



April 17, 2020

Ex Parte

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street SW
Washington, DC 20554

Re: *Unlicensed Use of the 6 GHz Band, ET Docket No. 18-295; Expanding Flexible Use in Mid-Band Spectrum between 3.7 and 24 GHz, GN Docket No. 17-183*

Dear Ms. Dortch:

On April 16, 2020 Michael Calabrese, representing the Open Technology Institute at New America (OTI), spoke by telephone to Aaron Goldberger, wireless and international advisor to Chairman Ajit Pai, and to William Davenport, chief of staff and senior legal advisor to Commissioner Geoffrey Starks, concerning the above-listed proceeding.

I began by conveying the strong support of both OTI and the broader Public Interest Spectrum Coalition (PISC) for the central decisions in the Commission’s draft Report and Order and FNPRM.¹ I expressed our appreciation in particular for the novel solution that will allow low-power, indoor-only (LPI) unlicensed use across the band’s entire 1,200 megahertz without burdening consumers and small business with the cost and complexity of coordination by an Automated Frequency Coordination (AFC) system. This particular outcome will generate unprecedented benefits for consumers and the economy, as a new study by NYU economist Raul Katz recently quantified.² Without affordable, do-it-yourself indoor access to the 850 megahertz in U-NII-5 and U-NII-7, a majority of homes and small businesses in particular would likely be limited to a single 160-megahertz channel between 6.875 and 7.125 GHz (U-NII-8 segment).

¹ Draft Report and Order and Further Notice of Proposed Rulemaking, *Unlicensed Use of the 6 GHz Band* ET Docket No. 18-295, GN Docket 17-183 (rel. Apr. 2, 2020) (“Draft Order”).

² Dr. Raul Katz, “Assessing the Economic Value of Unlicensed Use in the 5.9 GHz and 6 GHz Bands,” WifiForward (April 2020), <http://wififorward.org/wp-content/uploads/2020/04/5.9-6.0-FINAL-for-distribution.pdf>.

Although OTI strongly supports both LPI across all four band segments, as well as the innovative use of radiated power spectral density (PSD) to protect band incumbents from harmful interference, **we urge the Commission to immediately adopt the 8 dBm/MHz PSD power limit it is considering rather than defer that decision to the FNPRM.** The *Draft Order* is correct in observing that studies by CableLabs credibly demonstrate that LPI Wi-Fi authorized at 8 dBm/MHz radiated PSD will not cause harmful interference to fixed microwave incumbents in the band.³ The *Draft Order* states: “In fact the CableLabs Study shows I/N ratios far less than the -6 dB threshold the Fixed Wireless Communications Coalition, which represents the interest of the fixed microwave licensees, uses as a threshold for harmful interference to fixed microwave links.”⁴

In addition, as the *Draft Order* acknowledges, the “sporadic and bursty nature of Wi-Fi transmissions,” which is inherent in the contention-based protocol the Commission mandates in this Order, makes the occurrence of harmful interference even less likely.⁵ Moreover, as the *Draft Order* recognizes, high-power microwave links (point to point) have enormous excess margins to protect against interference from severe weather or from the deep atmospheric multipath fade that can occur during the eight-hour period after midnight.⁶ The Commission is certainly correct that indoor-only Wi-Fi, whether in homes, offices, schools or other establishments, are extremely unlikely to be operating at locations or times where even a line-of-sight transmission could overcome a microwave point-to-point link’s excess margin.⁷

Fixed Service microwave links – which currently share 850 megahertz in this lightly-used but extremely valuable band at no cost – are designed with excess link margin to protect against interference that far exceeds any plausible impact that an indoor, low-power device operating at 8 dBm/MHz radiated PSD could possibly generate. Fixed link fade margins typically exceed 40 dB.⁸ Thus, even in the corner cases posed by incumbent fixed link operators (e.g., a LPI router

³ *Draft Order* at ¶ 120 (“We find the CableLabs’ study persuasive because it uses actual air time utilization data for hundreds of thousands of Wi-Fi access points along with a statistical model for building entry loss.”). See also Letter from CableLabs, Charter and Comcast to Marlene H. Dortch, ET Docket 18-295, GN Docket 17-183, at 2-3 (March 25, 2020) (“Cable March 25 Ex Parte”) (“LPI Wi-Fi operation, even in worst-case scenarios, will maintain FS link reliability and will not cause harmful interference to FS, even at a conservative -6 dB I/N threshold.”) and studies referenced therein.

⁴ *Draft Order* at ¶ 119.

⁵ *Id.* at ¶ 141 (“the data that CableLabs submitted, collected from 500,000 Wi-Fi access points, shows that 95% of access points have an activity factor of less than 2% and only 1% of access points are active more than 7% of the time. This illustrates that most of the time a particular access point will not be transmitting.”).

⁶ *Id.* at ¶ 143.

⁷ See, e.g., Presentation attached to Letter from Paul Margie to Marlene H. Dortch, ET Docket 18-295, GN Docket 17-183, at 2-3 (Oct. 7, 2019) (study shows that “the effect of RLAN devices on fixed-service receivers, even accounting for rare deep-fade events, is minimal and does not rise to the level of harmful interference.”).

⁸ Chris Szymanski and Vinko Erceg, “Supplemental Link Margin Analysis,” Broadcom, Letter from Paul Caritj, counsel to Broadcom, to Marlene H. Dortch, ET Docket 18-295, GN Docket 17-183 (3/29/19)

in an open window very close to a link's main beam or receiver), "that interference is exceedingly unlikely to constitute harmful interference due to the available link margin."⁹ Even an unrealistically high assumption of a 10 or 20 dB increase in the noise from a LPI device directly to a fixed link receiver would not increase FS outage time, according to a coexistence study filed by CableLabs using real-world Wi-Fi utilization data from 500,000 access points.¹⁰ If FS operators need absolute certainty at the level of "five nines" at all times, they should move to a flexible use band and pay for that level of exclusive use.

As CableLabs, Charter and Comcast have described in connection with its studies showing 6 GHz incumbents would not suffer undue risk of harmful interference at 8 dBm/MHz PSD, substantial and "negative consumer impacts would result if LPI Wi-Fi were authorized at a radiated PSD of less than 8 dBm/MHz."¹¹ Further, in the context of the current pandemic, because Wi-Fi 6 routers and devices can come to market as soon as the end of this year, OTI believes it is critical that consumers and businesses have the indoor coverage they need to function well and affordably. Nationwide work and school closures have highlighted how critical it is to have affordable, high-capacity internet connectivity throughout every home. 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 and other high-bandwidth applications. Stay-at-home orders are turning homes into classrooms and offices, a situation that could persist to varying degrees into 2021.

I also expressed OTI's strong support for the Commission's decision to authorize unlicensed access points to operate both outdoors and indoors in the U-NII-5 and U-NII-7 sub-bands, under the control of an AFC system, at the standard Part 15 power levels that are currently permitted in the 5 GHz band. As OTI, PISC and most stakeholders have stated throughout this proceeding, thanks to the Commission's world-leading innovations that authorized automated coordination of sharing in the TV White Space spectrum and at 3550-3700 MHz (the new Citizens Broadband Radio Service), we can be confident that in these two sub-bands, fixed point-to-point operators can be completely protected from harmful interference.

("Broadcom Link Margin Analysis"). *See also* Letter from Apple, Broadcom, Cisco, et al. to Marlene H. Dortch, ET Docket 18-295, GN Docket 17-183, at 7 (Sept. 25, 2019) (applying industry-standard link planning algorithms shows virtually all FS links have more margin than required).

⁹ *Broadcom Link Margin Analysis* at 1.

¹⁰ CableLabs, "6 GHz Low Power Indoor (LPI) Wi-Fi / Fixed Service Coexistence Study," attached to Letter from Rob Alderfer, CableLabs, to Marlene H. Dortch, ET Docket 18-295, GN Docket 17-183 (Dec. 20, 2019) (sensitivity analysis demonstrating that even in unproven corner cases in which a Wi-Fi AP caused an unrealistically high 10 or 20 dB noise rise - which was not observed in CableLabs' simulation - there would be no impact on the Fixed Service).

¹¹ *Cable March 25 Ex Parte* at 3.

Concerning improvements to the *Draft Order*, OTI also recommends a **clarification that client device power levels for both LPI and standard power use are limited to 6 dB lower than the *maximum* transmit power of the associated access point**. We fully agree with the high-tech industry coalition that a power limit of 6 dB lower than the maximum power limit for LPI and standard/outdoor operations, respectively – rather than 6 dB below the actual power level of the access point – better protects incumbents and advance the Commission’s goal to encourage very wide-channel unlicensed operations at the lowest power necessary.¹²

I also conveyed OTI’s strong support for the authorization of Very Low Power devices at a power level that will allow consumers to take full advantage of 5G mobile connectivity to access innovative new applications and services, such as augmented reality and video streaming from smartphones to glasses or other wearables. For consumers, VLP is an integral benefit of authorizing shared, unlicensed use of the 6 GHz band. OTI agrees that VLP rules should be finalized after comment on the FNPRM. However, I suggested that the language in the FNPRM should be more suggestive of a positive and robust outcome, particularly since the extremely low power levels and likely use cases for VLP devices (e.g., indoors or at ground level, shielded by both the user’s body and general clutter) suggest they pose *de minimus* risk of even non-harmful interference to incumbents in the band.

Finally, I registered OTI’s **adamant opposition to the last-minute proposal by the National Association of Broadcasters to exclude the top 80 megahertz of the band** from low-power, indoor-only unlicensed use – instead giving broadcasters another exclusive, no-cost band of spectrum for a use case that would use perhaps one-billionth of the band’s capacity in any given week or month.¹³ Although electronic news gathering (ENG) is a vitally important activity for broadcast journalists, the record shows no valid evidence that ENG operations would fail or suffer harmful interference due to LPI in the band.

First, one of the NAB’s largest members and newscasters – NBC Universal – has stated it believes that harmful interference is extremely unlikely.¹⁴ Their filing cites two technical studies showing no interference under a variety of ENG use-case scenarios.¹⁵ Like the Commission –

¹² Letter from Apple, Broadcom, Cisco, et al. to Marlene H. Dortch, ET Docket 18-295, GN Docket 17-183, at 2 (April 7, 2020) (“adopting a rule that requires a client device to limit its transmit power to a level relative to the *actual* transmit power of an access point would not serve the Commission’s objective of preventing harmful interference to incumbents and could delay the introduction of 6 GHz Wi-Fi devices by requiring new standards changes, among other harms.”).

¹³ Letter from Patrick McFadden to Marlene H. Dortch, ET Docket 18-295, GN Docket 17-183, at 2 (April 10, 2020).

¹⁴ Letter from David Don, Comcast NBC Universal, to Marlene H. Dortch, ET Docket 18-295, GN Docket 17-183, at 3 (March 18, 2020).

¹⁵ The filing by Comcast NBC/Universal notes that a study by CableLabs tested a scenario with three indoor BAS camera locations in Grand Central Station and found a probability of 0.0007-0.0009% of dropping below 10 dB SINR from multiple Wi-Fi access points operating at low power. *See* Letter and Presentation from Rob Alderfer, CableLabs, and Elizabeth Andrión, Charter Communications, to Marlene

and unlike broadcast incumbents with nothing to lose by excluding the public from making use of this mostly fallow spectrum – NBC Universal recognizes that given the *de minimus* risk of interference, it is far more important to achieve more efficient and intensive use of the band through sharing.

Second, venues where broadcasters deploy news cameras – from Congressional hearing rooms to professional sports arenas – can decide for themselves whether the two uses are compatible.¹⁶ Stadiums and other venues that use enterprise Wi-Fi networks can choose, if they believe it’s important enough, to forsake use of the top 80 megahertz of the band so that ENG has exclusive access. That sort of market-based and place-based approach is more appropriate than a decision to let 80 megahertz lie fallow 99.99 percent of the time. Moreover, a study by the high-tech industry coalition showed that even unmanaged indoor ENG cameras would not suffer harmful levels of interference from LPI use in the same room.¹⁷

Third, NAB offers no basis for its request to set aside 80 megahertz in this band exclusively for its free (and relatively sparse) use. Considering that it takes less than 10 megahertz to transmit an 8K video signal, even in the future the claim that 80 megahertz is needed on an exclusive basis in a single location for ENG seems difficult to justify. Moreover, the 6 GHz band is only one of many BAS bands available to ENG operations. In a worst case scenario, an ENG operator can coordinate to use spectrum available to it in the 2 GHz or 13 GHz bands. Indeed, as the record indicates, ENG operations are increasingly moving away from dedicated ENG spectrum altogether, in favor of cellular connectivity or Wi-Fi.¹⁸

Respectfully submitted,

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H. Dortch, ET Docket 18-295, GN Docket 17-183, at 17 (Feb. 21, 2020). A separate study by the high-tech industry coalition, testing three distinct ENG use scenarios, reached similar results. *See* Letter from Apple, Broadcom, Cisco, et al. to Marlene H. Dortch, ET Docket 18-295, GN Docket 17-183, at 3 (Feb. 28, 2020) (“RLAN Group Feb. 28 Study”).

¹⁶ Presentation attached to letter from Paul Margie, counsel to Apple, Broadcom, Cisco, et al., to Marlene H. Dortch, ET Docket 18-295, GN Docket 17-183, at 17 (March 9, 2020) (“Venues, such as the Capitol, where ENG receivers are located, have IT managers or frequency coordinators, who manage the RF environment.”)

¹⁷ *Ibid.*

¹⁸ *RLAN Group Feb. 28 Study*, at 10, *supra* note 15. *See* Comments of Teradek, LLC and Amimon, Inc. at 1-2, ET Docket No. 18-295, GN Docket No. 17-183 (filed Feb. 15, 2019); Ven Balakrishnan, Strong Signals for Bonded Cellular in Broadcasting, GRANT THORNTON (Sept. 4, 2019) (“Our interviews suggest bonded cellular technology is currently used in up to 70% of live news broadcasts”), <https://www.grantthornton.co.uk/insights/strong-signals-for-bonded-cellular-in-broadcasting/>.