

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

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
)	

COMMENTS OF CTIA

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February 15, 2019

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CTIA¹ respectfully submits these comments in response to the *Notice of Proposed Rulemaking* (“NPRM”) released by the Federal Communications Commission (“Commission”) seeking to promote new opportunities in the 5.925-7.125 GHz (“6 GHz”) band.²

I. INTRODUCTION AND SUMMARY.

In the 6 GHz band covering 1.2 gigahertz of spectrum, there are both existing services with important incumbent operations *and* promise for new, highly valued services – unlicensed and licensed. CTIA therefore urges the Commission to revisit the approach to the 6 GHz band proposed in the NPRM and pursue a framework that balances multiple interests: protecting incumbent operations, devising a robust regime that will enable new unlicensed opportunities, and repurposing spectrum for exclusive use, flexible rights licensed stakeholders. CTIA is confident that the Commission can accomplish all of these goals by taking the following actions.

¹ CTIA – The Wireless Association® (“CTIA”) (www.ctia.org) represents the U.S. wireless communications industry and the companies throughout the mobile ecosystem that enable Americans to lead a 21st century connected life. The association’s members include wireless carriers, device manufacturers, suppliers as well as apps and content companies. CTIA vigorously advocates at all levels of government for policies that foster continued wireless innovation and investment. The association also coordinates the industry’s voluntary best practices, hosts educational events that promote the wireless industry and co-produces the industry’s leading wireless tradeshow. CTIA was founded in 1984 and is based in Washington, D.C.

² *Unlicensed Use of the 6 GHz Band*, Notice of Proposed Rulemaking, FCC 18-147 (rel. Oct. 24, 2018) (“NPRM”).

First, the Commission should promptly issue a further notice of proposed rulemaking to repurpose the upper portion of the 6 GHz band for exclusive use, flexible rights licensing. It should assign the repurposed spectrum by auction and require winning bidders to relocate point-to-point fixed service and electronic news gathering incumbents pursuant to the framework adopted in the *Emerging Technologies* proceeding, while ensuring that fixed satellite service operations are accommodated. The Commission should also work with the National Telecommunications and Information Administration (“NTIA”) to add a non-federal allocation to a portion of the 7.125-8.4 GHz band to expand opportunities for fixed service relocation and enhance the efficient use of spectrum in that band. The Commission can and should ensure that such actions do not inhibit or delay access to the lower portion of the 6 GHz band for unlicensed services.

Second, the Commission should adopt a spectrum sharing regime for unlicensed operations in the lower portion of the 6 GHz band by implementing a rigorous interference protection framework that permits unlicensed use while fully protecting incumbent operations. The Commission can take this action even as the further notice is pending, so as not to delay the introduction of a spectrum sharing regime in the lower portion of the band. CTIA supports adoption of an Automated Frequency Control (“AFC”) framework that serves as a positive control mechanism to authorize unlicensed access point operations, both outdoor and indoor, with robust security requirements to ensure operations comply with the AFC. The rules for unlicensed operations in the 6 GHz band should continue to be technologically neutral and avoid technical restrictions or requirements that favor one unlicensed technology over another.

II. THE COMMISSION SHOULD ENSURE A BALANCED APPROACH TO MID-BAND SPECTRUM FOR BOTH LICENSED AND UNLICENSED USES.

A. Mid-Band Spectrum Is Critically Important for Next-Generation Services.

As the Commission has recognized, the combination of favorable propagation characteristics and the opportunity for wider channelization makes mid-band spectrum uniquely well suited for next-generation wireless services.³ Low-band spectrum has beneficial physical characteristics that allow wireless signals to propagate further and penetrate in-building more readily than higher frequency bands. High-band spectrum is well suited to support key elements of 5G, as the wideband channelization available in high-band spectrum enables significantly higher speeds and far quicker response times. Mid-band spectrum blends these attributes, offering higher capacity than low-band, but with greater coverage and fewer facilities than high-band spectrum.⁴ CTIA firmly believes that both licensed and unlicensed spectrum will be important for a 5G future, and mid-band spectrum will be an essential component of success. As the Commission considers the unique opportunity to bring spectrum to market in this band, it should ensure that allocations between licensed and unlicensed spectrum are appropriately balanced.

Making licensed mid-band spectrum available will provide tremendous benefits to the American economy. According to a study released last week, making 400 megahertz of mid-band spectrum available over a seven-year period will result in \$150 billion in wireless

³ See Federal Communications Commission, The FCC's 5G FAST Plan, <https://www.fcc.gov/5G> (last visited Feb. 12, 2019).

⁴ See *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Order and Notice of Proposed Rulemaking, 33 FCC Rcd 6915, 6917 ¶ 5 (2018); NPRM ¶ 14.

investments, 1.3 million new jobs on a direct and spillover effect basis, and a contribution of \$274 billion to America's GDP.⁵

Yet, as of the end of 2018, the U.S. ranked sixth out of ten countries in terms of licensed mid-band spectrum availability, and other nations continue to rapidly make significant amounts of mid-band spectrum available.⁶ According to a recent report by Analysys Mason, several other countries will each make an average of 300 megahertz of licensed mid-band spectrum available by the end of 2020.⁷ China, Japan, South Korea, Spain, Ireland, Italy, and Australia have already auctioned or assigned hundreds of megahertz of mid-band spectrum.⁸ For example, China assigned 460 megahertz of mid-band spectrum to three of its national carriers last year.⁹ South Korea auctioned nearly 300 megahertz of mid-band spectrum, while Japan assigned 200 megahertz to providers on a national basis and has committed to release up to 500 megahertz of additional mid-band spectrum by March of this year.¹⁰ Other countries, including Germany, Sweden, Belgium, and Austria, have also confirmed that mid-band spectrum will be auctioned or assigned by mid-2019.¹¹ For example, Germany and Sweden both plan to designate 400

⁵ David W. Sosa & Greg Rafert, *The Economic Impacts of Reallocating Mid-Band Spectrum to 5G in the United States*, ANALYSIS GROUP, at 1 (Feb. 2019), <https://api.ctia.org/wp-content/uploads/2019/02/The-Economic-Impacts-of-Reallocating-Mid-Band-Spectrum-to-5G-1.pdf>.

⁶ See David Abecassis, Janette Stewart, Michael Kende & Chris Nickerson, *Final report for CTIA Mid-band spectrum global update*, ANALYSYS MASON (Nov. 2018), <https://api.ctia.org/wp-content/uploads/2018/12/Analysys-Mason-Mid-Band-Spectrum-Global-Update.pdf> ("Analysys Mason Report").

⁷ See Analysys Mason Report; see also Scott Bergmann & Kelly Cole, *More Mid-Band Spectrum is Key to U.S. 5G Leadership*, CTIA (Feb. 5, 2019), <https://www.ctia.org/-news/more-mid-band-spectrum-is-key-to-u-s-5g-leadership> ("CTIA Mid-Band Spectrum Blog").

⁸ Analysys Mason Report at 4-5.

⁹ Comments of CTIA, GN Docket No. 18-122, at 5-6 (filed Oct. 29, 2018) ("CTIA C-Band Comments").

¹⁰ Analysys Mason Report at 2.

¹¹ CTIA C-Band Comments at 5-7.

megahertz of mid-band spectrum to mobile in 2019.¹² Here in the United States, while spectrum in the 3 GHz band is highly appealing and of prime interest, wireless stakeholders also view the 6 GHz band as an important opportunity for mid-band licensed spectrum.

Mid-band spectrum, in particular the lower portion of the 6 GHz band, is also promising for unlicensed use. Apple, Broadcom, *et al.* noted that mid-band spectrum is “ideal for unlicensed use” because of its “favorable propagation characteristics, proximity to existing unlicensed operations, and ability to support the wide channels that advanced applications and gigabit services require.”¹³ As the Commission observed in the *Mid-Band Spectrum Notice of Inquiry* (“NOI”), the 6 GHz band is near-adjacent to spectrum designated for Unlicensed National Information Infrastructure (“U-NII”) use, and action in this band “would allow the devices to operate with wider channel bandwidths and higher data rates as well as with increased flexibility for all types of unlicensed operations.”¹⁴ Indeed, the lower portion of the 6 GHz band has been identified as “a strong candidate for global harmonization, and the band would be valuable to support next generation unlicensed use with wide channels and high throughput.”¹⁵

¹² Analysys Mason Report at 2-3.

¹³ Reply Comments of Apple Inc., Broadcom Limited, Cisco Systems, Inc., Facebook, Inc., Google LLC, Hewlett Packard Enterprise, Intel Corporation, Mediatek Inc., Microsoft Corporation, and Qualcomm Incorporated, GN Docket No. 17-183, at 9-10 (filed Nov. 15, 2017); *see also* Comments of NCTA—The Internet & Television Association, GN Docket No. 17-183, at 2 (filed Oct. 2, 2017) (noting “the 6 GHz band presents a unique opportunity to address the pressing need for additional unlicensed mid-band spectrum resources”).

¹⁴ *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Inquiry, 32 FCC Rcd 6373, 6382 ¶ 26 (2017) (“NOI”).

¹⁵ Comments of the Mid-Band Spectrum Coalition, GN Docket No. 17-183, at 14 (filed Oct. 2, 2017) (“Mid-Band Spectrum Coalition NOI Comments”).

B. The Commission Should Seek an Appropriate Balance Between Licensed and Unlicensed Mid-Band Spectrum.

Both licensed and unlicensed spectrum and technologies are key elements of meeting wireless demand, but the current allocations of licensed and unlicensed spectrum in the mid-band are off balance. While the Commission has made low- and high-band spectrum available for exclusive use, flexible rights licensing in recent auctions, access to licensed mid-band spectrum has been extremely limited so far.¹⁶

No licensed mid-band spectrum is currently available above 3 GHz and the U.S. only has concrete plans to deliver 70 megahertz of licensed spectrum in the of 3.5 GHz Priority Access License (“PAL”) spectrum, which itself is subject to low power levels short of macro broadband deployment levels.¹⁷ In the 3.7-4.2 GHz proceeding, the current proposal from incumbent satellite licensees involves repurposing only 180 megahertz for flexible-use licensed services,¹⁸ while the instant rulemaking is considering making more than six times that amount – 1.2 gigahertz – available for unlicensed use.¹⁹ As a nation, we need to make hundreds of megahertz of licensed mid-band spectrum available as quickly as possible to facilitate 5G deployments here in the U.S., and the 3.7-4.2 GHz and 6 GHz bands are prime spectrum. Indeed, 3GPP is

¹⁶ See, *infra*, Section II.B. See also CTIA Mid-Band Spectrum Blog; CTIA, *The Global Race to 5G*, at 8, 11 (Apr. 2018), <https://api.ctia.org/wp-content/uploads/2018/04/Race-to-5G-Report.pdf>.

¹⁷ *Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, Report and Order and Second Further Notice of Proposed Rulemaking, 30 FCC Rcd 3959, 3982 ¶ 67 (2015) (“3.5 R&O and Second FNPRM”).

¹⁸ Comments of the C-Band Alliance, GN Docket No. 18-122, at 5 (filed Oct. 29, 2018) (proposing to reallocate 200 megahertz, including a 20-megahertz guard band).

¹⁹ See generally NPRM.

investigating the 6 GHz band, recognizing that there is stakeholder interest in licensing the upper portion of the 6 GHz band.²⁰

Today the U-NII bands already offer 580 megahertz of mid-band spectrum for unlicensed use.²¹ The 3.5 GHz band provides 80 megahertz dedicated to General Authorized Access (essentially unlicensed) use and opportunistic sharing of the full 150 megahertz of the Citizens Broadband Radio Service band, including spectrum assigned as PALs.²² And, as for high-band spectrum, 5.5 gigahertz has been committed to flexible-use licensing while more than twice that amount – 14 gigahertz – is reserved for unlicensed use, even as seven gigahertz between 57-64 GHz, allocated some six years ago, remains lightly used by mass market unlicensed devices.²³ The 6 GHz band affords an opportunity to help balance the licensed and unlicensed opportunities in the mid-band.

III. THE COMMISSION SHOULD ADOPT A FURTHER NOTICE TO REPURPOSE THE UPPER PORTION OF THE BAND FOR EXCLUSIVE USE, FLEXIBLE RIGHTS LICENSED SERVICES.

A. Wireless Stakeholders Have Sought Licensed Access to a Portion of the 6 GHz Band for Some Time, Even While Pursuing Spectrum at 3.7-4.2 GHz.

Although the NPRM is focused on unlicensed opportunities, the NOI sought comment on licensing in the 6 GHz band,²⁴ and the subsequent record identified the potential for more

²⁰ 3rd Generation Partnership Project, 3GPP TR.37.890 v0.3 (2018-06), Technical Specification Group Radio Access Network; Feasibility Study on 6 GHz for LTE and NR in Licensed and Unlicensed Operation (Release 15), at 13, http://www.3gpp.org/ftp//Specs/archive/37_series/37.890/.

²¹ NOI, 32 FCC Rcd at 6383 ¶ 30.

²² 3.5 R&O and Second FNPRM, 30 FCC Rcd at 3961 ¶ 64.

²³ See *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014, 8096 ¶ 239 (2016); see also *Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration and Memorandum Opinion and Order, 32 FCC Rcd 10988 (2017).

²⁴ NOI, 32 FCC Rcd at 6385 ¶ 36.

intensive mobile use of the 6.425-7.125 GHz band. With today's demand for mid-band licensed spectrum, the Commission should revisit the record and consider a licensed framework for the upper portion of the 6 GHz band.

The Mid-Band Spectrum Coalition, a diverse group of stakeholders that came together in 2017 to promote access to mid-band spectrum for both licensed and unlicensed technologies, called for licensed use in the 3.7-4.2 GHz band and unlicensed use in the 5.925-6.425 GHz band, but stated that it had no position on whether the 6.425-7.125 GHz band should be licensed or unlicensed.²⁵ As the Coalition noted at the time, “some coalition members are interested in enabling the full 6 GHz band for unlicensed use, while others are interested in licensed use in the 6425-7125 MHz portion.”²⁶

Several stakeholders have supported licensed service in some portion of the 6 GHz band. T-Mobile, for instance, noted that the Commission could address the needs of both licensed and unlicensed stakeholders by designating the upper 6 GHz band for licensed use.²⁷ Verizon observed that the 6.425-7.125 GHz band holds promise for flexible-use operations.²⁸ And Ericsson added that the spectrum would “serve as a great complement to the millimeter wave band for use cases in urban core and densely populated areas, and beyond.”²⁹ Others likewise

²⁵ See Mid-Band Spectrum Coalition NOI Comments at 14.

²⁶ *Id.* at 12.

²⁷ Reply Comments of T-Mobile USA, Inc., GN Docket No. 17-183, at 21 (filed Nov. 15, 2017) (“T-Mobile NOI Reply Comments”).

²⁸ Comments of Verizon, GN Docket No. 17-183, at 22 (filed Oct. 2, 2017).

²⁹ Comments of Ericsson, GN Docket No. 17-183, at 10 (filed Oct. 2, 2017) (“Ericsson NOI Comments”).

supported exploring whether some or all of the band should be reserved for licensed mobile broadband services.³⁰

As CTIA urges a fresh look at the upper 6 GHz band, it continues to strongly support repurposing spectrum in the 3.7-4.2 GHz band for licensed flexible use.³¹ Access to the 3.7-4.2 GHz band is critical to the development of the nation's 5G networks. Nevertheless, even while opening the 3.7-4.2 GHz band for mobile 5G services is an important step, additional licensed mid-band spectrum is needed.³² As T-Mobile observed, opening 500 megahertz (or less) of spectrum in the 3.7-4.2 GHz band for licensed use while seeking to designate 1.2 gigahertz of spectrum for unlicensed operations "skew[s] [the] balance far too heavily in favor of unlicensed spectrum."³³ Further, the 6 GHz band and the 3.7-4.2 GHz band are two of the only opportunities for identifying large swaths of mid-band spectrum capable of supporting a macro environment.

B. The Commission Should Adopt a Further Notice to Propose Exclusive Use, Flexible Rights Licensing in the Upper Portion of the 6 GHz Band.

The Commission should promptly issue a further notice of proposed rulemaking to consider licensing the upper portion of the 6 GHz band for exclusive use, flexible rights services.

³⁰ Reply Comments of Competitive Carriers Association, GN Docket No. 17-183, at 7-8 (filed Nov. 15, 2017); Comments of the Information Technology Industry Council, GN Docket No. 17-183, at 5 (filed Oct. 2, 2017).

³¹ See, e.g., CTIA C-Band Comments at 7; Comments of AT&T Services, Inc., GN Docket No. 18-122, at 5-6 (filed Oct. 29, 2018); Comments of Ericsson, GN Docket No. 18-122, at 10 (filed Oct. 29, 2018); Comments of Nokia, GN Docket No. 18-122, at 3 (filed Oct. 29, 2018); Comments of T-Mobile USA, Inc., GN Docket No. 18-122, at 1 (filed Oct. 29, 2018); Comments of United States Cellular Corporation, GN Docket No. 18-122, at 1 (filed Oct. 29, 2018); Comments of Verizon, GN Docket No. 18-122, at 3 (filed Oct. 29, 2018).

³² See, e.g., Comments of Ericsson, Developing a Sustainable Spectrum Strategy for America's Future, NTIA Docket No. 181130999-8999-01, at 6 (filed Jan. 22, 2019).

³³ T-Mobile NOI Reply Comments at 21.

With this new notice, the Commission can fully explore licensed use cases for the upper 6 GHz band and ensure that it allocates new uses in the band in the most optimal way to meet consumer demands.

Importantly, a further notice examining the upper 6 GHz band need not delay any action in the current rulemaking – the Commission can move ahead and adopt a new spectrum sharing regime in the lower portion of the 6 GHz band that allows unlicensed operations while protecting incumbent licensed uses.

C. The Commission Should Ensure That Incumbents in the Repurposed Portion of the 6 GHz Band Are Made Whole.

While the unlicensed proposal in the NPRM represents an evolution in spectrum sharing regimes – enabling access to spectrum on a non-exclusive basis with better and more advanced ways to protect incumbents in the band – repurposing spectrum for a wide area, exclusive use, flexible rights licensing regime generally involves relocation to clear the band. In this case, a further notice to repurpose part of the 6 GHz band for a licensing regime necessarily must ensure that incumbent licensees are made whole and, in the context of fixed point-to-point and electronic news gathering incumbents, that generally means relocated to comparable facilities at the new licensees’ expense.

Fixed Point-to-Point Microwave Services (“FS”). The Commission should bring its longstanding relocation experience to bear in the 6 GHz band, enabling the efficient repurposing of the upper portion of the 6 GHz band by requiring auction winners to be responsible for arranging comparable facilities for incumbent licensees.

More than two decades ago, the Commission recognized that ensuring spectrum is put to its highest and best use would, in some cases, entail relocating incumbent users in a fair and equitable way. In the *Emerging Technologies* proceeding, the Commission developed a

comprehensive framework that requires new licensees in the band to relocate incumbents to comparable facilities (either spectrum-based or other media that are viable alternatives).³⁴ That framework is built on the objective of making incumbent users whole – specifically, that their reasonable out-of-pocket costs to relocate to comparable facilities are reimbursed. *Emerging Technologies* policies thus balance the interest of new licensees “with the need to minimize disruption to incumbent operations used to provide service to customers during the transition.”³⁵

The relocation framework has stood the test of time. The Commission used it in successfully clearing incumbent FS operations from several different bands, beginning with the Personal Communications Service (“PCS”) in 1993,³⁶ then the first Advanced Wireless Service band (“AWS-1”) in 2002,³⁷ and a decade later, for the AWS-4 band.³⁸ The further notice should propose to apply its “time-honored relocation principles for emerging technologies”³⁹ to the

³⁴ *Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies*, First Report and Order and Third Notice of Proposed Rulemaking, 7 FCC Rcd 6886 (1992) (subsequent history omitted).

³⁵ *Amendment of Part 2 of the Commission’s Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Services*, Ninth Report and Order and Order, 21 FCC Rcd 4474, 4480 ¶ 11 (2006) (applying *Emerging Technologies* policies to relocate Broadband Radio Service licensees).

³⁶ *Amendment of the Commission’s Rules to Establish New Personal Communications Services*, Second Report and Order, 8 FCC Rcd 7700 (1993) (subsequent history omitted).

³⁷ *Amendment of Part 2 of the Commission’s Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, Including Third Generation Wireless Systems*, Second Report and Order, 17 FCC Rcd 23193 (2002).

³⁸ *Service Rules for Advanced Wireless Services in the 2000-2020 MHz and 2180-220 MHz Band*, Report and Order and Order of Proposed Modification, 27 FCC Rcd 16102, 16214 ¶ 304 (2012).

³⁹ *Improving Public Safety Communications in the 800 MHz Band*, Fifth Report and Order, Eleventh Report and Order, Sixth Report and Order, and Declaratory Ruling, 25 FCC Rcd 13874, 13875 ¶ 2 (2010).

upper portion of the 6 GHz band in order to help meet the growing demand for licensed spectrum.

Broadcast Auxiliary Service (“BAS”) and Cable Television Relay Service (“CARS”).

The Commission has previously applied the *Emerging Technologies* framework to relocate BAS and CARS operations from spectrum designated for new licensed flexible use services – and it should now propose to apply that framework to the upper 6 GHz band. For example, in 2000, the Commission adopted relocation and cost-sharing rules to clear BAS licensees, which included CARS operations, from the 1990-2110 MHz band. Those rules, which were modeled on the existing rules for relocating FS incumbents, “ensur[ed] the continuity of BAS during the transition.”⁴⁰

BAS and CARS operations under the existing mobile allocation in the 6 GHz band were authorized when there were few other options for transmitting video signals. Today, however, there are alternatives. As one NOI commenter observed, “as an alternative to traditional electronic news gathering, some television broadcast stations are using aggregated licensed and unlicensed spectrum to capture and deliver content ... Moreover, there is other spectrum – in the 2 GHz and 12.7-13.2 GHz bands – that [is] available for BAS and CARS use.”⁴¹

Fixed Satellite Service (“FSS”). The Commission identified a small number of FSS operations in the upper 6 GHz band in the NOI.⁴² Existing FSS earth stations are limited to

⁴⁰ *Amendment of Section 2.106 of the Commission’s Rules to Allocate Spectrum at 2 GHz for Use by the Mobile Satellite Service*, Second Report and Order and Second Memorandum Opinion and Order, 15 FCC Rcd 12315, 12325-26 ¶¶ 27-28 (2000). See also 47 C.F.R. § 74.690 (rules for relocating BAS licensees).

⁴¹ Comments of T-Mobile USA, Inc., GN Docket No. 17-183, at 19 (filed Oct. 2, 2017) (“T-Mobile NOI Comments”).

⁴² NOI, 32 FCC Rcd at 6384 ¶ 33.

about 65 earth stations.⁴³ Most of those earth stations operate in the earth-to-space direction. Therefore, no interference would be caused to those earth stations and terrestrial operations would not interfere with the operation of the distant satellite. A smaller number of earth stations limited to the Mobile Satellite Service feeder links operate in the space-to-earth direction. These receive facilities could be accommodated through coordination zones to protect them from harmful interference.

In sum, the Commission should adopt a process to relocate incumbent FS and BAS operations in the upper portion of the 6 GHz band to comparable facilities, applying its successful *Emerging Technologies* framework and protecting incumbent FSS operations as necessary. This will ensure uninterrupted incumbent operations while clearing spectrum to help meet the urgent need for new licensed, flexible-use spectrum to meet fast-growing demand.

D. The Commission Should Engage with NTIA and Federal Agency Stakeholders to Consider Adding a Non-Federal Allocation to a Portion of the 7.125-8.4 GHz Band.

The 7.125-8.4 GHz band is one range of frequencies with the potential to accommodate fixed service operations that are relocated out of 6 GHz. Although today the 7.125-8.4 GHz band is allocated for federal use only, the Commission, together with NTIA and federal stakeholders, should explore whether a portion of the band can be made available for non-federal, commercial use. The 7.125-8.4 GHz band is immediately adjacent to 6 GHz, and contains allocations for the federal FS across the entire band. Because there is no difference in the technical parameters of non-federal FS stations as compared to the federal FS stations (other than frequency), non-federal FS could be easily coordinated to operate in the 7.125-8.4 GHz

⁴³ *Id.*

band without causing any disruption to federal services.⁴⁴ As described below, data indicates that this federal-only band is underutilized, so modifying the allocation would promote more efficient and effective use of spectrum. Accordingly, a portion of the band should be considered as an option for relocating non-federal FS operations from the 6 GHz band.

In 2010, the Fixed Wireless Communications Coalition (“FWCC”) filed a petition for rulemaking to modify the 7.125-8.5 GHz band’s allocation to shared federal and non-federal use, documenting light use of this substantial amount of spectrum.⁴⁵ The Commission put the petition out for comment, but has not taken further action.⁴⁶ The Commission should revisit this issue as part of the further notice.

In the NOI proceeding, CTIA urged the Commission to work with NTIA to make this band available for non-federal use,⁴⁷ and others specifically noted the band’s potential for accommodating operations relocated from the 6 GHz band.⁴⁸ Ericsson, for example, noted that opening up this band “would enable relocation of non-federal FS incumbents to adjacent frequencies with identical propagation characteristics and would open up a significant new band

⁴⁴ Given that federal FS successfully shares the 7.125-8.4 GHz band with other federal services in parts of the band, non-federal FS should be able to as well.

⁴⁵ Petition of the Fixed Wireless Communications Coalition for Rulemaking, RM-11605 (filed Mar. 16, 2010).

⁴⁶ NOI, 32 FCC Rcd at 6377 ¶ 11 n.14.

⁴⁷ Reply Comments of CTIA, GN Docket No. 17-183, at 13-14 (filed Nov. 15, 2017).

⁴⁸ *See, e.g.*, T-Mobile NOI Comments at 21 (“If the band is made available for FS use, it can accommodate FS operations that will be relocated from any parts of the 5.925-7.125 GHz band where future licensed wireless broadband operations are authorized.”); *see also* Comments of AT&T Services, Inc., GN Docket No. 17-183, at 18-19 (filed Oct. 2, 2017); Comments of Comsearch, GN Docket No. 17-183, at 4 (filed Oct. 2, 2017) (stating that the 7.125-8.400 GHz band “could provide a new home for displaced 6 GHz links in repacking or relocation scenarios”); Reply Comments of PacifiCorp., GN Docket No. 17-183, at 8-9 (filed Nov. 15, 2017).

for mobile services.”⁴⁹ Further, access to the 7.125-8.4 GHz band “would enable the truly high-capacity long haul point-to-point links of the future” and have “profound benefits for backhaul.”⁵⁰

As noted above, data reflect that the 7.125-8.4 GHz band has the capacity to accommodate relocated FS incumbents. In 2010, NTIA conducted spectrum surveys in several cities, and the results reflect limited operations in the band. The NTIA reports show that usage in the 7.125-8.4 GHz band is much less than non-federal usage in the 5.925-7.125 GHz band and, in fact, is virtually non-existent in some areas. For example, NTIA’s spectrum survey for Denver found only “several low-level signals recorded in this frequency range and only a few that were on continuously during the spectrum survey,” and the survey for San Diego measured “very little activity in these bands.”⁵¹ The minimal usage is illustrated by the figure below, which shows non-Federal use to the left of the vertical red line, and extremely limited federal use beginning at 7.125 GHz, to the right of the vertical red line:

⁴⁹ Ericsson NOI Comments at 11.

⁵⁰ *Id.*

⁵¹ Chriss Hammerschmidt, *Broadband Spectrum Survey in the San Diego, California Area*, NTIA Report No. TR-14-498, at 103-05, 120 (Mar. 2014), <https://www.its.bldrdoc.gov/publications/2741.aspx>; Chriss Hammerschmidt, Heather E. Ottke & J. Randy Hoffman, *Broadband Spectrum Survey in the Denver and Boulder, Colorado, Metropolitan Areas*, TR-13-496, at 115-117, 129 (Mar. 2014), <https://its.bldrdoc.gov/-publications/2735.aspx>. Given that there are substantial government and military facilities in those cities, usage of the band in other cities is also likely to be minimal.

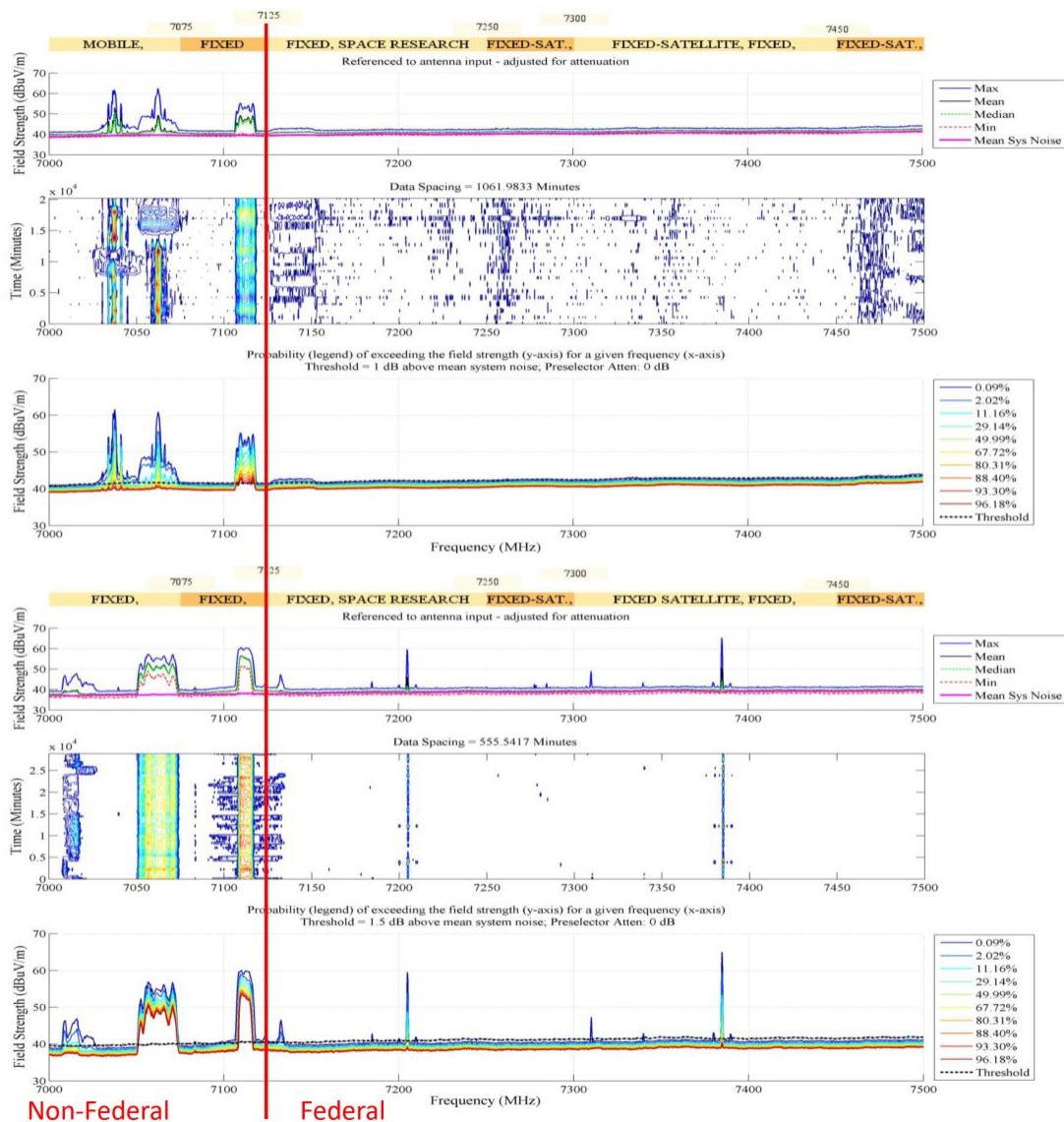


Figure 1. NTIA Spectrum Surveys in San Diego (Top) and Denver (Bottom)

The Commission should therefore work promptly with NTIA to add a non-federal allocation to this underused band, enabling relocation of many 6 GHz operations.

IV. WITH ADOPTION OF A RIGOROUS INTERFERENCE PROTECTION REGIME, UNLICENSED OPERATIONS CAN BE ALLOWED INTO THE LOWER PORTION OF THE 6 GHz BAND.

A. Unlicensed Stakeholders Seeking to Share the 6 GHz Band Must Shoulder the Burden of Protecting Incumbent 6 GHz Licensees from Interference.

The unlicensed opportunity in the 6 GHz band offers much promise, but Commission rules clearly place the burden of protecting licensed services as a condition of operation for unlicensed devices.⁵² Accordingly, any costs or disadvantages of protecting incumbent licensed services should be considered as a prerequisite for unlicensed operations in the 6 GHz band. Specifically, licensees should not be required to bear costs or to make concessions to enable unlicensed operations. This is consistent with the statement in Section 15.5 of the Commission's Rules that users of unlicensed devices "shall not be deemed to have any vested or recognizable right to continued use of any given frequency."⁵³

B. The Automated Frequency Control System Must be a Positive Control Mechanism That Authorizes Unlicensed Access Point Operations.

The AFC system proposal in the NPRM, if implemented as discussed below, represents a significant advancement over previous spectrum sharing regimes that did not adequately protect incumbent operations. For example, the positive control aspect of the AFC will ensure that unlicensed devices only operate as required by the AFC. This is a far preferable approach than reliance on a database that only provides a listing of available frequencies, such as the TV White Spaces database.⁵⁴ Further, all software and firmware associated with access points and client

⁵² See 47 C.F.R. § 15.5.

⁵³ *Id.*

⁵⁴ See 47 C.F.R. § 15.711(c)(2)(i) (requiring each fixed white space device to access a white space database to determine the available channels prior to its initial service transmission at a given location).

devices should be properly secured from tampering or unauthorized modifications. That potential is not theoretical – the illegal modification of 5-GHz U-NII equipment caused harmful interference to the Federal Aviation Administration’s Terminal Doppler Weather Radar (“TDWR”).⁵⁵ The AFC can serve as a mechanism to permit unlicensed operations based on known characteristics of incumbent 6 GHz licensees.

AFC System Certification. The Commission must select and certify AFC providers in a systematic manner to ensure accountability and robust protection of incumbent operations. Specifically, AFC applicants should be required to demonstrate their technical qualifications, and their systems should be available for Commission testing and subject to a public review period.

Robust Database to Protect Incumbent Licensed Services. For purposes of determining the characteristics of incumbent systems deployed in the 6 GHz band, an AFC should be required to use data contained within ULS and also to verify the information using a third-party database to protect incumbent service licensees from harmful interference at the hands of unlicensed devices. While the Commission’s bureaus previously found in another context that reliance on data in ULS would be sufficient to protect FS incumbents, the critical services in the band and potential for widespread deployment of unlicensed devices under this new regime justify an additional backstop here.

Database Update. An AFC should be required to check in regularly with the database for updates in order to ensure it accounts for new incumbent service operations that will continue to

⁵⁵ See *Revision of Part 15 of the Commission’s Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, First Report and Order, 29 FCC Rcd 4127, 4130-31 ¶¶ 11-12 (2014) (explaining that interference to the TDWR occurred as a result of devices that were certified under the rules, but then illegally modified and operated at high power levels in elevated locations).

be introduced, including authorizations for Special Temporary Authority (“STA”). This is essential given that STAs are often issued to address weather emergencies, natural disasters, and other public safety-related communications needs.⁵⁶

Access Point Registration. All access points must be required to register with an AFC by providing sufficient information to ensure accountability in the event of harmful interference. Information should include: FCC ID of the device; manufacturer’s serial number of the device; geographic coordinates; antenna height; name of the individual or business that owns the device; and contact information for a person responsible for the device’s operation.⁵⁷

AFC-Access Point Connection. Provided there is a robust AFC framework managing access point operations, there should be no need to extend AFC to client devices. However, mobile devices that are capable of hotspot operation must be authorized as access points, consistent with Section 15.202 of the Commission’s Rules.

Response to Interference Occurrence. In the event of harmful interference to an incumbent service licensee, unlicensed operations on the affected channel nearby the impacted licensee must cease immediately. The Commission should adopt a process that enables incumbent service licensees to report that harmful interference has occurred. The AFC, in turn, must identify and locate the interfering operations. The AFC must shut down those operations or, if a non-interfering channel is identified, shift the unlicensed station to another channel.

⁵⁶ See, e.g., *The Public Safety and Homeland Security Bureau, in Coordination With Multiple Other Bureaus, Issues Procedures to Provide Emergency Communications in Areas Affected By Hurricane Florence and Other Tropical Weather Systems*, Public Notice, DA 18-935 (rel. Sept. 11, 2018) (providing guidance on STA procedures in the event of a natural disaster).

⁵⁷ See 47 C.F.R. § 15.713(g)(3) (describing the white space database registration requirements); *id.* § 96.39(c) (describing registration requirements for 3.5 GHz Citizens Broadband Radio Service Devices).

Power Limits. Because of the AFC's capabilities to control unlicensed operating parameters specific to maintaining interference protection for each individual incumbent licensee's operations, along with the sophistication of directional antennas that may be deployed, the Commission should consider adopting higher power levels for outdoor operations than those proposed in the NPRM.⁵⁸

C. The Automated Frequency Control System Must Extend to Indoor Access Points.

To ensure protection of incumbent FS operations, the AFC should apply to all access points – whether located outdoors or indoors. The FWCC showed that indoor devices even at very low power levels pose an interference threat and that all devices require coordination.⁵⁹ If the cost of designing and manufacturing indoor access points increases as a result of the AFC requirements, this is simply the nature of the requirement that unlicensed devices not cause harmful interference to licensed services. The costs and burdens of protecting incumbents must be borne by the unlicensed use.

D. The Automated Frequency Control System Must Maintain Robust Security Requirements.

The Commission should require an AFC to operate as a centralized system, which will reduce the potential for malfeasance that has been experienced with some prior database efforts.

The Commission should also specify performance-based security requirements for devices to ensure that the software within them cannot be easily modified to enable operation on

⁵⁸ NPRM ¶¶ 78-79.

⁵⁹ Letter from Cheng-yi Liu & Mitchell Lazarus, Counsel for the Fixed Wireless Communications Coalition, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 17-183, at 2 (filed Aug. 28, 2018).

frequencies other than those indicated as available by the AFC system. For example, Section 15.202 of the Commission's Rules requires that master devices⁶⁰ – access points in this context – marketed within the U.S. be limited to operation on permissible Part 15 frequencies, and such devices cannot have the ability to be configured by end users or professional installers to operate outside the authorized bands.⁶¹

E. Rules Governing Unlicensed Operations Must be Technologically Neutral.

The success of the unlicensed spectrum regime is grounded in policy that permits innovation without seeking Commission authorization for every new generation of technology.⁶² Instead, the Commission sets technical thresholds, and device manufacturers and equipment users are allowed the freedom to operate in any way they choose within those technical limits. Those limits involve the requirement to avoid causing harmful interference to licensed users, but the Commission also maintains a policy of technology neutrality by not picking technical restrictions or requirements that favor one unlicensed technology over another.

As CTIA has previously observed, the success of unlicensed services is directly related to the technology-neutral approach the Commission follows in its Part 15 rules.⁶³ The rules for unlicensed operations in the 6 GHz band should continue to be technologically neutral and

⁶⁰ A master device as a device operating in a mode in which it has the capability to transmit without receiving an enabling signal. In this mode it is able to select a channel and initiate a network by sending enabling signals to other devices. A network always has at least one device operating in master mode. 47 C.F.R. § 15.202.

⁶¹ See Federal Communications Commission, OET Knowledge Base, KDB Publication 594280 D01 (Nov. 12, 2015), <https://www.fcc.gov/labhelp>.

⁶² See Ajit Pai, Chairman, Federal Communications Commission, Remarks at The Resurgent Conference, Austin, TX (Aug. 3, 2018) (“This concept of permissionless innovation has been essential to the growth of technological innovation. ... Basically, anyone can use this spectrum, so long as you don’t cause harmful interference to those using other spectrum bands.”).

⁶³ See Comments of CTIA, ET Docket No. 15-105, at 2 (filed June 11, 2015).

available for the full range of next-generation unlicensed technologies, including Wi-Fi, LTE-Unlicensed, and License Assisted Access technologies. Industry-based standards bodies have successfully adopted standards to ensure that varying technologies can coexist. The Commission has relied on those bodies – not prescriptive regulations – to drive innovative uses of spectrum and new technologies.⁶⁴ For example, the Commission rejected adding spectrum etiquette regulations to the 2.4 GHz and 5.8 GHz bands.⁶⁵ Technology neutrality was the right policy then, and remains the right policy today. It will ensure the continued growth of unlicensed services and the robust use of the 6 GHz band.

V. CONCLUSION.

CTIA commends the Commission for making repurposing mid-band spectrum for commercial use a top priority. The Commission should take the steps outlined herein to ensure spectrum is made available as quickly as possible, and in a manner that will promote competition and help meet increasing consumer demand.

⁶⁴ *Id.* at 7.

⁶⁵ *Modification of Parts 2 and 15 of the Commission's Rules for Unlicensed Devices and Equipment Approval*, Order and Second Memorandum Opinion and Order, 29 FCC Rcd 6366, 6370 ¶ 12 (2014).

Respectfully submitted,

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February 15, 2019