

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Office of Engineering and Technology	)	ET Docket No. 23-107
Seeks Comment on Wi-Fi Alliance Request	)	
For Waiver of Section 15.407(L)(2) of the	)	
Commission’s Part 15 Rules for AFC System	)	
Operation in the 6 GHz Band	)	

**COMMENTS OF  
THE PUBLIC INTEREST SPECTRUM COALITION  
  
THE OPEN TECHNOLOGY INSTITUTE AT NEW AMERICA  
PUBLIC KNOWLEDGE  
CONSUMER REPORTS  
CENTER FOR RURAL STRATEGIES  
AMERICAN LIBRARY ASSOCIATION  
SCHOOLS HEALTH LIBRARIES BROADBAND (SHLB) COALITION  
BENTON INSTITUTE FOR BROADBAND & SOCIETY  
ACCESS HUMBOLDT  
X-LAB**

The Open Technology Institute at New America, Public Knowledge, Consumer Reports, Center for Rural Strategies, American Library Association, the Schools Health Libraries Broadband (SHLB) Coalition, Benton Institute for Broadband & Society, Access Humboldt and X-Lab (“Public Interest Spectrum Coalition”) hereby submit these comments in response to the Office of Engineering and Technology’s Public Notice (“PN”)<sup>1</sup> seeking comment on the Wi-Fi Alliance’s request for a limited waiver of Section 15.407(l)(2) of the Commission’s rules.<sup>2</sup>

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<sup>1</sup> *Office of Engineering and Technology Seeks Comments on Wi-Fi Alliance Request for Waiver of Section 15.407(l)(2) of the Commission’s Part 15 Rules for AFC System Operation in the 6 GHz Band*, Public Notice, ET Docket No. 23-107, DA 23-239 (Mar. 21, 2023) (“OET Public Notice”).

<sup>2</sup> *Wi-Fi Alliance Request for Waiver*, ET Docket Nos. 21-352 & 23-107 (filed Feb. 17, 2023) (“WFA Waiver Request”).

PISC fully supports the Wi-Fi Alliance proposal to incorporate building entry loss (BEL) in its automated frequency coordination (AFC) predictive propagation model for specifically identifiable “composite devices” that will operate indoor-only. PISC agrees with OET that it will “be possible to protect the microwave incumbents while permitting the AFC systems to adjust their calculations to take into account building entry loss when standard-power devices are indoors.”<sup>3</sup> Our organizations strongly believe that the ultimate benefits of the 6 GHz band to consumers and the economy will largely hinge on the Commission adopting higher power levels for indoor use – where 80 percent or more of the nation’s total mobile device data traffic flows over Wi-Fi – a choice that will determine whether the typical household and small business can distribute the gigabit connectivity enabled by Wi-Fi 6E without the added cost and complexity of multiple routers or repeaters.

We therefore urge the Commission to approve the waiver and, separately, to also approve the proposed increase in the power spectral density limit for low-power, indoor-only (LPI) access points to 8 dBm/MHz across the band’s entire 1200 megahertz. Both of these enhancements will magnify the utility of indoor-only Wi-Fi connectivity for consumers and businesses alike.

**I. The Commission Should Grant the Waiver Request if WFA and other AFCs Demonstrate they can Determine a Composite Device is Certified as Indoor-Only**

PISC agrees that the Wi-Fi Alliance and other approved AFC operators should have the flexibility to incorporate building entry loss attenuation into the AFC’s calculations of channel availability and power constraints for composite devices that are authorized to operate in both lower power indoor (“LPI”) and standard power (“SP”) mode (“composite devices”). In its

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<sup>3</sup> Office of Engineering and Technology, *OET Announces Conditional Approval for 6 GHz Band Automated Frequency Coordination Systems*, Public Notice, ¶ 40 (Nov. 2, 2022) (“AFC Conditional Approval PN”).

*Public Notice* conditionally approving 13 entities to operate AFC systems, OET acknowledged that it will “be possible to protect the microwave incumbents while permitting the AFC systems to adjust their calculations to take into account building entry loss when standard-power devices are indoors.”<sup>4</sup> PISC agrees. As OET has stated, taking building entry loss (“BEL”) into account when calculating the allowed power level at an indoor location is straightforward propagation analysis.<sup>5</sup> An AFC’s ability to do so accurately can be part of the lab and field testing that is required before OET approves an AFC for full commercial operation.

As OET further observed in its *AFC Conditional Approval PN*, “[t]he sole requirement in the rules is for AFC systems to use the specified propagation models to protect microwave receivers based on the -6 dB I/N metric used in the *6 GHz Report and Order*.”<sup>6</sup> As a result, the determining question becomes “how the AFC systems [will] determine that a device is, in fact, located indoors.”<sup>7</sup> We believe that WFA has adequately described how this can be done and that OET should grant the waiver for all approved AFCs subject to the condition proposed by WFA: “AFC systems must be capable of interpreting the FCC ID and certified Equipment Class provided by a standard-power device spectrum inquiry request to positively confirm that the request originated from a composite *Indoor Only with AFC With Restriction* device.”<sup>8</sup>

Importantly, by definition and design, WFA proposes that the waiver will apply only to composite devices that adhere to the Product Form Factor (“PFF”) rules that the Commission established for LPI devices to prevent outdoor operation. The Wi-Fi Alliance also asserts that its

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<sup>4</sup> AFC Conditional Approval PN, *supra*, at ¶ 40.

<sup>5</sup> *Id.* (“it would stand to reason that an AFC could, based on building entry loss, determine a higher permitted power level for an indoor versus an outdoor standard-power device so long as it is aware of whether such a device is operating indoors or outdoors.”)

<sup>6</sup> *Id.*

<sup>7</sup> *Id.*

<sup>8</sup> WFA Waiver Request, *supra*, at 9.

AFC system can “positively confirm” that an access point is a composite device designed and certified to operate only indoors based on the requesting device’s FCC ID, and the AFC can thereby differentiate it from other standard power 6 GHz unlicensed devices.<sup>9</sup>

If OET requires that AFC systems first verify that an access point making a request for permission to transmit has a registered FCC ID approved for LPI mode, this should conclusively establish the device is operating indoor-only. And since the Commission has already established in the *6 GHz Report and Order* that building entry loss is an appropriate factor to consider in assessing the potential for harmful interference,<sup>10</sup> incumbent microwave links should be protected to the same degree that they are with respect to any other standard power access point.

## **II. More Power for Indoor-Only Use Under AFC Control Will Greatly Benefit Consumers Without Increasing the Risk of Harmful Interference to Incumbents**

The pandemic work and school closures highlighted how critical it is to have affordable, high-capacity internet connectivity throughout every household and supporting every device. Even homes with gigabit-capable fiber or cable service are discovering that today’s Wi-Fi is constrained in supporting multiple users engaged in video conferencing, streaming video, gaming and other high-bandwidth applications – let alone emerging applications such as augmented and virtual reality.

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

<sup>10</sup> Report and Order and Further Notice of Proposed Rulemaking, *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 GHz and 24 GHz*, 35 FCC Rcd. 3852, at ¶ 109 (rel. April 24, 2020) (*6 GHz Order and FNPRM*) (explaining that the Commission considered Monte Carlo simulations, “which take into account probabilistic factors such as building entry loss”); *Id.* at ¶ 118 (“We find the CableLabs’ study persuasive because it uses actual airtime utilization data for hundreds of thousands of Wi-Fi access points along with a statistical model for building entry loss.”)

Accordingly, PISC has strongly supported the proposal pending in the FNPRM to allow LPI devices to operate at a higher power spectral density of 8 dBm/MHz with a maximum permissible EIRP of 33 dBm for devices operating in a 320 megahertz bandwidth.<sup>11</sup> As the Commission observed in the FNPRM, “these rules would be useful for many indoor devices that require high data rate transmissions such as indoor access points communicating with clients like high-performance video game controllers, and wearable video augmented reality and virtual reality devices.”<sup>12</sup> Similarly, allowing composite devices coordinated by an AFC to take advantage of higher power levels on the standard power sub-bands would enhance connectivity and greatly benefit consumers.

The effective coverage area of an indoor Wi-Fi router is of the utmost importance to consumers. An inadequate power level will result in homes and businesses suffering dead zones or becoming burdened by the cost and complexity of multiple routers and/or repeaters. Even large enterprises will benefit from robust indoor coverage for factory automation, warehouse fulfillment centers, and other venues where IoT connectivity can boost productivity.

Unlike standard power outdoor Wi-Fi deployments, composite devices would operate entirely within a home or business, where building materials significantly attenuate the already low-power signal and minimize any potential interference. Routers are typically on the floor, or mounted high in a corner; rarely would they be positioned in front of a window. Just as the Commission concluded with respect to authorizing LPI, indoor-only Wi-Fi devices, whether in homes, offices, schools or other establishments, are extremely unlikely to be operating at

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<sup>11</sup> See Comments of the Public Interest Spectrum Coalition, *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 GHz and 24 GHz*, ET Docket No. 18-295, at 12-17 (June 29, 2020).

<sup>12</sup> *6 GHz Order and FNPRM* at ¶ 244.

locations or times where even a line-of-sight transmission could overcome a microwave point-to-point link's excess margin. Moreover, since composite devices would operate under the control of an AFC, they would by definition be authorized to operate only at a location that is not within the very conservative protection zones calculated by the AFC to ensure sufficient geographic separation between the services.

### **III. The Waiver Requested by WFA is in the Public Interest but Must Not be a Substitute for Increasing LPI Power Limits Across the Band's Full 1200 Megahertz**

PISC urges the Commission not to view the WFA Waiver Request as a *substitute* for the entirely separate question, pending in the FNPRM, about whether the power spectral density limit for LPI access points can be increased to 8 dBm/MHz for indoor-only use across the band's entire 1200 megahertz.<sup>13</sup> The WFA Waiver Request for composite devices and the proposed increase in allowed power for LPI devices each have distinct and separate benefits for consumer and business users. For example, devices operating at standard power are limited to two band segments that accommodate only four contiguous channels of 160 megahertz. In contrast, LPI devices are authorized to operate indoor-only over a contiguous 1200 megahertz that accommodates seven channels of 160 megahertz. Because most high-capacity applications – and

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<sup>13</sup> Studies in the record clearly demonstrate that the Commission can approve the pending proposal to increase the power limit for LPI access points from the current 5 dBm/MHz power spectral density (PSD) to 8 dBm/MHz PSD, the LPI client device PSD limit to 2 dBm/MHz, and the total power limit by at least 3 dB for LPI access points and client devices, to at least 33 dBm and 27 dBm, respectively. *See, e.g.*, Letter from Becky Tangren, Vice President & Associate General Counsel, NCTA – The Internet & Television Association, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 18-295, GN Docket No. 17-183 (filed Mar. 24, 2023); *CableLabs Power Level Sensitivity in Coexistence Simulations*, as attached to Letter from Becky Tangren, Vice President & Associate General Counsel, NCTA – The Internet & Television Association, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 18-295, GN Docket No. 17-183, at 2 (filed Nov. 28, 2022).

the most high-density user environments – are generally indoors, there is an enormous public interest benefit to consumers and the economy in authorizing an adequate power level for next generation Wi-Fi relying across the band’s entire 1200 megahertz.

In addition, operating at SP inherently imposes the additional cost of AFC coordination, which would be most burdensome for lower-income households. These same lower-income consumers are also likely to be the least able to afford the added cost of a composite router. Most lower-income households could quite likely enjoy adequate connectivity – and 1200 megahertz of bandwidth – if the LPI power density levels are increased, while avoiding the cost and complexity of AFCs.

While there is no question that having the option to use a composite device that operates at a higher power indoors under AFC control is an unmitigated benefit to all consumers, it should be adopted in tandem with raising the LPI power spectral density level across all 1200 megahertz. Not doing so would *widen* the digital divide as the most vital applications of the future rely increasingly on Wi-Fi 6E and soon Wi-Fi 7 connectivity indoors.

The Commission’s historic decision in April 2020 to authorize LPI devices across the entire 6 GHz band will only *potentially* make the enormous benefits of next generation Wi-Fi technology available and affordable to every home, business, school and library. In practice, the enormous public interest benefits of Wi-Fi 6E and Wi-Fi 7 will be undermined if the Commission restricts the power spectral density levels for LPI to an arbitrary low level (i.e., the current 5 dBm/MHz) that might appear to be a convenient “compromise” with powerful incumbents, but will in practice make Wi-Fi routers far more costly, complex, and less useful for the average household or small business.

## ***Conclusion***

The WFA Waiver Request is an opportunity to adopt a straightforward technical change that will enhance the connectivity of composite APs across a limited portion of the 6 GHz band – and for those who can afford the extra cost of AFC coordination. The WFA Waiver Request should be granted expeditiously, so that AFC operators can test and certify their systems with the capability to apply an accurate propagation model to indoor-only composite devices. At the same time, the Commission should not pull the technical rug out from under ordinary consumers, small schools, and small businesses by limiting the benefits of workable indoor-only power limits to a portion of the band. PISC urges the Commission to couple this common sense waiver with rapid approval of the proposed increase in power spectral density for LPI across the 6 GHz band’s entire 1200 megahertz.

Respectfully submitted,

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CENTER FOR RURAL STRATEGIES  
AMERICAN LIBRARY ASSOCIATION  
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