing incumbent licensees. As the NPRM recognizes, the 6 GHz band is heavily populated with licensed incumbent uses that constitute vital components of the national telecommunications infrastructure, such as fixed point-to-point microwave services, Fixed Satellite Services ("FSS"), Broadcast Auxiliary Services, and Cable Television Relay Services.[7] Licensed fixed service in the 6 GHz band is used for "highly reliable point-to-point microwave links that support a variety of critical services such as public safety (including backhaul for police and fire vehicle dispatch), coordination of railroad train movements, control of natural gas and oil pipelines, management of electric grids, long-distance telephone service, and backhaul for commercial wireless providers such as traffic between commercial wireless base stations and wireline networks."[8] The relevant FCC databases show over 47,000 unique call signs between 5.925 and 7.125 GHz,[9] which collectively support some 100,000 microwave links.[10] Over half of these links support licensees in the public safety, critical infrastructure, or utility industries.[11]

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[7] *See, e.g.*, NPRM at ¶¶8-9.

[8] *See* NPRM at ¶9 (internal citations omitted).

[9] *Id.* at ¶8.

[10] Letter from Stacey Black, Assistant Vice President of Federal Regulatory, AT&T, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183 at 1 (filed Mar. 19, 2018) ("AT&T *Ex Parte*").

[11] *Id.*

Commenters in the underlying NOI proceeding—representing such diverse interests as broadcasters, municipalities, electric companies, telecommunications providers, and railroad operators, to name a few—all emphasized the crucial role that the 6 GHz band plays within their networks and the national infrastructure. AT&T alone holds 8,138 licenses in this band used to operate thousands of microwave links. These links, in addition to providing backhaul for its wireless network and main telecommunications links for its landline network, will be utilized to support its roll-out of FirstNet—a public/private partnership in which AT&T is contractually committed to the U.S. government to ensure high levels of reliability for its public safety operations.[12] Even now, due to the high level of congestion in the 6 GHz band among point-to-point licensees, AT&T already experiences difficulty in coordinating its own microwave paths. Unfortunately, these same densely-populated areas are also likely to be targets for radio local area networks ("RLAN") operations, further exacerbating congestion issues. As a result, it is essential that the FCC protect this critical national infrastructure before it considers turning unlicensed users loose in this crowded, vitally important band.

For many technical reasons, the 6 GHz band is particularly well-situated to provide the microwave services that support crucial parts of the Nation's communications networks. First, the 6 GHz band is the lowest frequency band currently allocated for commercial microwave use, and the only such microwave band where signals are relatively unaffected by atmospheric rain, snow, or ice.[13] As a result, most 6 GHz microwave links are engineered to have extremely high levels of availability, *i.e.*, uptimes that are 99.999%, which translate to outages on the order of

[12] AT&T *Ex Parte* at 1.

[13] Comments of AT&T, GN Docket No. 17-813 at 14 (filed Oct. 2, 2017) ("AT&T Comments").

less than 30 seconds per month.[14] This extraordinary reliability, which is costly to engineer, is used where necessary and where even momentary outages can have significant downstream effects. Second, 6 GHz microwave is not susceptible, like fiber, to cable cuts, which makes it a uniquely resilient asset for critical communications on a standalone basis or as a backup to fiber.[15] Indeed, many of these links backhaul traffic from cell sites and, as a result, are essential parts of the United States' emergency 9-1-1 system. Third, 6 GHz systems are also some of the fastest to be brought back on-line in any post-disaster restoration effort.[16] Finally, 6 GHz microwave links can span long distances of 10 to 50 kilometers—on average 30 kilometers—and traverse areas where deploying intermediate hops or fiber optic transmission would be impossible or impractical, such as mountaintops.[17] The 6 GHz band, Duke Energy observes, "is the only remaining band available to utilities that provides the propagation needed to communicate over long distances from point to point."[18]

In sum, as the map belowshows,[19] microwave links in the 6 GHz band interweave through communities in the U.S., connecting remote, inaccessible, rural, and urban areas across the Nation and helping to provide essential services. And 6 GHz microwave is the rare —if not

[14] *Id.*

[15] *See id.*

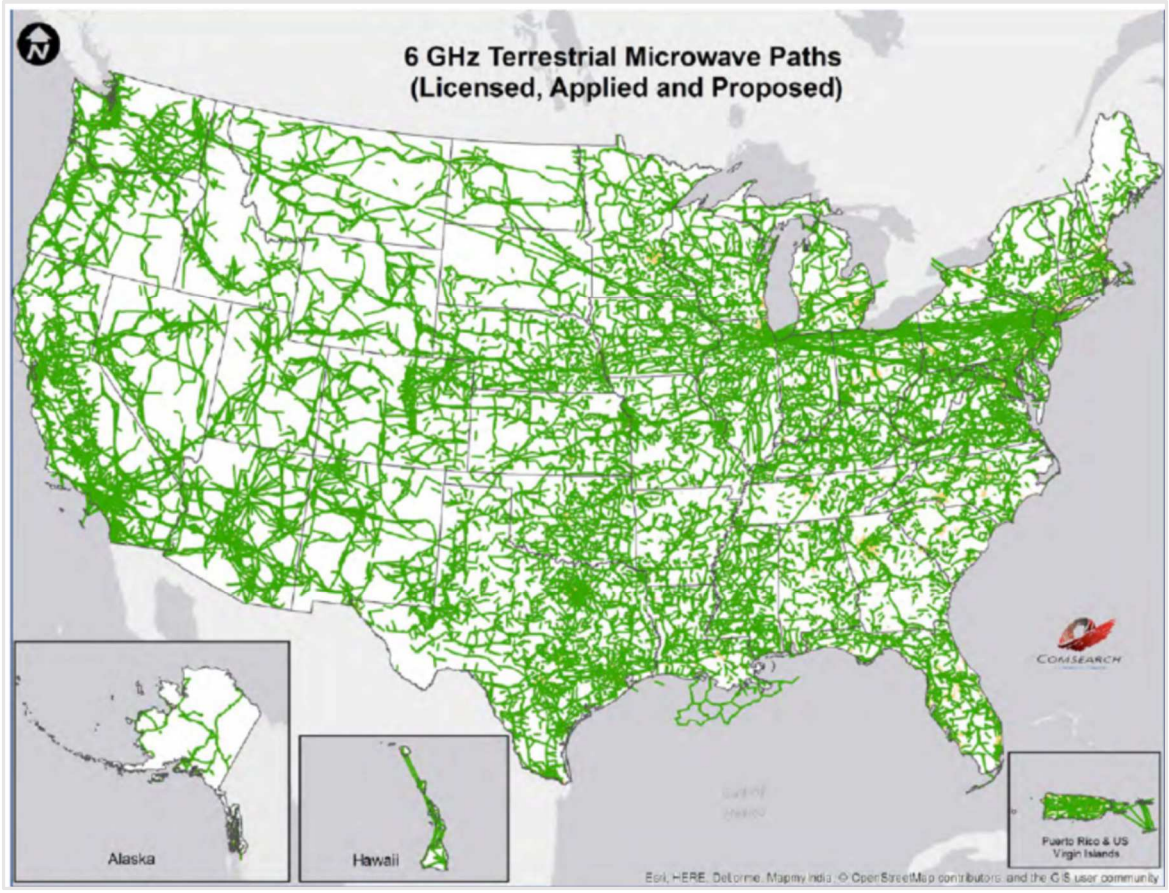
[16] *See, e.g.*, Reply Comments of State of West Virginia Department of Military Affairs and Homeland Security, GN Docket No. 17-813 at 1 (filed Nov. 7, 2017).

[17] AT&T *Ex Parte* at 3.

[18] Comments of Duke Energy, GN Docket No. 17-813 at 4 (filed Oct. 2, 2017) ("Duke Energy Comments").

[19] AT&T *Ex Parte* at 2.

unique—commercially available, rain-fade resilient, rapidly deployable, fiber alternative that can span great distances and traverse geographical impediments.[20]



B. The Record Shows That Unlicensed Use in the 6 GHz Band Poses a Serious Risk of Harmful Interference with Such Vital Incumbent Licensed Uses.

Despite the benefits of the 6 GHz band, the technical realities of providing point-to-point microwave services make it highly vulnerable to harmful interference. Point-to-point microwave paths typically use very high gain antennas oriented at elevations that are horizontal, or near horizontal. Although the microwave beams are narrow, the area within the boresight of the antenna is typically very large, given the length of the microwave paths. Indeed, when

[20] *See, e.g.*, AT&T Comments at 12, 15.

coordinating microwave links in the 6 GHz band, harmful interference potential is assessed at distances up to 125 miles in all directions and 250 miles in the main beam.[21]

Moreover, licensed incumbents invested heavily, and continue to invest, in developing point-to-point microwave systems with extremely low outage characteristics (99.999% or 99.9999% reliability, which, respectively, allow for total outages of only five minutes or thirty seconds per year), so virtually any interference caused by the addition of unlicensed services into the 6 GHz band will inevitably degrade the reliability of such systems and the essential services they support.[22] As the Fixed Wireless Communications Coalition ("FWCC") explains, even very brief interference to one receiver can disable an entire network of links for several minutes, using up years' worth of outage allowance:

> Interference that does not cause an immediate outage will nonetheless cut into fade margin, leaving the system more vulnerable to outage from fades it could otherwise withstand. If the system is already in a fade condition, even a small degree of interference may be enough to bring it down. A source of interference strong enough to overcome all of the remaining fade margin will cause errors in transmission. If the microwave link is part of a network—most are—this causes the network to lose synchronization. The whole network stays down while it resynchronizes. Cellular and land mobile radio sites commonly need fifteen minutes to resync after a short interruption. It takes just one such incident to consume several years' worth of outage allowance.[23]

In addition, the fact that many unlicensed operations will be indoors at low-power does not negate these concerns. Although the NPRM contemplates permitting unlicensed indoor, low-

[21] *See, e.g.*, Coordination Contours For Terrestrial Microwave Systems, National Spectrum Managers Association, Recommendation WG 3.90.026 (Apr. 1992), *available at* https://nsma.org/wp-content/uploads/2016/05/WG3.90.026.pdf.

[22] *See, e.g.*, Comments of National Spectrum Management Association, GN Docket No. 17-813 at 12 (filed Oct. 2, 2017) ("NSMA Comments").

[23] FWCC *Ex Parte* at 3.

power access point devices to operate free of any AFC system, commenters in the underlying NOI proceeding already point out that uncontrolled indoor operation at *any* useful power would create a serious risk of harmful interference, even to relatively distant fixed-service receivers.[24] Factors such as the relative elevation of the antenna and the height of the building housing the unlicensed operations and its construction materials all complicate many assumptions made by RLAN advocates and the FCC, falling far short of any justification for a *carte blanche* exception for low-power, indoor operations.[25] There is simply too much risk to proceed with the NPRM's recommendations, and the stakes are too high.[26]

Furthermore, in the NOI proceeding, many utilities expressed serious concerns about the potential for harmful interference with critical infrastructure operations, such as the provision of rail transport, energy, and electricity. The Association of American Railroads ("AAR") observed that "[i]t is infeasible and potentially dangerous for the band to be allocated for unlicensed use."[27] AAR added that its communications systems "have very high availability requirements which create minimal tolerance for interference, and interference mitigating techniques have not

[24] *See, e.g.*, FWCC *Ex Parte* at 4; Letter of Joseph H. Leikhim III, President, Leikhim and Associates LLC, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183 at 1, ET Docket No. 18-295 (filed Dec. 17, 2018); Letter from Patrick McFadden, Associate General Counsel, National Association of Broadcasters, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183 at 1, ET Docket No. 18-295 (filed Oct. 17, 2018).

[25] *See* FWCC *Ex Parte* at 4-6.

[26] These are just a few of the deficiencies of the RKF study cited by commenters in the underlying NOI proceeding. *See, e.g.*, Attachment "Broadcast Use of 6 GHz," attached to Letter from Patrick McFadden, Associate General Counsel, National Association of Broadcasters, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 18-295 (filed Oct 10, 2018); Letter of Ultra Wide Band Alliance, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183 at 4 (filed Oct. 18, 2018).

[27] Reply Comments of Association of American Railroads, GN Docket No. 17-813 at 3 (filed Nov. 15, 2017).

been demonstrated to be capable of protecting incumbent fixed microwave users."[28] The Lower Colorado River Authority also expressed significant concern about "the potential for risk of harmful interference to existing point-to-point operations," given that "utilities simply cannot risk interference to their systems."[29] Likewise, the Tucson Electric Power Company strongly opposed expansion of the 6 GHz band for any additional uses because that would "directly threaten TEP's ability to effectively communicate throughout its service area" and prevent the company from "reliably provid[ing] electric service."[30] Southern Company, an Alabama-based electric utility, stated that sharing between mobile devices and point-to-point microwave would be disharmonious, as "mobile operations create a dynamically changing spectrum environment, and thus are incompatible with fixed operations, absent special technical and/or operational requirements on the mobile systems."[31] The Utilities Technology Council and Edison Electric Institute added that "increasing demand from smart grid and other applications" will only heighten pressure on utilities to expand capacity in the 6 GHz band, while "congestion and interference from new entrants" will make it more difficult" for utilities to meet this demand with their existing systems."[32]

[28] *Id.*; *see also* NSMA Comments at 5.

[29] Comments of Lower Colorado River Authority, GN Docket No. 17-813 at 4 (filed Oct. 2, 2017).

[30] Comments of Tucson Electric Power Company, GN Docket No. 17-813 at 4 (filed Oct. 2, 2017) .

[31] Comments of Southern Company Services, Inc., GN Docket No. 17-813 at 4-7 (filed Oct. 3, 2017).

[32] Comments of the Utilities Technology Council and Edison Electric Institute, GN Docket No. 17-813 at 6-12 (filed Oct. 3, 2017).

In addition to utilities, many public safety stakeholders also observed that unlicensed uses would pose "an unnecessarily high risk" of harmful interference with essential fixed microwave links for their critical operations.[33] The National Public Safety Telecommunications Council ("NPSTC"), an organization of public safety entities and state, local, and federal government representatives, laid out the consequences of interference starkly in its NOI comments: "[C]atastrophic results could occur for public safety and the public it serves" if policymakers failed to accurately assess the potential for harmful interference.[34] NPSTC further noted its grave doubts of any claims of "no impact" on the reliability of critical fixed microwave links from proponents of spectrum sharing.[35] The City of Mesa, Arizona was also "unconvinced interference mitigation technologies are reliable enough to avoid interference," and it requested that the FCC continue to prohibit unlicensed uses in the 6 GHz band "until independent laboratory and field trial testing can be performed."[36] APCO International agreed with this cautious approach, echoing that "any … interference protection techniques for use in public safety bands must undergo substantial testing and be proven effective in advance" to avoid endangering key operations.[37] And in its role as the contractually-obligated provider of a nationwide wireless broadband network for FirstNet subscribers, AT&T likewise urges a highly

[33] Comments of Los Angeles County, California; the City and County of Denver, Colorado; the City of Kansas City, Missouri; Ozaukee County, Wisconsin; and the Government Wireless Technology & Communications Association, GN Docket No. 17-813 at 4 (filed Oct. 2, 2017); *see* Comments of National Public Safety Telecommunications Council, GN Docket No. 17-813 at 6-7 (filed Sept. 11, 2017) ("NPSTC Comments"); Comments of Association of Public Safety Communications Officials International, GN Docket No. 17-813 at 3 (filed Oct. 2, 2017) ("Comments of APCO International").

[34] NPSTC Comments at 6-7; *see* Comments of APCO International at 3.

[35] NPSTC Comments at 7.

[36] Comments of City of Mesa, Arizona, GN Docket No. 17-813 at 2 (filed Sept. 20, 2017).

[37] Comments of APCO International at 3.

cautious approach, as it must meet a robust reliability standard to assure that the public safety community can depend on FirstNet for its mission critical communications.

In sum, the existing record shows that licensed stakeholders, in light of the technical realities of the 6 GHz band, are justifiably apprehensive about the impact of interference from any unlicensed uses and remain unconvinced that any prevention or mitigation techniques would be adequate to safeguard their vital operations. The Commission and RLAN advocates should bear in mind the tragic consequences if interference from an unlicensed use were to cause loss of life or property.

C. The Source of Harmful Interference to Existing 6 GHz Operations Is Difficult Technically to Identify and Remedy in Real-Time.

If the Commission were to allow unlicensed uses in the 6 GHz band, incumbent point-to-point microwave station operators would be unable to determine in real-time the sources of interference to their operations, nor would they be able to immediately neutralize the source of any such interference.[38] Harmful interference to a microwave link essentially manifests itself as a non-localized decrease in the fade margin for a link—noise that can be anywhere within the boresight of the directional antenna, or even in some cases off-axis to the link. Because these links are not engineered to triangulate sources of noise, harmful interference could also be camouflaged by atmospheric or other naturally-occurring conditions.[39] Licensees would nonetheless tangibly experience harmful interference as the statistical performance of their path degrades: their microwave systems, engineered for extremely high reliability, would slowly die a "death by a thousand paper cuts."

[38] *See, e.g.*, NSMA Comments at 10-11.

[39] *See, e.g., id.* at 11.

Moreover, due to the itinerant and fluctuating nature of most unlicensed activity, the unlicensed device causing harmful interference might never be located, since it would likely be in motion or transmitting only intermittently and, therefore, even if detected, may have moved or turned off prior to being located. Finally, even if the interference could be identified, there are no practical procedures for mitigation given the lack of identities and control over unlicensed operations.[40] As Duke Energy explained, the process of resolving just one instance of interference can take weeks of searching for unwanted frequencies with antennas and spectrum analyzers in an effort to triangulate the offending device, racking up costs easily in excess of tens of thousands of dollars.[41]

These harms would only be exacerbated as more and more unlicensed devices began to transmit radio frequencies on the already crowded 6 GHz band. Thus, the outcome for incumbent licensed operations would be bleak. With the prospect for harmful interference high and its sources untraceable, incumbents' key communications facilities "would become wasting assets as the quality of service erodes without any feasible recourse by the licensee."[42]

III. THE COMMISSION SHOULD NOT PERMIT UNLICENSED USE IN THE 6 GHZ BAND WITHOUT REQUIRING RIGOROUS TECHNICAL ANALYSES AND ADOPTING ROBUST PROTECTIONS FOR INCUMBENT OPERATIONS.

A. Comprehensive and Highly Persuasive Interference Analyses Are Necessary Before the FCC Can Unleash Unlicensed Uses in the Densely-Populated 6 GHz Band.

The NOI record is clear that licensed 6 GHz operations for public safety, critical infrastructure, and commercial uses are vital and vulnerable components of our Nation's

[40] *See, e.g.*, APCO International *Ex Parte*, GN Docket No. 17-813 at 2 (filed Mar. 29, 2018).

[41] Duke Energy Comments at 4-5.

[42] AT&T Comments at 17.

telecommunications infrastructure that must be protected from harmful interference. Because, as explained above, incumbent uses require exceptionally high reliability criteria, any protections must be near flawless. Even ostensibly minor events of harmful interference could cause immediate and substantial damage. As such, post-event remedies would be inadequate and tantamount to no remedies at all.

Despite this, the FCC has chosen to proceed to an NPRM that would permit unlicensed uses alongside these vital, licensed operations—and with disconcertingly little technical justification. For just one representative example, the NOI record fails to yield any affirmative evidence demonstrating how the impact of multiple interferers on existing microwave systems in the band could be effectively mitigated by a database-driven sharing mechanism, such as that proposed by RLAN advocates.[43] Yet, this is primarily the solution that the Commission proposes to address potentially disastrous interference with mission critical, incumbent operations.

It is clear that comprehensive engineering analyses and prevention/mitigation proposals are essential for the FCC to realize its "commitment to preserv[ing] and protect[ing] the important base of incumbent users in the [6 GHz] frequency bands."[44] Accordingly, it remains necessary to undertake substantial record development, including additional studies and

[43] Reply Comments of AT&T, GN Docket No. 17-183 at 19 (filed Nov. 15, 2017) ("AT&T Reply").

[44] NPRM at ¶2; *accord* Comments of Comsearch, GN Docket No. 17-813 at 5 (filed Oct. 2, 2017); Comments of the Mid-Band Spectrum Coalition, GN Docket No. 17-813 at 4, 14 (filed Oct. 2, 2017); Comments of NCTA – The Internet and Television Association, GN Docket No. 17-813 at 4 (filed Oct. 2, 2017); Comments of Nokia, GN Docket No. 17-813 at 3, 164 (filed Oct. 2, 2017); Comments of the Satellite Industry Association, GN Docket No. 17-813 at 34-35 (filed Oct. 2, 2017).

modeling, before the FCC could move forward in its goal towards responsibly integrating unlicensed use.[45]

B. Incumbent Operators in the 6 GHz Band Are Entitled to at Least the Protections Afforded to Incumbents in Other Bands.

As a preliminary matter, AT&T notes that in other proceedings, like Citizens Broadband Radio Service ("CBRS"), the FCC has properly prioritized the protection of incumbent operations. In CBRS, for example, the FCC empowered a multi-stakeholder body to standardize the rules for protection, formalized a rigorous vetting process through lab certification, and announced a period of public trial to test its protections for incumbents users in a real-world environment setting.[46] In contrast, the NPRM here proposes only that unlicensed standard-power access points be required to obtain a list of permitted (or prohibited) frequencies from an automated frequency coordination ("AFC") system before they can transmit at a particular location on a given frequency in the 6 GHz band. Unlicensed low-power access point devices would not even be required to use the AFC system.[47] Such disparate treatment between strict

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[45] The FCC has, in the past, properly required new entrants to demonstrate persuasively that their operations would not detrimentally impact incumbent services. *See, e.g.*, *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, First Report and Order, 29 FCC Rcd 4127 (2014); *Unlicensed Operation in the TV Broadcast Bands/Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, Memorandum Opinion and Order, 27 FCC Rcd 3692 (2012); *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Notice of Proposed Rulemaking, 28 FCC Rcd 1769 (2013).

[46] *See* FCC, "3.5 GHz Band / Citizens Broadband Radio Service," https://www.fcc.gov/wireless/bureau-divisions/broadband-division/35-ghz-band/35-ghz-band-citizens-broadband-radio (last visited Feb. 15, 2018).

[47] NPRM at ¶¶20, 25.

pre-implementation analysis and testing in other contexts and lax pre-implementation analysis and testing here would exemplify arbitrary and capricious rulemaking.

C. If the FCC Concludes that Unlicensed Use Can Be Responsibly Integrated into the 6 GHz Band, Incumbent Licensees Are Entitled to Protections Beyond Those in the NPRM.

The NPRM's proposals, in short, are inadequate. As a preliminary matter, incumbent users must be made financially whole. New users should bear all costs of accommodating their new uses into the 6 GHz band, especially costs associated with interference resolution.[48] Although post-incident remedies would be cold comfort to incumbents experiencing degraded operations, any proposals that address integrating unlicensed use into the 6 GHz band must propose a technical solution to detect, locate, and resolve interference as rapidly as possible. Further, such a proposal must propose a mechanism that will mitigate any interference with microwave receivers within its operating area.

There are also specific modifications needed to the proposed regulatory scheme that are plainly required as a minimum basis for protection. Just a few examples follow: Public safety and critical infrastructure users "should be granted automatic registration" in any AFC system.[49] Registration should also be required at least for all radio local area networks—indoor as well as outdoor—as even indoor RLAN devices may potentially cause harmful interference with

[48] For example, when the Commission permitted Advanced Wireless Services (AWS) and Mobile Satellite Services (MSS) to displace incumbent Fixed Microwave Services and Broadband Radio Service at the 2150-2160/62 MHz and 2160-2175 MHz bands, it required the beneficiaries of the relocation to bear the costs of such relocation. *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems,* Ninth Report and Order and Order, 21 FCC Rcd 4473 ¶¶114-22 (2006).

[49] Comments of Motorola Solutions, Inc., GN Docket No. 18-122 at 3 (filed Oct. 2, 2018).

licensed operations with the proposed power limits.[50] As is currently required with fixed white space devices and CBRS, registration should include the device's location, antenna height above ground, device identification information, and contact information for the device's operator.[51] As previously noted, the AFC and mitigation systems should not be designed to protect only existing users; rather, protection should also cover microwave links that will be added in the future. Moreover, given the large number and dynamic nature of microwave licensee operations, AT&T agrees with CommScope that "any sharing approach should require at least daily RLAN interactions with the coordination database to reflect the most up-to-date information."[52] And, as a final matter, the AFC database administrators should build and manage an additional interference reporting portal that tracks interference and promptly resolves issues as reported. This would give incumbent users additional recourse to resolve identified interference issues, outside of contacting the FCC pursuant to the current Commission rules.

The Commission's approach to permitting unlicensed use into the unoccupied channels in the television broadcast frequency bands (the so-called, "TV white spaces") is instructive here. In addition to establishing a third-party registration database for incumbent users, the FCC imposed rigorous requirements on unlicensed devices ("Television Band Devices" or "TVBDs"), including power and emission limits, antenna requirements, and their associated certification and verification testing procedures. The process was lengthy, comprehensive, and, by the FCC's

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[50] *See* Attachment A at 11-13 to Letter from Catherine Wang, Counsel, CommScope, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 17-183 (filed Aug. 28, 2018) ("CommScope *Ex Parte*"); 47 C.F.R. §§ 96.39, 96.41) (requiring registration for all Citizens Broadband Radio Service Devices, including end user devices transmitting at a maximum effective isotropic radiated power ("EIRP") of 23 dBm).

[51] *Accord* 47 C.F.R. §§ 15.513(g) (white spaces), 96.39(c) (CBRS).

[52] CommScope *Ex Parte* at 2.

own description "conservative … to minimize the potential for interference to authorized services."[53] Likewise, in the 5 GHz context, the FCC proceeded painstakingly to avoid disturbance to operations in the Wi-Fi community, soliciting, receiving, and examining many mitigation proposals. Ultimately, licensed radio service providers, unlicensed device manufacturers, and other stakeholders were able to collaborate and develop Licensed Assisted Access ("LAA") standards that would allow unlicensed devices using a version of LTE technology to coexist with Wi-Fi and other unlicensed devices operating in the band—provided that LAA stakeholders were able to comply with extensive and rigorous certification procedures.[54] The same multi-stakeholder approach might be workable in the 6 GHz band by encouraging all parties to develop standards for new unlicensed devices that could be enforced through a rigorous equipment certification program and ensure the full protection of incumbent microwave users.

IV. CONCLUSION

AT&T supports the Commission's effort to develop a spectrum pipeline that will allow licensed and unlicensed broadband services to keep pace with the explosive growth in consumer and business data demands. However, the FCC must proceed very cautiously before permitting unlicensed uses in the already densely-populated 6 GHz band. The Commission must undertake and solicit thorough, independent technical studies and analyses, and conduct rigorous pre-

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[53] *See Unlicensed Operation in the TV Broadcast Bands/Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, Memorandum Opinion and Order, 27 FCC Rcd 3692, 3697, ¶14 (2012).

[54] Julius Knapp, "Industry Makes Progress on Unlicensed LTE Coexistence," Sept. 23, 2016, https://www.fcc.gov/news-events/blog/2016/09/23/industry-makes-progress-unlicensed-lte-coexistence; *see Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, First Report and Order, 29 FCC Rcd 4127 (2014).

implementation performance trials, to ensure that incumbent users—and the vital services they provide—are not detrimentally impacted.[55]

Respectfully submitted,

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[55] *See, e.g.*, AT&T Reply at 24-25.