

August 3, 2023

Chairwoman Jessica Rosenworcel  
Federal Communications Commission  
45 L Street, NE  
Washington, DC 20554

Dear Chairwoman Rosenworcel,

We are writing to thank you for your steadfast and successful leadership in promoting unlicensed innovation and to urge you to finalize two issues in the pending 6 GHz proceeding in a robust way that is consistent with four key principles described below. The authorization of Very Low Power (VLP) devices and higher power for indoor-only use (LPI) are particularly crucial for digital equity and inclusion, for continued U.S. leadership in next generation Wi-Fi, and for virtually all consumers, businesses and community anchor institutions that increasingly rely on Wi-Fi for connectivity. Above all, we need to ensure that final rules for the 6 GHz band do not create a new Wi-Fi Digital Divide.

As the Commission noted in its new Policy Statement on promoting efficient use of spectrum: "As spectrum bands grow more congested, our networks continue to require greater bandwidth to support next-generation applications like robotics, artificial intelligence, precision farming, augmented reality, and cloud computing."<sup>1</sup> This is especially true in the home, where Wi-Fi provides the first and final transit for consumer data traffic. As connected devices and high-bandwidth applications proliferate, they will require increasing bandwidth to accommodate the growing exchange of traffic, making the capacity and capability of the 6 GHz band urgent. As the Policy Statement made clear, the path forward requires a focus on real-world practicalities as opposed to assuming perfect protection for every edge-case and corner-case postulated by incumbents. We urge you to apply the principles adopted in the Policy Statement here.

Americans increasingly equate broadband with Wi-Fi. This perception highlights that, for most people, Wi-Fi is the essential path to reliable and affordable broadband internet access, carrying more traffic than all other wireless technologies combined. Wi-Fi is also a fundamental complement to mobile carrier networks, which could not possibly provision 5G-quality throughput for outdoor and mobile use if Wi-Fi was not available to efficiently offload the vast majority of mobile device traffic.

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<sup>1</sup> Federal Communications Commission, Policy Statement, *Principles for Promoting Efficient Use of Spectrum*, ET Docket No. 23-122, at 1 (rel. Apr 21, 2023) ("Policy Statement").

Consumers are already starting to reap the benefits of Wi-Fi 6E.<sup>2</sup> Together with the roll-out of Wi-Fi 7 next year for both indoor and outdoor use – both of which depend on robust and reliable access to wide channels across the 6 GHz band – we can look forward to the sort of multi-gigabit throughput, low latency and deterministic scheduling that allows innovations in 5G/6G applications to be available in any home, business, school or library that has a fiber or other high-capacity connection to the internet. School and business campuses, entertainment venues, hospitals, factory complexes and all manner of enterprise will increasingly rely on the enormous capacity and high reliability that Wi-Fi 7 will offer to all.

Wi-Fi is also generating competition in the mobile market. Xfinity (Comcast) and Spectrum (Charter) each have more than 6 million wireless subscribers. Their “Wi-Fi first” MVNOs are leveraging the fact that cable internet subscribers offload more than 85% of mobile device traffic.<sup>3</sup> Cable’s experience also indicates how critical Wi-Fi will be to the practical success of fiber broadband deployments in general, including federal investments that prioritize high-capacity connections, because without Wi-Fi 6E/7 consumers and businesses will not be able to distribute and share ultra-high-speed connections among multiple users and devices.

American innovation gave birth to Wi-Fi – and U.S. companies continue to dominate Wi-Fi chip and equipment markets, contributing \$995 billion to the US economy in 2021 alone. The tremendous scope of global markets for Wi-Fi depend in large part on harmonization of both unlicensed spectrum bands and the technical rules governing devices, all of which the FCC has historically shaped.

For all these reasons and more, we urge you to adopt the increased power level for LPI and the proposed authorization of VLP at 14 dBm EIRP, as proposed in the 6 GHz FNPRM.<sup>4</sup> In both cases the record is now replete with updated analyses that demonstrate the risk of *actual harmful interference* is exceedingly unlikely.

Concerning LPI, the probabilistic analysis by CableLabs that the Commission relied on in the *6 GHz Order* (an approach the D.C. Circuit Court explicitly upheld),<sup>5</sup> has been supplemented to show that even at somewhat higher power levels (above 8 dBm/MHz PSD), and applying the

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<sup>2</sup> Wi-Fi Alliance, Ex Parte Letter to Marlene H. Dortch, Federal Communications Commission (May 18, 2023), <https://www.fcc.gov/ecfs/document/10518205628326/1> (stating that more than 473 million Wi-Fi 6E devices and 94.6 million Wi-Fi 6E access points will ship in 2023).

<sup>3</sup> Press Release, Charter Communications, *Charter Launches Spectrum One, Offering Customers Unrivaled Connectivity and Value* (Oct. 31, 2022), <https://corporate.charter.com/newsroom/charter-launches-spectrum-one> (“more than 85 percent of mobile customers’ activity occurs over Wi-Fi”).

<sup>4</sup> *Unlicensed Use of the 6 GHz Band*, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd. 3852, ¶ 243 (2020) (“6 GHz Order” or “FNPRM”).

<sup>5</sup> *AT&T Services, Inc. v. Federal Communications Commission*, 21 F.4<sup>th</sup> 841, 847-848 (D.C. Cir. 2021).

most conservative standards supplied by 6 GHz incumbents, there is no meaningful risk of harmful interference to fixed link operations.<sup>6</sup> A separate university study, funded by the National Science Foundation, found that at the University of Michigan (which has upgraded 16,000 indoor access points to Wi-Fi 6E), the measured outdoor signal strength of even such a dense deployment “does not pose an interference risk to incumbents.”<sup>7</sup>

Concerning VLP, the record now includes two new Monte Carlo simulation studies that use different methodologies, both based on conservative assumptions, and study different cities. Each study independently demonstrates even more conclusively than previous work that the risk of harmful interference to incumbents from VLP devices is insignificant operating at 1 dBm/MHz and up to 14 dBm total power EIRP.<sup>8</sup> Field testing, including data on Wi-Fi/Fixed Service interactions from a recent University of California San Diego field study, reinforce previous findings.<sup>9</sup> Further, the overwhelming majority of VLP devices will be used indoors, where (like LPI) the attenuation of walls and windows eliminates any risk of harmful interference.

To fulfill the promise and potential of the Commission’s historic 2020 *6 GHz Order*, our organizations urge you to resolve the issues pending in the FNPRM in a manner that is **consistent with the following four public interest goals and principles:**

- ***Digital Equity and Inclusion:***

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. Similarly, the enormous future value of AR/VR and other applications possible with VLP devices – whether for an individual or in a school or library – should not require the extra cost and complexity of database control.

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<sup>6</sup> 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 8 dBm/MHz PSD is *de minimus* risk of harmful interference).

<sup>7</sup> Letter and Presentation from Prof. Monisha Ghosh, University of Notre Dame College of Engineering to Marlene H. Dortch, Sec’y, FCC, *Unlicensed Use of the 6 GHz Band*, ET Docket No. 18-295 (July 21, 2023).

<sup>8</sup> See, e.g., Letter and Presentation from Paul Margie, Counsel to Apple Inc., to Marlene H. Dortch, Sec’y, FCC, *Unlicensed Use of the 6 GHz Band*, ET Docket No. 18-295 (Feb. 6, 2023).

<sup>9</sup> See Letter from Paul Caritj, Counsel to Apple Inc., Google LLC and Meta Platforms Inc., to Marlene H. Dortch, Sec’y, FCC, ET Docket No. 18-295 (filed May 30, 2023) (attaching *6 GHz Field Test Results Report: University of California San Diego*).

- ***U.S. Leadership and Global Harmonization***

Since 2020, more than 55 nations in the Americas, Europe and Asia have followed the FCC’s lead by authorizing at least 500 megahertz at 6 GHz for unlicensed use. Further, most of these nations (including the European Union, United Kingdom and South Korea) have also adopted the FCC’s proposal (still pending here) to authorize VLP at 14 dBm EIRP. Canada plans to harmonize with other leading nations. With the 2023 World Radio Conference approaching, this is not the time for the U.S. to fall behind and undermine the development of harmonized global markets for innovative and interoperable VLP devices. It is vital for the Commission to demonstrate its commitment to the most robust use of the 6 GHz band by finalizing these issues prior to WRC-23.

- ***Innovation in the U.S Wireless Ecosystem***

Our society is on the cusp of a wireless future in which personal communication that relies on a smartphone or laptop is just one aspect of how we’ll connect to an endless variety of devices, sensors, tools and systems at home, work and in public places. Innovation will automate most of the communication and data sharing among devices with widely divergent needs for bandwidth and latency. As you stated recently: “If we do this right, the least interesting thing will be our phones, because we’ll bring wireless functionality into the world at large – we’ll put sensors in so much around us.”<sup>10</sup>

The form factor, battery life and cost of all this innovation in VLP connectivity will become crucial to productivity and to whether its benefits are a luxury or affordable for all. We cannot predict what these thousands of new devices and applications will do, but we can hasten and democratize innovation – as we’ve done with Wi-Fi policy for two decades – by making access as open, simple and affordable as possible.

- ***Spectrum Sharing, Interference Realities and Shared Responsibilities***

The 2020 *6 GHz Order* is in line with recent FCC decisions that advance more intensive spectrum sharing and reject a reliance on corner cases and outdated measures of “interference” (such as the use of a particular I/N value without any probability factor) that are unrelated to the actual risk of *harmful* interference (i.e., to link availability). While the *6 GHz Order* determined that the rules for unlicensed use must avoid a “significant risk” of harmful interference, it also stressed that the FCC is “not required to refrain from authorizing services or unlicensed operations whenever there is any possibility of harmful interference.”<sup>11</sup>

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<sup>10</sup> Howard Buskirk, *Communications Daily*, “FCC to Consider Inventory Sale After Auction Authority Restored: Rosenworcel” (July 26, 2023).

<sup>11</sup> *6 GHz Order*, ¶ 146. See also Brief for Federal Communications Commission and United States of America at 28 n.7, *AT&T Servs. Inc. v. FCC*, (No. 20-1190) (D.C. Cir. Apr. 16, 2021) (“Because -6 dB is a ‘conservative’ threshold, the Commission noted that it was ‘not making a determination that any signal received with an I/N greater than -6 dB would constitute harmful interference.’”).

In the *6 GHz Order*, the Commission rejected the use of a simplistic I/N metric, specifically stating that it was “not making a determination that any signal received with an I/N greater than -6 dB would constitute ‘harmful interference.’”<sup>12</sup> Opponents of the FCC challenged this point in an appeal to the D.C. Circuit. In its brief defending the *6 GHz Order*, the Commission reiterated this finding, stating: “Because -6 dB is a ‘conservative’ threshold, the Commission noted that it was ‘not making a determination that any signal received with an I/N greater than -6 dB would constitute harmful interference.’”<sup>13</sup>

The D.C. Circuit upheld the *Order*. The D.C. Circuit’s decision strongly endorsed the Commission’s reliance on large-scale probability studies assessing the risk of harmful interference from LPI devices operating without geolocation database control, studies that clearly support the proposed *increase* in LPI unlicensed power levels to 8 dBm/MHz.<sup>14</sup>

Similarly, in April of this year the Commission rejected calls for the use of a static and antiquated interference metric for the purpose of facilitating coexistence among multiple NGSO satellite constellations that share spectrum – and instead adopted “degraded throughput” as the appropriate metric for sharing rather than a static and misleading I/N value.<sup>15</sup> That same month the Commission also adopted its Policy Statement on sharing principles and reciprocal obligations for transmitters and receivers. The three categories of principles in that Policy Statement should be applied to 6 GHz: “Interference Realities,” “Shared Responsibilities,” and “Data-Driven Regulatory Approaches to Promote Co-Existence.”<sup>16</sup> Concerning interference realities, the agency now recognizes that: “*The electromagnetic environment is highly variable, and zero risk of occasional service degradation or interruption cannot be guaranteed.*”<sup>17</sup>

As the Commission considers higher power for LPI devices and a VLP device class, it should ensure that it adheres to this approach and not base any analysis or rules on the -6 dB I/N threshold, which the *6 GHz Order* adopted solely for protection area calculations by the Automated Frequency Coordination systems, and not for Commission harmful interference determinations. Relying on the calculated probability of a “significant risk” of harmful

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<sup>12</sup> *Unlicensed Use of the 6 GHz Band*, Report and Order and Further Notice of Proposed Rulemaking, 35 FCC Rcd. 3852 ¶ 146 (2020).

<sup>13</sup> Brief for Federal Communications Commission and United States of America, *AT&T Servs. Inc. v. FCC*, at 28 n.7 (No. 20-1190) (D.C. Cir., Apr. 16, 2021).

<sup>14</sup> *AT&T v. FCC* at 847-848.

<sup>15</sup> Report and Order and Further Notice of Proposed Rulemaking, *Revising Spectrum Sharing Rules for Non-Geostationary Orbit, Fixed-Satellite Service Systems*, IB Docket No. 21-456 (rel. April 21, 2023). See also Comments of the Public Interest Organizations, *Revising Spectrum Sharing Rules for Non-Geostationary Orbit, Fixed-Satellite Service Systems*, IB Docket No. 21-456 (March 25, 2022).

<sup>16</sup> *Policy Statement on Efficient Spectrum Use*, *supra* n. 1, at 2-3.

<sup>17</sup> *Id.* at 2 (emphasis added).

interference, as the Commission did in authorizing LPI, makes even more sense with VLP devices that are inherently itinerant, that operate at far lower power levels, and that are subject to attenuation from far-field/body loss, propagation loss, polarization loss, feeder loss, total power control and other mitigating factors.<sup>18</sup> High-power fixed links in the band also have enormous fade margins that make even corner cases (e.g., AR/VR glasses on a rooftop next to the boresight of a fixed link) unlikely to result in actual failure of the link.

Although most VLP use will be indoors, adopting functional and low-cost rules for VLP devices will be even more valuable to consumers once the Commission certifies AFCs for standard power operation in the coming months. America's unserved and underserved communities will greatly benefit once more wide, fast and low-latency channels across 850 megahertz of the band are available to fuel reliable point-to-multi-point outdoor broadband deployments, especially if authorized in tandem with the use of directional antennas.

The Commission can also confidently adopt its proposed increased power levels for LPI operations (from 5 dBm/MHz to 8 dBm/MHz) given CableLabs' multiple studies and other findings in the record that demonstrate that there is no meaningful risk of harmful interference to incumbent fixed links, whereas consumers stand to gain significant benefits of expanded throughput and coverage at those power levels.

Your decision on these two key issues will determine the future of Wi-Fi connectivity and its impact on digital equity, innovation and U.S. leadership in this mostly made-in-America pillar of our wireless future. The stakes for consumer welfare, innovation and the economy overall could not be higher. We look forward to supporting your efforts to continue to expand public access to unlicensed and shared spectrum.

Sincerely,

**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**

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<sup>18</sup> See, e.g., Letter from Paul Caritj, Counsel to Apple Inc., Broadcom Inc., Google LLC and Meta Platforms Inc., to Marlene H. Dortch, Sec'y, FCC, ET Docket No. 18-295 (filed July 26, 2023).