Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20544

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

REPLY COMMENTS OF THE PUBLIC INTEREST ORGANIZATIONS

OPEN TECHNOLOGY INSTITUTE AT NEW AMERICA
BENTON INSTITUTE FOR BROADBAND & SOCIETY
CENTER FOR RURAL STRATEGIES
COSN—CONSORTIUM FOR SCHOOL NETWORKING
PUBLIC KNOWLEDGE
SCHOOLS, HEALTH & LIBRARIES BROADBAND (SHLB) COALITION
TRIBAL DIGITAL VILLAGE–TDVNET
WASKAWIWIN

April 21, 2026

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The Open Technology Institute at New America, the Benton Institute for Broadband and Society, the Center for Rural Strategies, Public Knowledge, COSN–Consortium for School Networking, the Schools Health & Libraries Broadband (SHLB) Coaltion, Tribal Digital Village–TDVNet and Waskawiwin ("Public Interest Organizations" or "PIOs") respectfully submit these Reply Comments in response to the *Third Further Notice of Proposed Rulemaking* in the above-captioned proceeding. We applaud the Commission for continuing to improve the rules for unlicensed sharing across the entire 6 GHz band, which we believe will substantially improve the quality of connectivity indoors for all Americans.

I. INTRODUCTION AND SUMMARY

The Commission's historic decision in 2020 to "go big" on 6 GHz for next generation Wi-Fi has exceeded even optimistic projections and is already generating billions in value and incalculable user utility even during these early days in the nation's mass transition to Wi-Fi 7. Americans increasingly equate broadband with Wi-Fi. Wi-Fi is the essential path to affordable broadband internet access in virtually every indoor location. This is especially true at home, where Wi-Fi provides the first and final transit for 90 percent or more of consumer data traffic. Trends in consumer use, applications and use cases tell a more particular story very relevant to this proceeding: the vast majority of mobile device data use is indoors and carried to and from end users over Wi-Fi. But while Wi-Fi use is overwhelmingly indoors, needlessly low indoor-only power levels threaten to deprive too many Americans of affordable access to the most advanced features and enormous benefits of next generation Wi-Fi 7 and 8. We urge the Commission to use this proceeding to at least modestly increase power levels for indoor-only operations. Accordingly, we make three main points below:

First, although our organizations also support substantially higher power for indoor-only composite routers under AFC control, we believe that the American people will benefit most from a modest 3 dB increase in the power spectrum density level for LPI operations (from 5 dBm/MHz to 8 dBm/MHz). This will make the entire 1,200 megahertz of contiguous spectrum available for LPI use more productive and reliable for the typical household or small business, including the millions that purchase Wi-Fi routers on an off-the-shelf, plug-and-play basis. The record shows overwhelming support for this modest LPI power increase. This is not surprising

since a series of technical studies dating back to 2019 have clearly established that there is no significantly greater risk of harmful interference to band incumbents at 8 dBm/MHz PSD.

Second, our organizations strongly support the Commission's proposal to adopt rules authorizing indoor-only Wi-Fi access points under Automated Frequency Coordination (AFC) control to fully account for Building Entry Loss (BEL) when calculating available channels and power levels. Our groups agree with the majority of commenters that the 'credit' for BEL should be no less than the 20.5 dB attenuation value specified in the ITU-R P.2109 standard, which is the same ITU standard the Commission relied upon in its original *Order* in 2020 to set LPI power levels. We further agree with Wi-Fi Alliance and other parties that the credit for BEL could be closer to 30 dB than to 20.5 Db without creating an undue risk of harmful interference to incumbent high-power microwave links. The option to transmit indoors at more robust power levels is particularly important for schools, libraries, hospitals, public health clinics and any other venue or enterprise that determines it needs better coverage and more reliable connectivity than it can achieve relying solely on LPI.

Third, our groups support the Commission's proposal to authorize the operation of LPI access points on cruise ships as defined in 33 CFR § 101.105. In both form and function, cruise ships have become floating hotels and entertainment venues, where millions of travelers each year gather in close proximity and in areas (e.g., defined sea channels and ports) where harmful interference to 6 GHz incumbents is highly unlikely. The structural characteristics of any relatively large passenger ship will substantially attenuate radiofrequency signals. We also note that if the need to protect Earth Exploration Satellite Services (EESS) use of 6 GHz over coastal waters is or soon will be obsolete due to ITU agreements subsequent to the 2020 *Order*, the Commission should lift all special restrictions on 6 GHz unlicensed operations aboard cruise ships and oil platforms.

II. ROBUST WI-FI COVERAGE AND RELIABILITY INDOORS IS INCREASINGLY CRUCIAL FOR CONNECTIVITY IN EVERY HOME, BUSINESS, SCHOOL, LIBRARY AND PUBLIC VENUE

When the Commission authorized unlicensed sharing across the entire 6 GHz band in 2020—including an unprecedented 1,200 megahertz of contiguous spectrum for indoor-only Wi-Fi use—it made a calculated bet on innovation that is just beginning to pay off for America's consumers and economy overall. The band is an anchor for the unlicensed device ecosystem that supports a spectacular variety of consumer, community anchor and business uses. As NCTA put it in 2023, abundant unlicensed connectivity "has countless consumer, industrial, and business uses, from smart locks and thermostats, to factory monitoring, to cloud computing capabilities. Access to more unlicensed spectrum also has allowed manufacturers to innovate and create new products (e.g., AI-assisted searching, high-capacity networks, and IoT devices)."[1]

The Commission's historic decision in 2020 to "go big" on 6 GHz for Wi-Fi has exceeded even optimistic projections and is already generating billions of dollars in value and incalculable user utility even during these early days in the nation's mass transition to next generation Wi-Fi 7. The Commission's series of subsequent orders expanding and strengthening the unlicensed ecosystem across 6 GHz are doing even more to pave the way for innovative wireless applications that will play a crucial role in ensuring high-quality and affordable connectivity in every location across the country—including homes, schools, business, healthcare facilities and public gathering places of all kinds.[2]

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[1] Comments of NCTA–Internet & Television Association, ET Docket No. 18-295, GN Docket No. 17-183, at 3 (filed March 23, 2026). Hereinafter all comments cited are from this docket and date unless otherwise indicated.

[2] See, e.g., Comments Of Apple, Broadcom, Cisco Systems and Hewlett Packard Enterprise. "By making the band available for nextgeneration Wi-Fi, the Commission unlocked the foundation

Weak indoor Wi-Fi signals will disproportionately deprive many—including less affluent households, small businesses, students and more—of affordable access to this advanced connectivity. The ordinary family and small business may miss out on the enormous benefits of next generation Wi-Fi 7 and 8 unless the Commission acts in this proceeding to at least modestly increase power levels for indoor-only operations.

A. Most Current and Future High-Capacity Use Cases Are Indoors

Trends in consumer use, applications and use cases tell an additional and even more relevant story: that the vast majority of mobile device data use is indoors and carried to and from end users over Wi-Fi. Roughly 85 to 90 percent of all mobile device data traffic is already offloaded to Wi-Fi.[3] Billions of consumer devices—smartphones, tablets, laptops, smart home devices—connect primarily or exclusively over Wi-Fi, especially indoors.

As households, schools, businesses and other locations transition to next generation Wi-Fi 7 and 8, the 6 GHz unlicensed band will provide relief for what had been a growing congestion on the 2.4 and 5 GHz unlicensed bands. This additional capacity, featuring more and wider contiguous channels, is particularly crucial indoors, in areas where multiple devices compete for limited spectrum—such as in homes and offices, in airports, stadiums and other crowded venues with hundreds of users online simultaneously, and where data needs are only increasing. The very wide contiguous channels available indoors across the entire 6 GHz band supports enterprise Wi-Fi, smart manufacturing, high-bandwidth streaming and massive data transfer. As

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for Wi-Fi 6E, Wi-Fi 7, Wi-Fi 8, and a new generation of high-capacity, low-latency wireless applications that are transforming connectivity in homes, schools, businesses, hospitals, and public venues across the country." *Id*. at 1.

[3] "Industry Stats: Wi-Fi Powers America's Connectivity," NCTA (Feb. 17, 2026), https://www.ncta.com/news/industry-stats-wi-fi-powers-americas-connectivity (reporting that "90% of mobile data runs on Wi-Fi").

Apple et al. puts it, "Today, the overwhelming majority of 6 GHz deployments occur indoors under the LPI framework, supporting high capacity residential broadband, multi-dwelling unit connectivity, enterprise collaboration platforms, industrial Internet of Things ("IoT"), immersive augmented reality ("AR")/virtual reality ("VR") applications, telehealth services, transportation, and high-density educational networks."[4]

As IoT devices proliferate within homes, the share of data they consume—which is typically small per individual device but must be continuous and reliable—will expand in the aggregate. An increase in videoconferencing is similarly putting strain on enterprise data use. This trajectory can only be expected to continue and increase over time and with new applications. For example, even a minor increase in virtual reality teleconferencing is projected to require massive amounts of data per access point over the next several years.[5]

Indeed, major government and industry visions for 6G espouse a number of projected high-value applications that will be used primarily or entirely indoors.[6] As Google's Preston Marshall observes in his book *Evolving to 6G*: "Cellular technology dominates outdoors, but wireless is dominated by indoor usage."[7] He notes that among the very high-capacity and low-latency applications most commonly listed as justifying investments in a future 6G wireless ecosystem,

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[4] Comments of Apple, Broadcom, Cisco Systems and Hewlett Packard Enterprise at 10.

[5] World Broadband Association, *Next Generation Broadband Roadmap 2023-2030*, at 17, https://worldbroadbandassociation.com/wp-content/uploads/2024/06/Next-generation-broadband-roadmap-2023-to-2030.pdf.

[6] *See generally* Michael Calabrese and Jessica Dine, *The Next Frontier in Spectrum Policy: Indoor-Only Sharing of Federal Bands* (New America, 2024), https://www.newamerica.org/insights/the-next-frontier-in-spectrum-policy/; Michael Calabrese and Jessica Dine, *What 6G Should Be: Ubiquitous and Seamless Connectivity, Not Just Another "G"* (New America, 2026), https://www.newamerica.org/insights/what-6g-should-be/.

[7] Preston Marshall, *Evolving to 6G: The Case for a New Approach to 6G and Beyond* (Seattle, WA: Amazon Publishing, May 2024), at 95.

most—including virtual reality, telepresence, immersive gaming, robotics, Industrial Internet of Things (IIoT), virtual twins, and more—will operate primarily or entirely indoors, where Wi-Fi dominates. Further, as Apple, Broadcom, Cisco and Hewlett Packard Enterprise state, "Applications such as video conferencing, cloud collaboration tools, gaming, and real-time analytics increasingly rely on symmetrical traffic patterns that require both strong downlinks from the AP and strong uplinks from the client device.[8] The integration of AI into home and business networks will only reinforce this need by demanding higher and higher uplink capacity from the user's device—which even current use cases such as video conference, gaming, and cloud collaboration are already beginning to require.[9]

B. The Current Rules Cause Significant Digital Divide Concerns

Despite this, indoor coverage gaps remain where mobile signals cannot penetrate and the strength of a Wi-Fi connection is inadequate to cover the entire home or building, leading consumers to either suffer dead zones or the inconvenience and cost of purchasing additional equipment to expand services, which is not always feasible. This is particularly relevant because this indoor coverage gap falls hardest on those who can least afford to fix it.

For a large enterprise or well-resourced institution, inadequate coverage from a single access point can be cured by installing a more dense Wi-Fi network with boosters (network extenders, mesh nodes) to achieve complete interior coverage. The well-informed and well-resourced can still benefit fully from the coming benefits of next generation Wi-Fi, but the

[8] "Explore the impact of 6G: Top use cases you need to know," Ericsson Blog, Dec. 19, 2024, https://www.ericsson.com/en/blog/2024/12/explore-the-impact-of-6g-top-use-cases-you-need-to-know.

[9] Comments of Apple, Broadcom, Cisco Systems and Hewlett Packard Enterprise at 11.

typical family and small business may not unless the Commission acts in this proceeding to at least modestly increase power levels for indoor-only operations.

Consider a lower-income family living in a multi-unit apartment building or in an older home with thick plaster or masonry walls. An indoor-only (LPI) access point operating at current power levels may leave home offices, bedrooms or common areas with spotty or entirely absent coverage. Those same households may not have the resources or technical proficiency to purchase and employ the necessary network extenders. Nor may smaller or less-resourced schools, libraries, or health clinics—especially those in older buildings where installing additional access points may be prohibitively difficult or impossible. The burden of insufficient Wi-Fi connectivity is thus shouldered by those least able to carry it.

The Commission has long recognized that meaningful digital access requires both making spectrum available and ensuring the rules governing its use enable affordable, accessible connectivity for all Americans. Under the current rules, the burden of unnecessarily limited power levels, or complicated AFC control, most falls on those least able to afford it—and the benefits of future Wi-Fi applications will least accrue to those ill-positioned to receive them. And as new building construction increasingly incorporates energy efficient materials with high attenuation characteristics, power levels for LPI and composite AFC routers that fail to account fully for the protective effects of building entry loss will further widen those gaps.

III. TECHNICAL STUDIES AND MOST COMMENTERS STRONGLY SUPPORT A 3 dB INCREASE IN POWER FOR INDOOR-ONLY (LPI) OPERATIONS TO 8 DBM/MHZ PSD

Americans increasingly equate broadband with Wi-Fi. This is especially true at home, where Wi-Fi provides the first and final transit for 90 percent or more of consumer data traffic. For most Americans, Wi-Fi is the essential path to affordable broadband internet access in

virtually every indoor location, carrying far more traffic than all other wireless technologies combined. Wi-Fi is also a fundamental complement to mobile carrier networks, which could not possibly provision the cellular infrastructure and spectrum it would take to enable affordable and quality 5G, let alone 6G, throughput indoors on smartphones and other devices if Wi-Fi was not available to efficiently offload the vast majority of mobile device traffic. As connected devices, high-bandwidth applications and AI-integrated connectivity rapidly proliferate, the typical household, small business, school and library will require increasing bandwidth (both uplink and downlink) to accommodate the growing exchange of traffic, making the coverage, capacity and capability of Wi-Fi across the entire 1,200 megahertz of the 6 GHz band urgent.

Although our organizations also support substantially higher power for indoor-only composite routers under AFC control, we believe that the American people will benefit most from a modest increase in the power spectrum density level for LPI operations (from 5 dBm/MHz to 8 dBm/MHz). This will make the entire 1,200 megahertz of contiguous spectrum available for LPI use more productive and reliable for the typical household or small business, including the millions that purchase Wi-Fi routers on an off-the-shelf, plug-and-play basis. Indeed, as our organizations and others in the Public Interest Spectrum Coalition previously told the Commission:

> "Weak indoor signals and any unnecessary reliance on costly and complex database control over Wi-Fi and other unlicensed technologies will disproportionately deprive low-income households, students and others of affordable access to this advanced connectivity. Today residents of the typical home or apartment enjoy robust Wi-Fi without purchasing repeaters. While enterprises and other operators will find AFC

control of access points at standard power a manageable burden, ordinary consumers should be able to realize the full benefits of Wi-Fi 6E/7 on a plug-and-play basis."[10]

Accordingly, our groups strongly agree with Apple, Broadcom, Cisco, Hewlett Packard and other world-leading U.S. Wi-Fi companies that a "PSD limit of 5 dBm/MHz for LPI APs reduces Wi-Fi coverage areas and drives up costs for homes and enterprises that must compensate with additional equipment, wiring, and installation."[11] Studies by CableLabs have demonstrated that the current PSD limit reduces indoor Wi-Fi coverage by 31–43% and decreases average throughput by 53–63% compared to 8 dBm/MHz.[12] The Consumer Technology Association estimates that a 3 dB increase would expand indoor Wi-Fi coverage by up to 75%, a boost in coverage and wide-channel use that is particularly important for larger indoor environments such schools, hospitals, multi-story homes and office buildings.[13]

Relying on AFC-controlled access points to achieve wider indoor coverage is practical and perhaps preferred for larger enterprises with IT budgets and expertise. However, it is unrealistic to conclude that ordinary consumers, small business owners, smaller neighborhood schools,

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[10] Letter from Open Technology Institute at New America, Public Knowledge, Consumer Reports, Next Century Cities, American Library Association, Center For Rural Strategies, National Digital Inclusion Alliance (NDIA), Schools Health Libraries Broadband (SHLB) Coalition, Tribal Digital Village Network, Digital Promise, Benton Institute For Broadband & Society, COSN–Consortium For School Networking, WISPA—Broadband Without Boundaries , State Educational Technology Directors Association (SETDA), United Church Of Christ Media Justice Ministry, Access Humboldt, X-Lab, Institute For Local Self-Reliance, ET Docket 18-295 and GN Docket 17-183, at 3 (filed Aug. 3, 2023).

[11] Comments of Apple, Broadcom, Cisco Systems and Hewlett Packard Enterprise at 8.

[12] *See* Letter from Rob Alderfer, Vice President of Technology Policy, CableLabs, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 18-295 and GN Docket No. 17-183, at 2 (filed Mar. 19, 2020); Comments of Wi-Fi Alliance at 14 ("Keeping the PSD limit at 5 dBm/MHz would substantially limit consumer use of 6 GHz LPI operations").

[13] Comments of Consumer Technology Association at 3; Comments of Apple, Broadcom, Cisco Systems and Hewlett Packard Enterprise at 11.

libraries and other locations have the technical sophistication, awareness or ability to install and pay for a home or enterprise Wi-Fi mesh network and the repeaters it would take to ensure the enormous benefits of next generation Wi-Fi 7 and (soon) Wi-Fi 8 are readily available to all. Consumers and small enterprises should also not be required to pay for a more expensive composite router along with the ongoing subscription costs of registering for AFC coordination, substantial costs even without professional installation (and assuming the GPS signal inside their home or enterprise can establish their location).

Further, as WifiForward explains in its comments, the Wireless Broadband Alliance found an inherent 3 dB propagation disadvantage for users operating indoors on the 6 GHz versus the 5 GHz unlicensed bands due to free space path loss and indoor clutter.[14] This means that the 5 dBm/MHz limit effectively handicaps 6 GHz relative to lower bands. As NCTA previously noted, 5 GHz Wi-Fi operations allow "*eight times* more radiated power than the *6 GHz Order* allows for LPI Wi-Fi at 160-megahertz bandwidths."[15] The Commission should strive to avoid this disparity, since encouraging use of the more numerous and wider channels available for LPI across the 6 GHz band would better serve the public interest. Reduced congestion, faster throughput, lower latency and other attributes of indoor coverage at 8 dBm/MHz PSD will best serve the public interest, particularly in denser environments (schools, workplaces, public venues) and as AI creates increasing demand for robust uplinks and near real-time response for smart homes and enterprise IoT networks.

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[14] Comments of WifiForward at 5-6, citing Wireless Broadband Alliance, "Get Ready for Wi-Fi 7 – Applying New Capabilities to the Key Use Cases" (2023) at 35, available at https://wballiance.com/resources/wba-white-papers (registration required).

[15] *See* Comments of NCTA – The Internet and Television Assoc., ET Docket No. 18-295, GN Docket No. 17-183 (filed June 29, 2020); Comments of Apple, Broadcom, Cisco Systems and Hewlett Packard Enterprise at 13.

The record shows overwhelming support for this modest LPI power increase. This is not surprising since technical studies in the record as far back as 2019 clearly established that there is no significantly greater risk of harmful interference to band incumbents at 8 dBm/MHz PSD. In establishing the power limits for LPI, the Commission's *6 GHz First Order* relied specifically on a Monte Carlo simulation study submitted by CableLabs.[16] In its opinion upholding the 2020 *Order*, the D.C. Circuit Court of Appeals strongly endorsed the Commission's reliance on this sort of large-scale probability study to assess the risk of harmful interference from LPI devices operating without geolocation database control, studies that clearly supported the proposed increase in LPI unlicensed power levels to at least 8 dBm/MHz.[17] The D.C. Circuit's opinion stated that the Monte Carlo simulations relied on by the Commission offer a "more complete view of potential outcomes and their associated likelihoods" than studies that identify a "single, worst-case values for all but one variable—that is, values likely to cause harmful interference."[18]

A subsequent Monte Carlo simulation by CableLabs demonstrated that even at spectral power density levels higher than 8 dBm/MHz PSD, and applying the most conservative assumptions, there is no meaningful risk of harmful interference to fixed link operations.[19] This

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[16] *Unlicensed Use of the 6 GHz Band*, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd. 3852, ¶¶ 120, 141 (2020) ("*6 GHz First Order"*). *See* CableLabs, "6 GHz Low Power Indoor (LPI) Wi-Fi / Fixed Service Coexistence Study" *attached to* Letter from Rob Alderfer, CableLabs, to Marlene H. Dortch, Sec'y, FCC, ET Docket No. 18-295 (Dec. 20, 2019).

[17] *AT&T Services, Inc. v. Federal Communications Commission*, 21 F.4th 841, 847-848 (D.C. Cir. 2021).

[18] *Id*. at 847, 849.

[19] CableLabs, *Power Level Sensitivity in Coexistence Simulations*, attached to Letter from Becky Tangren, Vice President & Associate General Counsel, NCTA–The Internet & Television Association, to Marlene H. Dortch, Sec'y, FCC, ET Docket No.18-295, at 2 (filed Nov. 28, 2022) (confirming CableLabs' prior findings that at 8 dBm/MHz PSD there is *de minimus* risk of harmful interference).

more comprehensive 2022 CableLabs analysis demonstrated that "before a 6 GHz LPI access point causes any impact to a fixed link's 99.999% reliability, the PSD limit must be significantly higher than 8 dBm/MHz."[20]

While those past studies and the experience of countries that have adopted a higher power for LPI form a sufficient basis for the Commission to adopt this change, the record now includes a new and more comprehensive technical study submitted by leading high-tech companies that confirms an LPI power level of 8 dBm/MHz PSD does not materially increase the risk of harmful interference to FS receivers.[21] This study should remove any doubt that while increasing the PSD limit to 8 dBm/MHz would yield enormous benefits for the American people, the increased risks to incumbent fixed links is negligible.

The study by RFK Engineering Solutions submitted by Apple, et al. modeled all 222 Fixed Service receiver links registered in ULS for the San Francisco Bay Area, running 100,000 iterations and generating over 222 billion LPI-FS interactions. The study also makes assumptions that deliberately overstate potential interference, including that LPI devices will operate at maximum output power and at a 2% duty cycle that is five times the activity level the Commission assumed in the *6 GHz First Order*.[22] According to Apple, Broadcom, et al., "[t]he study shows that increasing LPI PSD by 3 dB would be inconsequential. Compared to the status quo, for each link that achieves 5-nines reliability today or better, the median link would only be

[20] Comments of NCTA—The Internet & Television Association at 11.

[21] "Report on Frequency Sharing Between Low Power Indoor RLAN Devices and Fixed Service Microwave Receivers in the 6 GHz Band" (*2026 San Francisco LPI Study*), attached as App. A to the Comments of Apple, Broadcom, Cisco Systems and Hewlett Packard Enterprise, *Unlicensed Use of the 6 GHz Band*, ET Docket 18-295 (March 23, 2026).

[22] *Id*. at Appendix A, 13–14.

affected *less than 0.003 seconds* over the course of a year."[23] In fact, despite choosing a hilly and densely-populated metro area where a Wi-Fi router could be within view of a FS link, the study found "no change in the 'nines availability' for *any* FS link in the area under study."[24]

In contrast, opponents of a 3 dB increase in LPI for indoor-only use continue to rely on contrived corner-case scenarios that rely on flawed assumptions and do not reflect real world operations. NCTA, for example, describes the contrived nature of a study showing interference resulting from two standard-power access points deliberately aligned with a fixed service link's main beam and at unrealistically high and identical power levels.[25] We agree with NCTA that "the Commission previously rejected such unrealistic studies and should continue to do so."[26]

The Commission must also consider the experience in other countries that followed the FCC's lead, but with a less cautious approach to PSD levels for indoor-only use. When the UK, European Union and other countries around the world adopted the FCC's LPI innovation in 6 GHz, they set the PSD limit for LPI APs at 10 dBm/MHz or higher.[27] As the Wi-Fi Alliance

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[23] Comments of Apple, Broadcom, Cisco Systems and Hewlett Packard Enterprise at 4. For context, the study notes that FS links today experience nearly 300 seconds of annual impact from natural phenomena alone. *2026 San Francisco LPI Study*, Appendix A, at 15.

[24] *Id*.

[25] *See* Comments of NCTA—The Internet & Television Association at 12-13, citing DOE CESER 6 GHz Interference Study attached to Letter from Brett Kilbourne, Utilities Technology Council, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 18-295 at at 10, Section 2.3.2 Columbus Experiments Methodology (Jan. 22, 2026).

[26] *Id*.

[27] *See, e.g.*, Comm'n Implementing Decision (EU) 2024/3157 Amending Implementing Decision (EU) 2021/1067 on the Harmonized Use of Radio Spectrum in the 6 425-6 425 MHz Frequency Band for the Implementation of Wireless Access Sys. Including Radio Loc. Area Networks (WAS/RLANs) at 3, *Official J. of the European Union* (Dec. 17, 2024), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ%3AL_202403157; *Improving Spectrum Access for Wi-Fi: Spectrum Use in the 5 GHz and 6 GHz Bands* at 80, OFCOM (July 24, 2020), https://www.ofcom.org.uk/siteassets/resources/documents/consultations/category-2-6-

points out, Europe "permits LPI operations at *10 dBm/MHz*, and years of real-world deployment there confirm no harmful interference."[28] Our groups agree with Apple, et al. that "the current LPI PSD limit leaves American users worse off in narrower channel applications than their counterparts in many other countries that have adopted PSD limits of 10 dBm/MHz or higher."[29] Since widespread deployment of Wi-Fi 7 in homes, schools, libraries and smaller enterprises is just beginning, it is imperative that the Commission "act[] now to adopt the proposed 8 dBm/MHz PSD [] needed to maintain U.S. leadership in next-generation wireless technologies."[30]

Finally, our groups applaud the Commission for proposing to rely in part on the agency's 2023 policy statement on principles to promote spectrum efficiency in its pending Report and Order on *Modernizing Spectrum Sharing for Satellite Broadband*, which involves balancing similarly worst-case claims by incumbent GSOs against the enormous public interest benefits of a modest increase in power for more recent NGSO/LEO satellites sharing the band.[31] The draft Order states that the Commission "seek[s] to achieve abundance and reject technically unnecessary restrictions borne from a zero-sum mindset." In this proceeding as well, our groups urge the Commission to be "guided by the Commission's policy statement on spectrum

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weeks/189812-improving-spectrum-access-for-wi-fi----spectrum-use-in-the-5-and-6-ghz-bands/associated-documents/6ghz-statement.pdf?v=325088.

[28] Comments of Wi-Fi Alliance at 14.

[29] Comments of Apple, Broadcom, Cisco Systems and Hewlett Packard Enterprise at 8.

[30] *Id*. at 8, 15-16 (noting many countries adopting LPI at PSD levels of 10 dBm/MHz or higher, including 11 dBm/MHz in the UK, Australia and New Zealand).

[31] *Modernizing Spectrum Sharing for Satellite Broadband*, Draft Report and Order, SB Docket No. 25-157, at ¶ 30 (April 9, 2026), citing *Principles for Promoting Efficient Use of Spectrum and Opportunities for New Services Promoting Efficient Use of Spectrum Through Improved Receiver Interference Immunity Performance*, Policy Statement, 38 FCC Rcd 3682 (2023).

management," which "favors efficiency over absolute protection guarantees" against any level of interference.[32] We urge the Commission to include the same strong reiteration of its principles favoring spectrum abundance in adopting this modest increase in LPI power levels.

IV. THE RECORD STRONGLY SUPPORTS PERMITTING AFC SYSTEMS TO ACCOUNT FOR BUILDING ENTRY LOSS (BEL) OF AT LEAST 20.5 dB AND POSSIBLY UP TO 30 dB

There is a clear consensus in the record supporting the Commission's proposal to adopt rules authorizing indoor-only Wi-Fi access points under Automated Frequency Coordination (AFC) control to account for BEL when calculating available channels and power levels. Our organizations strongly support this consensus view. The option to transmit indoors at more robust power levels is particularly important for schools, libraries, hospitals, public health clinics and any other venue or enterprise that determines it needs better coverage and more reliable connectivity than it can achieve relying solely on LPI. Although this indoor power increase would apply only to 850 megahertz (the U-NII-5 and U-NII-7 band segments), we agree with most commenters that community anchor institutions and even individual households should have the option, if they choose, to pay more for a composite router under AFC control to boost performance.

The record shows widespread agreement that the current allowance of 6 dB of BEL established by the Commission through a series of ad hoc waivers is needlessly restrictive and misaligned with both indoor-only operation and with the nearly decade-old standard for BEL established by the International Telecommunications Union (ITU). Caution in granting the initial waivers was understandable considering that AFCs have only been certified for commercial

[32] *Id*.

operation since February of 2024. Today, however, the Commission has the experience it needs to conclude that the combination of accurate AFC geolocation and the multiple LPI form factor restrictions that apply to composite routers are together sufficient to protect incumbent high-power microwave links.

The primary issue has become how much higher than the 6 dB of BEL granted in the waivers can be authorized without creating undue risk of actual harmful interference to incumbent fixed links. Our groups agree with the vast majority of commenters that the 'credit' for BEL should be no less than the 20.5 dB attenuation value specified in the ITU-R P.2109 standard.[33] Crucially, this is the same ITU standard the Commission relied upon in its original *6 GHz First Order* to set LPI power levels.[34] As NCTA explains, the 20.5 dB figure reflects "the median value of the BEL curve based on a 70/30 mix of traditional versus thermally efficient buildings" and therefore it should represent the floor of what is technically defensible for indoor-only operations.[35] Moreover, as Wi-Fi Alliance stated in its 2024 *Request for Waiver,* the very restrictive 6 dB BEL attenuation value established in recent waiver decisions is based on outdoor use, specifically a scenario where "a standard power client device is assumed to operate outdoors

[33] *See, e.g.,* Comments of Wi-Fi Alliance at 7; Comments of NCTA at 2; Comments of Information Technology Industry Council at 2; Comments of Comsearch at 1; Comments of Federated Wireless at 5; Comments of WifiForward at 16 ("the Commission itself used a BEL of 20.5 dB when it calculated LPI power levels"); Comments of C3Spectra Inc. at 11, 17-18 (codify BEL at 20.5 dB but "[p]ermit AFC operators to modify the BEL value . . . based on site-specific information.").

[34] *See 6 GHz Report & Order and FNPRM* ¶ 117 n.297 (establishing BEL value for use in determining power limits for LPI operation).

[35] *See* Comments of NCTA—Internet & Television Association at 8.

and not necessarily benefit from the additional 20.5 dB of BEL the Commission assumed when determining the permitted power levels for LPI devices."[36]

Our groups further agree with Wi-Fi Alliance, NCTA, WifiForward and other commenters that today and looking forward, the credit for BEL could be closer to 30 dB than to 20.5 Db without creating an undue risk of harmful interference to incumbent high-power microwave links.[37] We agree in particular with Wi-Fi Alliance that although the 20.5 dB attenuation value specified in the 2017 ITU-R P.2109 standard, which the Commission relied upon in setting the LPI power level, was "technically sound based on the record and international guidance available at the time,"[38] three developments since 2020 justify updating the 'credit' for BEL to the 25–30 dB range:

First, the U.S. building stock is evolving, becoming steadily more thermally efficient and thus more attenuating over time. This "mak[es] the Commission's 70/30 building mix assumption on which its 20.5 dB value is based overly conservative" and only more so as time passes.[39] All 50 states have adopted building energy codes, "green building materials account for approximately 55 percent of construction revenue," and "LEED-certified assets now comprise roughly 46 percent of recent urban deliveries."[40]

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[36] *Wi-Fi Alliance Request for Waiver of Section 15.407(l)(2) of the Commission's Rules for AFC System Operation in the 6 GHz Band*, Order, 39 FCC Rcd. 13216 ¶ 15 n.56 (2024).

[37] *See, e.g.*, Comments of Wi-Fi Alliance at 7; Comments of NCTA at 2; Comments of WifiForward at 16; Comments of Information Technology Industry Council at 2 (supports "at least" 20.5 dB); Comments of C3Spectra Inc. at 11, 17-18 (codify BEL at 20.5 dB but "[p]ermit AFC operators to modify the BEL value . . . based on site-specific information.").

[38] Comments of Wi-Fi Alliance at 7.

[39] *Id*.

[40] *Id*. at 8.

Second, the ITU's attenuation value does not account for clutter and the probability of further indoor attenuation. For example, Wi-Fi routers are rarely positioned in front of an open or traditional clear window pane. Indoor Wi-Fi routers are more commonly on the floor, in a closet and/or have furniture or other obstructions between them and an uncoated window pane.[41]

Third, the ITU's revised BEL standard—updated in 2023—includes a correction factor that takes elevation angles and antenna discrimination into account.[42] Under ITU-R P.2109-2, BEL increases by approximately 0.212 dB per degree of elevation angle, which is roughly 6 additional dB at 30 degrees, and is particularly relevant in dense urban environments where interference risk is likely to be the greatest.

In short, we agree with the Wi-Fi Alliance that "[t]aken together, these factors—including updated ITU-R P.2109-2 modeling, the increasing prevalence of thermally efficient construction, elevation-angle effects, and incumbent antenna discrimination—demonstrate that a BEL value in the range of 25–30 dB is more technically justifiable for the 6 GHz band."[43]

In addition, the requirement that composite routers can only operate above the maximum LPI power level if they are under the control of an AFC system adds a practical safety net. As NCTA explained, if harmful interference somehow occurs, AFCs can readily identify the source and force the access point to reduce power or switch channels.[44] "An AFC is required to be capable of identifying and locating composite access points and/or outdoor access points—all of

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[41] "When realistic indoor device distributions and established probabilistic modeling are applied, the model predicts median BEL ranges of 18-22 dB for traditional buildings and 28-35 dB for thermally efficient buildings." *Id*. at 9.

[42] *See* International Telecommunication Union, *Predictions of Building Entry Loss*, Recommendation ITU-R P.2109-2 (Aug. 2023), https://www.itu.int/dms_pubrec/itu-r/rec/p/R-REC-P.2109-2-202308-I!!PDF-E.pdf.

[43] Comments of Wi-Fi Alliance at 9.

[44] Comments of NCTA—The Internet & Television Association at 8.

which must be registered with the AFC—and also has the ability to force the access point to reduce its power or switch to a non-overlapping channel."[45]

As we opined in the previous section concerning a modest increase in LPI power spectral density, the Commission must be careful not to return to the mindset of scarcity and to a focus on the absolute protection of traditional incumbents in shared bands, especially where a policy of facilitating spectrum abundance and innovation is likely to lead to demonstrably greater gains for consumers and the economy overall. This tradeoff is as relevant in the 6 GHz band as it is for the Commission's impending order to modernize outdated and overly-protective ITU satellite spectrum sharing rules in the Ku and Ka bands. In this respect, WifiForward's deconstruction of the "fictional outdoor client" scenario used to justify a 6 dB BEL limit is instructive, as it shows clearly why this sort of incumbent-contrived, corner-case scenario is "wildly improbable" and should not be used by the Commission to justify suppressing indoor power levels for all enterprise, school, library and the other millions of potential users of composite routers for indoor-only Wi-Fi connectivity.[46]

V. THERE IS STRONG SUPPORT FOR AUTHORIZING LPI OPERATIONS ON CRUISE SHIPS

Our groups support the Commission's proposal to authorize the operation of LPI access points on cruise ships as defined in 33 CFR § 101.105. The public interest benefits of ending the blanket prohibition on LPI operations aboard all boats is clear in the record. In both form and function, cruise ships have become floating hotels and entertainment venues, where millions of

[45] *Id*. at 8. *See* 47 C.F.R. §§ 15.407(k)(1)-(5); *see also Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, 91 FR 8173, 8177 (Jan. 29, 2026) (to be codified as 47 C.F.R. § 15.407(k)(17)).

[46] *See* Comments of WifiForward at 15-16.

travelers each year gather in close proximity and in areas (e.g., defined sea channels and ports) where harmful interference to 6 GHz incumbents is highly unlikely. As Cisco and Hewlett Packard Enterprise state, a "record 21.7 million Americans are projected to travel on cruise ships in 2026—a 4.5 percent increase over 2025, and a 8.4 percent jump from 2024."[47]

It is also indisputable that like any other large hospitality, transportation or entertainment venue, "there is insufficient spectrum available in large, congested indoor common areas of cruise ships, such as restaurants, casinos, theaters, and promenades."[48] Industry growth and the rising expectations of consumers for high-quality Wi-Fi connectivity everywhere makes the availability of the entire 6 GHz band increasingly important to passenger experience. As the Cruise Lines International Association opines, "as passenger volumes increase, cruise ships are becoming increasingly dense, high-demand connectivity environments, with thousands of users relying on onboard networks simultaneously."[49] Accordingly, we agree with the consensus among commenters that "[p]ermitting 6 GHz operation on cruise ships would therefore advance the public interest and align with the Commission's goals of promoting efficient spectrum use, robust connectivity, and continued innovation."[50]

It is noteworthy that in addition to the typically isolated locations where cruise ships dock and operate, the structural characteristics of any relatively large passenger ship will substantially attenuate radiofrequency signals. As multiple parties explain, "cruise ships are constructed with thick steel hulls, reinforced bulkheads, and specialized glass that create significant building entry loss."[51]

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[47] Comments of Cisco Systems and Hewlett Packard Enterprise at 1.

[48] *Id*. at 4.

[49] Comments of the Cruise Lines International Association at 2.

[50] *Id*. at 3.

[51] *Id*. at 2.

Cisco and HPE likewise explain that "[a] ship hull . . . is typically made of steel that can be up to 40 mm thick," causing "the signals transmitted by LPI access points [to] be significantly attenuated when passing through a cruise ship's walls."[52]

Moreover, the primary rationale for extreme caution here has changed since the Commission's *6 GHz First Order* in 2020 sought to protect Earth Exploration Satellite Services ("EESS"), which provide remote sensing measurements taken over the ocean. Cisco and HPE point out that subsequently "[t]he 2023 World Radiocommunications Conference resolved to migrate the EESS ocean sensor measurements out of the 6 GHz band to the 4200-4400 MHz and 8400-8500 MHz bands."[53] We agree that if the need to protect EESS over coastal waters is or soon will be obsolete, the Commission should lift all special restrictions on 6 GHz unlicensed operations aboard cruise ships and oil platforms.

Finally, we disagree with AT&T, which supports easing the restriction, but proposes that the Commission should "define a 'cruise ship' to require a minimum of 500 passengers for hire."[54] AT&T's stated rationale is that only cruise ships carrying more than 500 passengers need an LPI authorization to ensure high-capacity Wi-Fi in "large, congested indoor common areas."[55] However, AT&T's rationale is irrelevant both to interference risk and to the purpose of leveraging LPI for Wi-Fi in complex hospitality venues, whether on land or at sea. No party supporting the Commission's proposal to remove this prohibition has suggested that the sole or primary purpose of LPI on a cruise ship is to provide sufficient capacity in rooms that hold more than 500 people at one time. In fact, even on a cruise ship with 2,000 passengers, it would be

[52] Comments of Cisco Systems and Hewlett Packard Enterprise at 7–8.

[53] *See id*. at 10.

[54] Comments of AT&T Inc. at 5.

[55] *Id*.

exceedingly rare to have more than 500 passengers sharing the same spectrum in the same room. These ships will typically have multiple restaurants and entertainment venues that strive to give passengers more choice and to spread them out even during peak evening times. What matters most is that the 100 or 200 passengers who may congregate in any particular location on the ship have quality service. AT&T ignores the primary goal of leveraging LPI on cruise ships, which is to ensure that passengers in all locations on the ship have the high-capacity and low-latency quality of service that next generation Wi-Fi makes possible through a combination of very wide channels across the full 1,200 megahertz, augmented by spectrum re-use from room to room.

VI. CONCLUSION

The public interest benefits of more robust indoor-only Wi-Fi coverage are clear. The Commission now has the opportunity to ensure that every user—homes, businesses, libraries, schools and public venues of all kinds—can benefit from next generation Wi-Fi 7/8 and the myriad use cases it will support.

Respectfully submitted,

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