

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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

**COMMENTS OF THE
CONSUMER TECHNOLOGY ASSOCIATION**

The Consumer Technology Association (“CTA”)¹ respectfully submits these comments in response to the above-captioned Notice of Proposed Rulemaking (“*Notice*”) seeking comment on making spectrum above 95 GHz more readily accessible for new innovative services and technologies.²

I. INTRODUCTION AND SUMMARY

The demand for connectivity to new and innovative consumer technologies continues to grow at unprecedented rates. To meet that demand, the wireless and consumer technology industries have invested billions of dollars in a wide range of technologies that utilize spectrum bands previously considered unsuitable to support the connectivity needs of American

¹ Consumer Technology Association (“CTA”)TM is the trade association representing the \$351 billion U.S. consumer technology industry, which supports more than 15 million U.S. jobs. More than 2,200 companies – 80 percent are small businesses and startups; others are among the world’s best known brands – enjoy the benefits of CTA membership including policy advocacy, market research, technical education, industry promotion, standards development and the fostering of business and strategic relationships. CTA also owns and produces CES[®] – the world’s gathering place for all who thrive on the business of consumer technologies. Profits from CES are reinvested into CTA’s industry services.

² *Spectrum Horizons*, Notice of Proposed Rulemaking and Order, FCC-18-17 (rel. Feb. 28, 2018) (“*Notice*”).

consumers. This investment has complemented the Commission’s many, concurrent actions over the past several years to make more spectrum commercially available.

The fruit of these efforts is perhaps most evident in the development of wireless services on millimeter wave (“mmW”) spectrum. The mmW spectrum will, among other things, support the development of Fifth Generation (“5G”) wireless services. 5G will enable both huge and tiny services, ranging from spectrum-hungry broadband video programming to micro-signals for Internet of Things (“IoT”) devices. These next generation services and applications will spur new innovative consumer technologies – improving consumers’ lives, making industry more efficient, powering smarter cities and government, fostering American leadership, and creating new jobs.

Although mmW spectrum was once thought not viable for mobile broadband and other applications, technological advancements in computing and antennas have allowed the innovation industry to unlock the potential of these bands to provide super-fast data rates with low latency, offering game-changing capabilities to consumer devices and applications. And, just as importantly, by making mmW spectrum available on a licensed, lightly licensed, and unlicensed basis through actions taken in the *Spectrum Frontiers* proceeding, the Commission helped enable the kind of permissionless innovation that has made the U.S. the world leader in wireless services and technology.

The spectrum bands above 95 GHz offer yet another opportunity for the Commission to unleash permissionless innovation. The continued technological advancements in computing and antennas are now showing the potential of spectrum above 95 GHz to help the wireless and innovation industries meet the growing demand for consumer connectivity to new and innovative

consumer technologies. Thus, CTA applauds the Commission for issuing this NPRM as a forum for developing a record on the current and potential future uses of spectrum above 95 GHz.

As the Commission proceeds with its examination of these bands, CTA submits these comments to update the Commission on the efforts of the consumer technology industry to explore the use of spectrum above 95 GHz, to suggest a set of basic principles that should guide the Commission's consideration of this spectrum as technology utilizing these bands develops, and to respond to certain issues raised by the Commission in the NPRM. With respect to issues raised in the NPRM, CTA (1) agrees that the four bands proposed for unlicensed use are well-suited for such operations, (2) requests that the Commission maximize sharing with federal users where appropriate, and (3) urges the Commission to continue to prioritize sound engineering, such as the agency recently did through the creation of an honors engineering program.

II. RECENT ADVANCEMENTS IN COMPUTING AND ANTENNAS SHOW THE PROMISE OF SPECTRUM ABOVE 95 GHZ TO HELP MEET THE GROWING DEMAND FOR CONNECTIVITY TO NEW AND INNOVATIVE CONSUMER TECHNOLOGIES

Consumer demand to communicate, consume content, and connect things is stretching the limits of current communications technologies and networks. In response to this demand, the innovation industry is exploring how the spectrum above 95 GHz can help meet this challenge. CTA has been at the forefront of these efforts, including contributing to the efforts of the Commission's Technical Advisory Council ("TAC") to explore the 95-275 GHz band leading up to the *Spectrum Frontiers* proceeding.³

One potential use of spectrum above 95 GHz is for the delivery of high-definition ("HD") video signals. As the NPRM notes, Japan Telegraph and Telephone Corporation used a 120

³ See FCC, *TAC Spectrum Frontiers Working Group*, Meeting Presentation (Sept. 23, 2013), <https://transition.fcc.gov/bureaus/oet/tac/tacdocs/meeting92313/TAC9-23-13Presentation.pdf>.

GHz band wireless link in a long-range transmission trial of material to provide live TV coverage of the 2008 Beijing Olympics.⁴ In turn, Japan's Ministry of Internal Affairs and Communications subsequently revised its radio allocations to allocate spectrum above 95 GHz to accommodate such HD video services in Japan.⁵ This action opens the door for the delivery of new and innovative video services over previously underutilized spectrum.

CTA members and others are also exploring the use of certain bands above 95 GHz for wireless transmission over distances consistent with backhaul applications to support future networks. Indeed, researchers at IEEE identified bands above 95 GHz almost a decade ago as spectrum that potentially would support wireless backhaul.⁶ Today, some CTA members, including T-Mobile, believe spectrum above 95 GHz could potentially be utilized to support backhaul operations for 5G networks. Access to robust and competitive backhaul services will be critical for, among other things, the operation of 5G networks.⁷ These networks will rely upon a massive deployment of small cells, all of which in turn will need to be connected. Bands above 95 GHz can be utilized to connect these small cells, especially those in locations where installation of fiber backhaul is difficult or cost prohibitive. By lowering the cost of backhaul service, network operators will be able to deploy networks over larger areas, allowing more consumers to connect their devices to 5G networks.

Industry is also studying the potential of this spectrum to support a variety of short-range applications, including wireless local area networks, wireless personal area networks, kiosk

⁴ See Notice ¶ 12.

⁵ See *id.*

⁶ See N. Kukutsu et al., *Toward practical applications over 100 GHz*, IEEE MTT-S, International Microwave Symposium Digest, at 1134, 1135 (June 2010).

⁷ CTA, *Development and Deployment of 5G Networks*, at 22 (Oct. 2017) (identifying the competitive availability of backhaul as one of the factors that will sustain the momentum in 5G development and deployment).

downloading, wireless connections in data centers, and chip-to-chip communications.⁸ Each of these applications holds the potential to fuel greater innovation in the consumer technology industry.

Moving forward, the Commission and the wireless and consumer technology industries must continue to work seamlessly to explore options to make additional spectrum available. By doing this, the Commission can help satisfy consumer demand for connectivity and continue to fuel innovation and economic growth in the consumer technology industry.

III. PRINCIPLES SIMILAR TO THOSE PREVIOUSLY SUGGESTED BY CTA SHOULD GUIDE THE COMMISSION AS IT EXPLORES UNDERUTILIZED SPECTRUM

In its initial comments in the Commission's *Spectrum Frontiers* proceeding, CTA offered a set of basic principles that the Commission could use during its exploration of mmW spectrum.⁹ As CTA explained at the time, these principles would encourage investment and innovation in these bands by the wireless and technology industries. As companies such as Verizon and Samsung conduct trials and begin to deploy 5G networks and services on mmW spectrum, it is clear that the approach taken by the Commission in the *Spectrum Frontiers* proceeding has facilitated innovation and investment in these bands. Moreover, many of the Commission's actions in that proceeding were consistent with the principles set forth by CTA.

Accordingly, CTA offers a similar set of principles tailored to the unique attributes of spectrum above 95 GHz and the wide variety of use cases that these higher frequencies potentially can support. These principles can serve as the touchstone of rules to encourage investment and innovation in spectrum above 95 GHz:

⁸ See Notice ¶ 13.

⁹ See Comments of the Consumer Electronics Association, GN Docket No. 14-177, at 8-14 (Jan. 15, 2015). In 2015, CTA changed its name from the Consumers Electronic Association.

- *Technical neutrality and upholding the Commission’s commitment to refrain from defining, standardizing, or specifying the characteristics of services within these bands is crucial.* Given the nascent nature of the communication technologies using the bands above 95 GHz,¹⁰ the Commission must not pick winners or losers, but provide sufficient flexibility in its rules.
- *The Commission must continue to be an active facilitator in development of technologies utilizing these bands, including by working at a pace commensurate with industry developments.* To encourage marketplace development, the FCC must continue to play an active role as facilitator in the further development of the technologies utilizing bands above 95 GHz. The TAC, workshops, and other vehicles, such as the Commission’s experimental licensing program, can inform the Commission’s decision so as to act promptly when opportunities to facilitate new and innovative uses arise.
- *The Commission should continue to encourage and participate in global harmonization efforts.* International harmonization is crucial to enabling the most efficient deployment of next generation technology, especially as both innovative research and supply chains are increasingly global in scale.
- *Allocations and service rules should take into account the physical characteristics of the spectrum.* Above 95 GHz, data bandwidth increases with frequency bandwidth, but propagation and penetration significantly decrease.¹¹ To the extent spectrum is licensed, licensing regimes and construction requirements should reflect the propagation properties of these spectrum bands.
- *The Commission should craft service rules and licensing regimes to maximize innovation.* The Commission should accommodate the entire range of possible uses for the mmW bands, providing a variety of lightly-licensed and unlicensed approaches to ensure that operators can utilize these bands to work harmoniously with low, mid, and other higher frequency bands. That is, rules and licenses should not put unnecessary administrative obstacles in the way of providing service by multiple operators, and as many technologies and use cases as possible, in all areas.
- *Protections for federal users should ensure that spectrum is used efficiently while guarding against harmful interference.* The growing demand for connectivity to consumer devices and applications has created a pressing need for more spectrum. The Commission, working with the National Telecommunications and Information Administration (“NTIA”), should promote the efficient use of spectrum by federal users while preventing harmful interference

¹⁰ See, e.g., Notice ¶ 67 (noting that “the technology for practical RF communications above 95 GHz is at a very nascent stage”).

¹¹ See *id.* ¶¶ 22-25 (describing and analyzing propagation properties of mmW frequencies). At the same time, the Commission also should continue its efforts to make lower frequency spectrum, which has additional propagation and penetration capabilities, available. The Commission must take action on all fronts to maintain the United States’ leadership role in innovation.

to these users. Such policies will enable the Commission and NTIA to continue to identify new opportunities for sharing and reallocation of spectrum to ensure that consumers have the connectivity required for consumer devices and applications as they continue to evolve.

Adherence to these principles will result in a regulatory regime that balances licensed and unlicensed operations, facilitates the efficient use of spectrum by both commercial and federal users, and encourages present and future experimentation, all of which will lay a solid foundation for innovation in the consumer technology industry.

IV. THE BANDS IDENTIFIED FOR UNLICENSED USE ARE WELL-SUITED FOR UNLICENSED OPERATIONS

CTA generally supports a mix of lightly-licensed and unlicensed spectrum above 95 GHz. Such a balanced approach can encourage innovation and investment where the development of technologies for these bands is relatively nascent.

The four frequency bands currently proposed for unlicensed use (the 122-123 GHz band, the 244-246 GHz band, the 174.8-182 GHz band, and the 185-190 GHz band) are well-suited for unlicensed operations. Two of these bands—the 122-123 GHz and 244-246 GHz bands—are in frequency bands that are allocated for use by Industrial, Scientific and Medical (“ISM”) equipment, whose operation lends itself to opportunistic sharing with unlicensed operations. ISM equipment or appliances are “designed to generate and use locally RF energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunication.”¹² Because ISM applications are generally used for non-communications services, concerns about interference to ISM applications are minimal.¹³ Moreover, spectrum above 95 GHz is likely to be used in narrow beam operations due to the atmospheric propagation

¹² 47 C.F.R. § 18.107(c).

¹³ See *Revision of Part 15 of the rules regarding the operation of radio frequency devices without an individual license*, Notice of Proposed Rule Making, 2 FCC Rcd 6135, 6138 ¶ 24 (1987) (“ISM devices are a source of interference but normally are not susceptible to receiving interference from other sources.”).

characteristics of the bands, making it unlikely that such operations will be negatively impacted by ISM devices. Such factors make these bands well-suited for unlicensed operations.

The 174.8-182 GHz and 185-190 GHz bands likewise are well-suited for unlicensed operations due to their propagation characteristics. Specifically, these bands are located in regions of spectrum where electromagnetic waves propagating through the environment encounter significant attenuation due to rain and atmospheric water vapor. These attenuation characteristics promote extensive reuse of frequencies without risk of harmful interference to other users. Thus, adopting an allocation for unlicensed use in these bands at this early date likely will provide many innovators the opportunity to experiment with new technologies and applications free from significant risk of harmful interference. Such initial allocations can inform consideration of further unlicensed allocations in the future.

V. THE COMMISSION SHOULD MAXIMIZE THE USE OF THIS SPECTRUM BY ENCOURAGING SHARING WITH FEDERAL USERS

As demand for today's data-intensive devices and services surges, innovators require more spectrum to keep up. The Commission, with its federal partners, must continue to work seamlessly to explore options to make additional spectrum available. Along these lines, with the proper safeguards in place, spectrum bands above 95 GHz in which federal users solely conduct passive operations may be well-suited to sharing with non-federal users. To facilitate the efficient use of spectrum above 95 GHz, the Commission should work with NTIA to explore safeguards that might potentially allow for sharing of these bands by non-federal users.

VI. SOUND ENGINEERING MUST BE THE LODESTAR FOR COMMISSION ACTION

As connectivity grows in importance, the Commission must ensure that the agency has a sufficient number of qualified engineers to help facilitate innovative new solutions to identifying new bands of spectrum for commercial use and to independently assess mechanisms for

increasing the efficiency of sharing capabilities between all users and in all licensing regimes. Engineers also will be critical to generating the Office of Engineering and Technology’s knowledge database publications, answering inquiries about measurement techniques, and supplying technical rule guidance.¹⁴ These technical guidance resources will enable timely and efficient introduction of compliant products and services. CTA applauds the Commission for establishing an honors engineering program to help grow this vital resource.¹⁵

Similarly, CTA urges the Commission to utilize existing and incoming engineering resources to provide greater clarity regarding RF exposure rules, both with respect to metrics by which exposure is measured and limits that should apply to transmitters operating above 100 GHz.¹⁶ Uncertainty regarding these engineering issues has the strong potential to impede innovation in these bands.

¹⁴ See Notice ¶ 83 (“As technology evolves to address the technical challenges related to perform compliance measurements above 95 GHz (with respect to propagation, interference protection, modulation techniques, transmission security, etc.), we expect that OET ... will provide guidance on appropriate measurement techniques through its knowledge database publications as products are developed, seeking notice and comment as appropriate.”).

¹⁵ FCC, News Release, *FCC Launches New Honors Engineering Program* (Apr. 2, 2018), https://transition.fcc.gov/Daily_Releases/Daily_Business/2018/db0402/DOC-350020A1.pdf.

¹⁶ Notice ¶ 82.

VII. CONCLUSION

CTA thanks the Commission for exploring the potential future uses of spectrum above 95 GHz to meet the growing demand for consumer connectivity to new and innovative consumer technologies. CTA looks forward to working with the Commission to fully evaluate and take advantage of the many consumer-friendly opportunities presented by the mmW bands, including the spectrum above 95 GHz.

Respectfully submitted,

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