

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

In the Matter of)	
)	
Spectrum Horizons)	ET Docket No. 18-21
)	
James Edwin Whedbee Petition for Rulemaking to)	RM-11795
Allow Unlicensed Operation in the 95-1,000 GHz)	
Band)	

COMMENTS OF CTIA

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May 2, 2018

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CTIA¹ respectfully submits these comments in response to the Notice of Proposed Rulemaking seeking comment on making spectrum above 95 GHz more readily accessible for new innovative services and technologies.²

I. INTRODUCTION AND SUMMARY.

The Federal Communications Commission (“Commission”) has been at the forefront of unlocking a variety of new spectrum opportunities for use for innovative wireless products and services. As a result, the U.S. wireless industry is a global success story, delivering \$475 billion annually to America’s economy, supporting 4.7 million jobs, and contributing 2.6 percent of total U.S. gross domestic product.³ The Commission’s commitment to identifying and

¹ 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 *Spectrum Horizons, et al.*, Notice of Proposed Rulemaking and Order, ET Docket No. 18-21, *et al.*, FCC 18-17 (rel. Feb. 28, 2018) (“*Spectrum Horizons NPRM*”).

³ *How the Wireless Industry Powers the U.S. Economy*, ACCENTURE STRATEGY (Apr. 2018), <https://api.ctia.org/wpcontent/uploads/2018/04/Accenture-Strategy-Wireless-Industry-Powers-US-Economy-2018-POV.pdf>.

evaluating new spectrum bands for additional uses and opportunities, for a mix of licensed and unlicensed purposes, has directly contributed to U.S. global leadership. In the *Spectrum Horizons NPRM*, the Commission takes the next incremental step towards identifying and allocating the needed spectrum resources critical to maintaining U.S. leadership in the development and implementation of new and innovative technologies and services.

At this point in technology development, the wireless industry believes that spectrum above 95 GHz will be very useful for fixed microwave and wireless backhaul purposes, especially for small cells. This will be especially true in areas where fiber is not feasible or available and would be highly beneficial to enable further small cell deployments for both 4G and 5G mobile broadband services. However, given the nascent nature of technology for the spectrum bands above 95 GHz, the Commission should adopt flexible licensing and technical rules that will further U.S. leadership in the wireless marketplace. Similarly, any sharing requirements for these spectrum bands should prioritize terrestrial fixed and mobile services while providing adequate interference protections to current and future uses. To that end, CTIA generally agrees with the approach outlined in the *Spectrum Horizons NPRM* and encourages the Commission to utilize database managers to mitigate sharing and interference issues among the various users above 95 GHz. Finally, CTIA generally supports the Commission's proposal to set aside spectrum above 95 GHz for both licensed and unlicensed use, and to make certain bands available under the existing Part 15 rules for unlicensed millimeter wave spectrum bands.

II. THE COMMISSION SHOULD ADOPT FLEXIBLE LICENSING AND TECHNICAL RULES FOR SPECTRUM BANDS ABOVE 95 GHz.

A. Light-Touch Licensing Rules Will Foster Innovation and Investment in the Spectrum Bands Above 95 GHz.

The Commission seeks comment on adopting proposed rules for fixed point-to-point operations in 36 gigahertz of spectrum between 95 GHz and 241 GHz; permitting licensed fixed

operations in 66.2 gigahertz of spectrum between 158.5 GHz and 275 GHz currently allocated for either Fixed Satellite Service (“FSS”) or the Mobile Satellite Service (“MSS”); and allowing mobile deployment in the spectrum above 95 GHz.⁴ CTIA generally supports the Commission’s efforts to investigate and identify new sources of spectrum to support innovative and nascent services, and agrees with the proposal to allow for the licensing of more than 100 gigahertz of spectrum for fixed and mobile services.⁵

International standards setting bodies are already exploring recommendations for deployment of services in several of these bands.⁶ At this early developmental stage, however, it is difficult to predict the full range of services that may be deployed. In considering rules for the spectrum bands above 95 GHz, the Commission should thus refrain from imposing rigid rules that may restrict or foreclose services from being deployed in these bands. Instead, the Commission should adopt flexible rules that afford licensees the ability to determine the types of services that may be successfully deployed in these frequency ranges.

Fixed Licensing. Initially, CTIA recommends that any rules adopted by the Commission for fixed licensed services be consistent with the flexible framework established for the 70/80/90 GHz bands.⁷ This approach has proven successful in allowing innovation to flourish to

⁴ *Spectrum Horizons NPRM* ¶ 28.

⁵ The specific spectrum bands for licensed services are 95-100 GHz, 102-109.5 GHz, 111.8-114.25 GHz, 122.25-123 GHz, 130-134 GHz, 141-148.5 GHz, 151.5-164 GHz, 167-174.8 GHz, 191.8-200 GHz, 209-226 GHz, 231.5-235 GHz, 238-241 GHz, and 252-275 GHz.

⁶ See, e.g., European Conference of Postal and Telecommunications Administrations, Electronic Communications Committee (“ECC”), SE19_37 - ECC Recommendation and ECC Report containing guidelines on deployment of fixed services operating in the allocated in the bands 92 – 94 GHz, 94.1 – 95 GHz, 95 – 100 GHz, 102 – 109.5 GHz and 111.8 – 114.25 GHz; SE19_38 - ECC Recommendation and ECC Report containing guidelines on deployment of fixed services operating in the allocated in the bands 130-134 GHz, 141-148.5 GHz, 151.5-164 GHz, and 167-174.8 GHz, <https://eccwp.cept.org/default.aspx?groupid=45> (forthcoming report on the guidelines for deployment of fixed services in the studied bands, targeted for release in September 2018).

⁷ See, e.g., 47 C.F.R. §§ 101.1501-101.1527.

accommodate new and previously unconsidered services, and relies upon private database managers to oversee licensing and operation of the spectrum without unnecessary regulatory requirements. In contrast, the Commission should reject more burdensome prior coordination licensing requirements to protect FSS from interference from fixed terrestrial licensees, as they would inhibit use of spectrum above 95 GHz and unreasonably slow the licensing process.⁸

Additionally, CTIA notes that the Commission has proposed to license the 122.25-123 GHz band for fixed services as well as make it simultaneously available for unlicensed uses.⁹ As the sharing requirements associated with contemporaneous licensed and unlicensed uses would be complicated, the Commission should consider how licensed, unlicensed, and existing industrial, scientific and medical (“ISM”) use of this band could be accommodated.

Mobile Licensing. In addition, the Commission also should ensure that opportunities for mobile wireless services in the bands above 95 GHz are not foreclosed. The wireless industry is constantly innovating and utilizing different spectrum bands for delivery of service to consumers. Indeed, the spectrum above 3 GHz was not seen as viable for mobile wireless services until only a few years ago – yet now it is considered a fundamental building block for 5G. With more than 396 million active wireless connections in the U.S. and a 238 percent increase in data traffic over the last two years, the Commission should continue to explore new sources of spectrum to handle this increasing demand.¹⁰ The Commission should thus avoid

⁸ See 47 C.F.R. § 101.103.

⁹ *Spectrum Horizons NPRM* ¶¶ 5, 31. See also *Amendment of Parts 2 and 15 of the Commission’s Rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications*, Notice of Proposed Rulemaking, 9 FCC Rcd 7078, ¶ 18 (1994) (proposing to make the 122.5-123 GHz band available for unlicensed use).

¹⁰ See *How the Wireless Industry Powers the U.S. Economy*, ACCENTURE STRATEGY (Apr. 2018), https://www.accenture.com/t20180404T025245Z_w_us-en_acnmedia/PDF-74/Accenture-Strategy-Wireless-Industry-Powers-US-Economy-2018-POV.pdf.

adopting rigid allocations and rules for the spectrum above 95 GHz that would require a new rulemaking if technology evolves to support mobile wireless in these bands. For example, the Commission could modify the Part 30 technical rules to tailor them towards use of the spectrum above 95 GHz for mobile operations, while deferring on the precise licensing scheme until further development of the potential use cases for mobile services. Alternatively, it could suggest that the existing 70/80/90 GHz licensing framework could be modified to accommodate mobile services in the future. Regardless of approach, the Commission should not take any action that would restrict future licensed mobile operations in this spectrum.

B. Relaxed Technical Rules Will Allow for Easier Deployment of New and Innovative Uses.

The Commission also seeks comment on a number of technical rule requirements for licensing fixed services in the spectrum above 95 GHz.¹¹ As with the recommended approach for licensing rules, CTIA urges the Commission to refrain from imposing proscriptive technical regulations for the spectrum bands above 95 GHz. The Commission itself has recognized that “adopting less restrictive rules will encourage greater use of these bands because equipment will likely be less expensive and licensees will have more flexibility in the uses they can make of this spectrum.”¹² Thus, the Commission’s guiding principle in this proceeding should be to ensure that it is not foreclosing future innovations or use cases at this very nascent stage of development. Adopting flexible technical rules to allow providers the flexibility to determine what services to deploy is paramount to ensuring that innovation flourishes in these bands.

¹¹ *Spectrum Horizons NPRM* ¶¶ 32-40.

¹² *Id.* ¶ 33.

Antenna Gain Requirements. CTIA supports the proposal to apply the more relaxed 43 decibels (isotropic) (“dBi”) antenna gain limit applicable to the 70/80 GHz spectrum bands, rather than the 50 dBi requirement applied to the 90 GHz band.¹³ CTIA further believes that it is unnecessary to reduce the maximum transmit equivalent isotropically radiated power (“EIRP”) for each dB the antenna gain is less than 50 dBi. Instead, licensees should be free to deploy antennas with less gain than 50 dBi without lowering the transmit power of the device.

Although CTIA supports, at a minimum, the more relaxed 43 dBi limit, industry filings indicate that the existing antenna rules in the 70/80/90 GHz band may not be able to support “the antenna deployments needed for expanding existing LTE networks and the coming 5G networks.”¹⁴ Specifically, providers have indicated that they are unable to install “small unobtrusive flat panel antennas demanded by landlords and local zoning boards because they are unable to meet the stringent cross-polarization standards set forth in the rules.”¹⁵ In light of these potential impediments, the Commission should explore further changes to its rules to allow the deployment of flat panel antennas that will be critical to licensed operators as they deploy 5G and other advanced services. After additional investigation and as technology development efforts advance, the wireless industry may propose more detailed information on the most appropriate antenna gain values for bands above 95 GHz.

Bit Rate Requirements. CTIA also encourages the Commission to adopt the more relaxed bit rate requirement of 0.125 bits/second/Hz, consistent with the rules for the 70/80 GHz

¹³ *Id.*

¹⁴ *See* Letter from John Hunter, Senior Director, Technology and Engineering Policy, T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket Nos. 10-153, 15-244, at 2 (filed Jan. 18, 2018).

¹⁵ *Id.*

band.¹⁶ Although, as the Commission notes, efficiency requirements may be less necessary at higher frequency ranges given the limited path length in these bands,¹⁷ adopting minimal use requirements ensures that licensees are making efficient and effective use of the spectrum.

Transmit Power Limits. The Commission should adopt a transmit power limit that factors in the propagation and attenuation issues experienced in the spectrum above 95 GHz. CTIA supports the initial proposal of 25 decibel watts per megahertz (“dBW/MHz”),¹⁸ but notes that other services, even in lower spectrum bands, have greater transmit power limits. CTIA thus recommends that the Commission consider whether a limit such as 31.25 dBW/MHz (or even a slightly higher limit) would allow licensees the power needed to overcome propagation and attenuation issues while also being consistent with power limits found in other bands, including Personal Communications Service (“PCS”) and Advanced Wireless Services (“AWS”).¹⁹

Point-to-Multipoint Services. Finally, the Commission seeks comment on whether to make provisions for fixed point-to-multipoint systems in addition to point-to-point links, and proposes allowing licensees to register operations in an area around a fixed location instead of registering each individual link.²⁰ CTIA supports the Commission’s proposed approach of permitting point-to-multipoint licensing in the spectrum above 95 GHz, as doing so will increase flexibility for licensees. Consistent with this approach, however, CTIA observes that varying use

¹⁶ *Spectrum Horizons NPRM* ¶ 33.

¹⁷ *Id.* ¶ 22.

¹⁸ *Id.* ¶ 34.

¹⁹ The 31.25 dBW/MHz limit was proposed by Battelle Memorial Institute in its rulemaking petition. *See* Petition of Battelle Memorial Institute, Inc. for Rulemaking, RM-11713, at 12 (filed Feb. 6, 2014) (suggesting an EIRP of 70 dBW). PCS licensees are permitted to operate at an EIRP of 1640 watts (which translates to 32.15 dBW/MHz). *See* 47 C.F.R. § 24.232. Similarly, AWS licensees are generally allowed to operate at an EIRP of 1640 watts (or 32.15 dBW/MHz), but in rural areas are permitted double the power (3280 watts). *See* 47 C.F.R. § 27.50(d).

²⁰ *Spectrum Horizons NPRM* ¶ 38.

cases (point-to-point, point-to-multipoint, mobile) should be governed by database managers and the industry rather than dictated by Commission rules. Such an approach will allow technology to develop organically without unnecessary regulatory burdens that could stunt innovative new services and applications.

III. THE COMMISSION'S SPECTRUM SHARING PROPOSALS WILL ENCOURAGE MORE ROBUST USE OF THE SPECTRUM ABOVE 95 GHz.

The Commission has advanced a number of sharing proposals for the bands above 95 GHz that appear generally workable. It should therefore ensure that terrestrial fixed and mobile services will be permitted while protecting other incumbent and future uses of the spectrum.²¹

As an initial matter, CTIA recommends that the Commission rely upon the existing database managers to mitigate interference among users of the spectrum bands above 95 GHz, given that each of the varying uses likely will require specific sharing solutions to alleviate interference effects. With technology development still at a nascent stage, permitting management of the interference environment by database managers and the industry would enable all parties the ability to utilize the existing database manager licensing framework to obtain frequency assignments and interference protection. Sharing criteria could be developed through this collaborative process, with the Commission being involved only if parties were unable to reach a consensus agreement on how to protect all affected stakeholders.

Additionally, CTIA agrees with the Commission's proposal to register individual links/systems and believes that extending the duties of the existing 70/80/90 GHz database managers to the spectrum above 95 GHz would be the best approach. There is no reason that this framework, which has been highly successful in managing the 70/80/90 GHz spectrum,

²¹ *Id.* ¶¶ 42-51.

could not be extended to the spectrum above 95 GHz in a similar fashion. Further, the previously approved database managers should be permitted to immediately manage the spectrum above 95 GHz. Should there be demand, new database managers could be authorized by the Commission through a similar vetting process as the original database managers.

Moreover, other users of the spectrum above 95 GHz (including the passive services, FSS and MSS, radar systems, and federal users) should be permitted to provide their technical data to database managers. In this way, all users of spectrum above 95 GHz would be subject to the same licensing and interference management methodology. Further, database managers could more nimbly modify the protection requirements through a consensus-based process and allow for rapid and effective use of the spectrum.

In addition to the general principle of allowing database managers to oversee the frequency coordination and sharing process, the Commission also sought comment on a number of specific sharing scenarios. CTIA addresses these below.

Radio Astronomy Service Sharing (“RAS”). The Commission seeks comment on whether excluding fixed and mobile stations from localities where RAS operations are conducted would provide adequate protection for incumbent operations.²² Initially, CTIA observes that T-Mobile has provided a detailed technical analysis that demonstrates that adjacent-band passive services, including RAS, can be fully protected from interference by imposing certain “modest operating constraints.”²³ In addition, as the National Radio Astronomy Observatory (“NRAO”) recently noted, radio astronomy and fixed services currently operate compatibly under the rules

²² *Spectrum Horizons NPRM* ¶ 43.

²³ Letter from Steve B. Sharkey, Vice President, Government Affairs – Technology and Engineering Policy, T-Mobile USA, Inc., to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 14-177, *et al.*, at 2 (filed Oct 2, 2017) (“T-Mobile Coexistence Study”).

for the 70/80/90 GHz bands.²⁴ Therefore, CTIA agrees with NRAO that extending the 70/80/90 GHz rules “above 95 GHz will continue to foster coexistence of such operations as long as local conditions are considered, for instance, the lessened atmospheric absorption in the vicinity of radio astronomy observatories.”²⁵ As NRAO explained, the coordination distance between fixed service and radio astronomy operations does not need to be adjusted for operations above 95 GHz, as RAS has effectively compensated for the increased atmospheric attenuation in this spectrum by moving to higher and drier sites for its higher frequency operations.²⁶ CTIA also agrees with NRAO that extended coordination distances may be necessary to ensure compatibility between mobile services and RAS, and that the Commission should consider extending the rules requiring pre-coordination of power levels to mobile service, in addition to fixed service.²⁷

CTIA notes, however, that over time, coordination and exclusion zones, as well as power levels, may be able to be modified to allow for more widespread terrestrial operations. Once technology is deployed and the NRAO and wireless industry have more real-world experience and data about sharing, wireless operations may be possible in closer proximity to RAS and may be able to operate at higher power levels.

Earth-Exploration Satellite Service (“EESS”)/Space Research Service (“SRS”)

Sharing. The Commission also seeks comment on the methodology to model interference to EESS and SRS.²⁸ CTIA observes that the T-Mobile Coexistence Study equally applies to the

²⁴ Comments of NRAO, ET Docket No. 18-21, at 5 (filed Apr. 1, 2018).

²⁵ *Id.*

²⁶ *Id.*

²⁷ *Id.* at 6.

²⁸ *Spectrum Horizons NPRM* ¶ 45.

EESS and SRS.²⁹ Specifically, T-Mobile explained that “[b]roadband deployments in the 32 GHz, 47 GHz, and 50 GHz bands can coexist with existing RAS, EESS, and other passive operations without causing harmful interference.”³⁰ Although T-Mobile did not directly analyze the spectrum bands above 95 GHz, its findings can be extended to these bands. CTIA therefore recommends that the Commission utilize T-Mobile’s analysis to define the adjacent-band protections needed for EESS and SRS in the bands above 95 GHz and guide its development of technical interference limits for terrestrial fixed and mobile service uses.

CTIA also notes that the passive services are co-channel with proposed licensed terrestrial fixed and mobile services in the 105-109.5 GHz, 111.8-114.25 GHz, and 217-226 GHz bands.³¹ For these bands, additional study is warranted to determine the protection requirements necessary to accommodate the passive services.

FSS Sharing. In addition, the Commission has suggested managing sharing between FSS licensees and terrestrial fixed and mobile services as it has done in other millimeter wave bands.³² The Upper Microwave Flexible Use Service (“UMFUS”) sharing rules, as adopted in Part 30 of the Commission’s rules, should be the starting point for sharing in the spectrum above 95 GHz. The Commission should be able to develop coordination and exclusion zones to accommodate the propagation characteristics associated with the spectrum above 95 GHz, as opposed to the spectrum below 60 GHz. Moreover, the existing 70/80/90 GHz database approach should be applied to any future FSS earth stations – FSS future satellite services could

²⁹ T-Mobile Coexistence Study at 2.

³⁰ *Id.* at 35.

³¹ *Spectrum Horizons NPRM* at Table 1.

³² *Id.* ¶¶ 46-47.

work with the database managers to have their FSS earth stations added and coordinated with terrestrial fixed and mobile services above 95 GHz.

Federal Sharing. The Commission has proposed to adopt a new footnote to the Table of Allocations to protect the future rights of federal users.³³ The Commission should instead extend the use of the database manager program to federal users rather than adopt a new footnote. Federal users could provide their technical information to database managers and obtain protection from interference as well as additional frequency assignments.

IV. DEDICATING SPECTRUM FOR BOTH LICENSED AND UNLICENSED USE WILL PROMOTE INNOVATION IN BANDS ABOVE 95 GHz.

In addition to ensuring that the rules for the bands above 95 GHz support licensed fixed and mobile wireless use, the Commission proposes to make 15.2 gigahertz of spectrum above 95 GHz available for unlicensed use. Two of the bands proposed for unlicensed use are designated under Part 18 for ISM uses, while the other two bands are adjacent to the 182-185 GHz band where no transmissions are permitted.³⁴ The Commission also seeks comment on allowing unlicensed use of the 116-122 GHz band, which is currently allocated to passive services.³⁵

CTIA has long recognized that both licensed and unlicensed spectrum have an important role to play in the wireless ecosystem and, where spectrum is not easily used for licensed terrestrial fixed and mobile wireless services, it should be made available on an unlicensed basis. CTIA therefore generally encourages the Commission to adopt its proposed approach, and agrees that applying Section 15.255 requirements would be appropriate,³⁶ as it will provide a consistent framework for unlicensed spectrum access above 24 GHz. However, as noted above, the 122.25-

³³ *Id.* ¶ 51.

³⁴ *Id.* ¶¶ 54, 55.

³⁵ *Id.* ¶ 57.

³⁶ *Id.* ¶ 56.

123 GHz band has been proposed for both licensed and unlicensed uses. For this band, the Commission should consider how licensed, unlicensed, and existing ISM uses will be accommodated.

V. CONCLUSION.

The Commission's continued efforts to identify and allocate additional spectrum for terrestrial fixed and mobile wireless services will ensure that the U.S. takes a leading role in developing and deploying next-generation technologies and services, including fixed wireless backhaul. CTIA urges the Commission to employ a balanced, light-touch approach to licensing and technical rules in these nascent bands. By doing so, the Commission will provide licensees with the flexibility necessary to maximize the potential of these bands, unlocking countless benefits for American consumers.

Respectfully Submitted,

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