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The FCC's 5.9 GHz Proposal Would Advance Both Wi-Fi and Vehicle Safety

by

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I. Introduction and Summary

The FCC is poised to put an additional 75 MHz of high-demand mid-band spectrum to its highest and best use. Chairman Ajit Pai has included an item on the Commission's agenda for its November 18 Open Meeting that at long last would free the 5.9 GHz band from a technological no man's land. The American public has waited more than twenty years for the Dedicated Short-Range Communications service in the 5.9 GHz band to reach the necessary critical mass of deployments – in cars, trucks, and roadside devices – to improve automotive safety. It clearly has not happened.

That is why strong support exists on both sides of the political aisle for a fresh approach to this vastly underutilized spectrum that advances both public safety and the capabilities of Wi-Fi networks.

In December 2020, all five Commissioners voted in favor of a proposal to split the 5.9 GHz band into two parts: the lower portion for unlicensed use and the upper portion for Intelligent

Transportation System services. The draft item proposed by Chairman Pai would make 45 MHz of essentially untapped spectrum immediately available for indoor Wi-Fi and, for the first time, allocate 30 MHz to a successor vehicle safety technical standard with broad industry support: Cellular Vehicle-to-Everything, or C-V2X. This is a win-win proposal that would (1) quickly provide much-needed additional capacity to both existing Wi-Fi 4 and 5 equipment and next-generation Wi-Fi 6 devices, and (2) reignite efforts to provide tangible and timely improvements to the safety of our roadways.

II. The FCC's Earlier Embrace of DSRC Has Not Improved Vehicle Safety

The Commission specified Dedicated Short-Range Communications (DSRC) as the technical protocol for the exchange of transportation-related safety messages more than two decades ago.¹ But for a signaling-based approach to prove meaningfully viable, every vehicle must be able to both send and receive information. DSRC to this day has not come anywhere close to realizing those essential network effects. Only one production model car ever included such capability, and today less than 16,000 vehicles – out of a total of 274 million – support DSRC.² As a consequence, the *Draft Order* estimates that the probability that two vehicles within 600 meters of one another are both DSRC-enabled – and thus able to exchange accident-avoiding data – is but 0.00006326.³

Fortunately, and as the Free State Foundation showed in comments filed in the 5.9 GHz rulemaking proceeding, the marketplace has addressed traffic safety needs through other means: cameras, sensors, sonar, light detection and ranging (LiDAR), and the use of other frequency bands.⁴ In addition, a successor standard to DSRC has emerged: Cellular Vehicle-to-Everything (C-V2X). C-V2X has widespread support from automobile manufacturers including Audi, BMW Group, Daimler, Ford, GM, Honda, Hyundai Motor Group, Jaguar Land Rover, Nissan Motor Corporation, Groupe Renault, Volkswagen, and Volvo.⁵ Commenters indicate that 30 MHz is adequate capacity for C-V2X – and proponents welcome

¹ See *Amendment of Parts 2 and 90 of the Commission's Rules to Allocate the 5.850-5.925 GHz Band to the Mobile Service for Dedicated Short Range Communications of Intelligent Transportation Services*, ET Docket No. 98-95, Report and Order, 14 FCC Rcd 18221 (1999).

² See *Use of the 5.850-5.925 GHz Band*, ET Docket No. 19-138, First Report and Order, Further Notice of Proposed Rulemaking, and Order of Proposed Modification, FCC CIRC2011-01 (released October 28, 2020), available at <https://docs.fcc.gov/public/attachments/DOC-367827A1.pdf> (*Draft Order*), at ¶ 69.

³ See *id.* at ¶ 70.

⁴ See Comments of the Free State Foundation, *Use of the 5.850-5.925 GHz Band*, ET Docket No. 19-138 (filed March 6, 2020), available at <https://freestatefoundation.org/wp-content/uploads/2020/03/FSF-Comments-5.9-GHz.Final-030620.pdf>, at 5-6.

⁵ See "Our Members," The 5G Automotive Association (5GAA), available at <https://5gaa.org/membership/our-members/>. 5GAA "is a strong advocate of Cellular-V2X (C-V2x)." See "Experience the Future of Mobility," 5GAA, available at <https://5gaa.org/5g-technology/experience-the-future/>. The *Draft Order*, citing comments filed by 5GAA, reports that "Ford intends to deploy C-V2X in all of its new vehicle models sold in America (pending favorable regulatory action) and that several other automobile manufacturers, including Audi, Daimler North America Corp., BMW of North America, and Jaguar Land Rover ... have trialed C-V2X." *Draft Order* at ¶ 99 n.243.

agency action to allow, for the first time by rule, use of the upper 5.9 GHz band for this technology.⁶

III. More Capacity Is Needed for Wi-Fi

Demand for Wi-Fi has been on the upswing for years. The COVID-19 pandemic has accelerated that trend as people increasingly work, learn, interact, and consume content from their homes. As a result, existing unlicensed allocations in the 2.4 and 5 GHz bands are approaching full capacity.⁷ The *Draft Order* cites two 2017 studies for the proposition that "the U.S. will need between 788 megahertz and 1.6 megahertz of new mid-band spectrum by 2025 to accommodate the growing demand for Wi-Fi."⁸ Relatedly, the latest Wi-Fi protocol, Wi-Fi 6, is capable of providing gigabit speeds – but requires contiguous, 160 MHz channels to achieve its full potential.

The *Draft Order* seizes upon the fact that the lower 45 MHz of the 5.9 GHz band is well positioned to quickly address both of these pressing concerns. *First*, this spectrum is virtually unoccupied: as Chairman Pai noted in a recent blog post, "[u]nfortunately, after two decades, DSRC has barely been deployed, meaning this spectrum has been largely unused."⁹ As a consequence, it can be reallocated immediately for indoor use without concern for harmful interference.¹⁰ Wireless access points and other devices already in the field will be able to take advantage of this new capacity through software and/or firmware devices – consumers will not have to replace existing hardware in order to take advantage of this spectrum.¹¹

⁶ See *Draft Order* at ¶¶ 33-34. Consistent with the Free State Foundation's suggestion, the item on circulation would designate the entire upper 30 MHz for C-V2X use rather than 'splitting the baby' between C-V2X and DSRC. See Comments of the Free State Foundation, *Use of the 5.850-5.925 GHz Band*, ET Docket No. 19-138 (filed March 6, 2020), available at <https://freestatefoundation.org/wp-content/uploads/2020/03/FSF-Comments-5.9-GHz.Final-030620.pdf>, at 11, *Draft Order* at ¶¶ 29-47.

⁷ See, e.g., Andrew Long, "Wi-Fi 6E Can Modernize Unlicensed Wireless," *Perspectives from FSF Scholars*, Vol. 15, No. 7 (February 7, 2020), available at <https://freestatefoundation.org/wp-content/uploads/2020/02/Wi-Fi-6E-Can-Modernize-Unlicensed-Wireless-020720.pdf>, at 3 ("[C]urrent Wi-Fi offerings are showing their age. In part this is because Wi-Fi is a victim of its own success.... [T]he number of connected devices (both consumer and, in particular, [Internet of Things]) is exploding. The laws of physics dictate that more devices operating in a fixed amount of spectrum inevitably leads to overcrowding.") (citations omitted); *id.* at 4 ("[T]he spectrum that the FCC allocated in the 2.4 GHz and 5 GHz bands for unlicensed use in 1985 is overcrowded and encumbered by networks based upon the Wi-Fi 4 and 5 standards.") (citation omitted).

⁸ *Draft Order* at ¶ 15.

⁹ Ajit Pai, "A New Look For Familiar Themes" (October 27, 2020), available at <https://www.fcc.gov/news-events/blog/2020/10/27/new-look-familiar-themes>.

¹⁰ See *id.* at ¶¶ 67-76 (finding the probability of interference to both vehicle-to-vehicle and vehicle-to-infrastructure operations using the DSRC standard during the one-year transition period to be sufficiently low – 0.00006326 and 0.0000061, respectively – to warrant only a 20 dBm/MHz access transmit power limit).

¹¹ See *id.* at ¶ 22 ("We expect the benefits arising from this reallocation of the lower band will be available to American consumers shortly after the rules in this proceeding become effective.... We anticipate that many Wi-Fi access points currently operating using U-NII-3 spectrum, in addition to being capable of software upgrades, will be able to meet the requirements we adopt for indoor-only devices.").

In addition, after the expiration of the one-year transition period during which the limited number of incumbent ITS licensees must migrate to the upper portion of the band,¹² the lower 45 MHz also will open up to full-power outdoor use. And in the intervening period, wireless ISPs currently using that spectrum pursuant to pandemic-related grants of Special Temporary Authority (STA), of which there are more than 100, may be able to continue to use that spectrum to supplement their offerings during this ongoing period of heightened demand.¹³

Second, this 45 MHz of spectrum, which occupies the frequencies between 5.850 and 5.895 GHz, is directly adjacent to existing unlicensed allocations in the 5 GHz band. As wireless carriers roll out 5G, cable operators migrate to multi-gigabit offerings delivered over the emerging "10G" platform, and fiber-to-the-home (FTTH) deployments expand substantially, the next generation of wireless networking, Wi-Fi 6, can complement licensed services with significantly faster speeds, lower latency, better power management, and support for more devices.¹⁴

In order for Wi-Fi 6 to reach its full potential, however, 160 MHz wide channels are needed.¹⁵ That is why the *Draft Order* describes the combination of the 5 (also referred to as U-NII-3) and 5.9 (U-NII-4) GHz bands as "greater than the sum of its parts," explaining that "[w]hereas the upper portion of the U-NII-3 band can only support at most one 80-megahertz channel and the U-NII-4 band (in isolation) could only support a single 40-megahertz channel, together they can enable a single 160-megahertz channel for U- NII operations."¹⁶

Further, unlike Wi-Fi 6E devices compatible with the 6 GHz band, Wi-Fi 6 devices operating in the 5 GHz and 5.9 GHz bands will not have to support Dynamic Frequency Selection (DFS), a burdensome interference-avoiding requirement that impedes overall efficiency and complicates the device development and approval processes. As such, the *Draft Order* suggests that we could see Wi-Fi 6 devices able to operate within the 160 MHz channel spanning the 5 GHz and 5.9 GHz bands on store shelves even before Wi-Fi 6E devices.¹⁷

¹² See *id.* at ¶ 49 ("We adopt our proposal to require existing ITS licensees to cease use of the 5.850-5.895 GHz portion of the 5.9 GHz band and will provide ITS licensees up to one year from the effective date of this First Report and Order to cease operating in this portion of the band."). ITS licensees will have two years to transition from DSRC to C-V2X. See *id.* at ¶ 143.

¹³ See Press Release, "Chairman Pai Proposes Modernizing the 5.9 GHz Band" (October 27, 2020), available at <https://docs.fcc.gov/public/attachments/DOC-367801A1.pdf> (noting that "during the pandemic, the FCC has granted temporary access to over 100 wireless Internet service providers, or WISPs, to use this spectrum, which has helped them increase speeds, decrease congestion, and extend coverage areas" and that "[t]he new rules would create a path for WISPs to use this spectrum permanently"); *Draft Order* at ¶ 57 ("We nonetheless will allow some outdoor operations in certain specified locations in the band through the STA process (i.e., on a non-interference basis), where such operations would not cause harmful interference to any incumbent operations.").

¹⁴ See, e.g., Andrew Long, "'10G' Can Help Future-Proof Broadband Infrastructure," *Perspectives from FSF Scholars*, Vol. 15, No. 47 (September 11, 2020), available at <https://freestatefoundation.org/wp-content/uploads/2020/09/10G-Can-Help-Future-Proof-Broadband-Infrastructure-091120.pdf>, at 3, 5-7.

¹⁵ See *Draft Order* at ¶ 17 (emphasizing that Wi-Fi 6 "require[s] wide-bandwidth 160-megahertz channels to deliver the most capacity and advanced features").

¹⁶ *Id.* at ¶ 20.

¹⁷ See *id.* at ¶ 23 ("Comcast states that equipment developed without DFS for the 5.9 GHz band will be available sooner than equipment subject to DFS test procedures.").

IV. Conclusion

In 2015, Commissioners representing both political parties – Jessica Rosenthal, the Democrats, and Michael O’Rielly, the Republicans – collaborated on a call to unleash the 5.9 GHz band.¹⁸ The *Draft Order* that Chairman Pai has added to the November Open Meeting’s agenda would do exactly that. Much-needed additional capacity would be made available to existing Wi-Fi devices. Wi-Fi 6 would gain access to a 160 MHz channel, unlocking its full potential. And the automobile industry for the first time would be authorized by rule to deploy C-V2X, a modern, cellular-based automotive safety solution.

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Further Readings

Andrew Long, "['10G' Can Help Future-Proof Broadband Infrastructure](#)," *Perspectives from FSF Scholars*, Vol. 15, No. 47 (September 11, 2020).

Andrew Long, "[Study: Additional Spectrum for Wi-Fi Promises Economic Benefits](#)," *FSF Blog* (April 21, 2020).

[Comments of the Free State Foundation](#), *Use of the 5.850-5.925 GHz Band*, ET Docket No. 19-138 (March 6, 2020).

Andrew Long, "[Wi-Fi 6E Can Modernize Unlicensed Wireless](#)," *Perspectives from FSF Scholars*, Vol. 15, No. 7 (February 7, 2020).

Seth L. Cooper, "[FCC Proposes to Make 5.9 GHz Spectrum Available for Unlicensed Uses](#)," *FSF Blog* (December 12, 2019).

Randolph J. May and Gregory J. Vogt, "[NTIA Report Identifies Mid-Band Spectrum Repurposing Opportunities](#)," *Perspectives from FSF Scholars*, Vol. 14, No. 28 (October 2, 2019).

Gregory J. Vogt, "[Getting to 'Yes' on Allocating Identified 5G Mid-Band Spectrum](#)," *Perspectives from FSF Scholars*, Vol. 14, No. 13 (May 15, 2019).

Randolph J. May, "[Spectrum Matters Matter](#)," *FSF Blog* (November 5, 2018).

¹⁸ See Joint Statement of Commissioners Jessica Rosenworcel and Michael O’Rielly (April 20, 2015), available at <https://docs.fcc.gov/public/attachments/DOC-333108A1.pdf> ("More than a decade and a half after this spectrum was set aside for vehicle and roadside systems, we agree it is time to take a modern look at the possibilities for wireless services in these airwaves, to allow a broader range of uses. We believe by taking steps right now, we can support automobile safety, increase spectrum for Wi-Fi, and grow our wireless economy."); Michael O’Rielly and Jessica Rosenworcel, "Driving Wi-Fi Ahead: the Upper 5 GHz Band" (February 23, 2015), available at <https://www.fcc.gov/news-events/blog/2015/02/23/driving-wi-fi-ahead-upper-5-ghz-band> (arguing that "we should not strand our spectrum strategies in turn-of-the-millennium safety technologies when there ... may be other more efficient ways to reach these same goals").