

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of)	
)	
Office of Engineering and Technology Seeks)	ET Docket No. 17-340
Comment on Technological Advisory Council)	
Spectrum Policy Recommendations)	
)	

**COMMENTS OF THE
CONSUMER TECHNOLOGY ASSOCIATION**

The Consumer Technology Association (“CTA”)¹ respectfully submits these comments in response to the above-captioned Public Notice seeking comment on spectrum policy recommendations from the Commission’s Technological Advisory Council (“TAC”).² CTA is proud to participate on the TAC and applauds the Commission and the TAC for continuing to explore ways to promote the efficient and fair allocation of spectrum in congested radio frequency (“RF”) environments.

I. INTRODUCTION

The demand for wireless data is rapidly increasing as entities, including CTA’s member companies, continue to develop new and innovative connected services and products for consumers. To meet this demand, the Commission must not only identify additional spectrum

¹ Consumer Technology Association (“CTA”)™ 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 *Office of Engineering and Technology Seeks Comment on Technological Advisory Council Spectrum Policy Recommendations*, Public Notice, 32 FCC Rcd 10160 (OET 2017) (“Notice”).

for licensed and unlicensed use, but also find ways to increase efficient spectrum use in congested RF environments. Packing more communications into the same amount of available spectrum requires better techniques for mitigating interference between different systems operating in the same or nearby spectrum bands.

The TAC's efforts to explore ways to promote the efficient and fair allocation of spectrum are commendable. In particular, the TAC's proposed *Basic Spectrum Management Principles* provide a useful starting point for promoting increased efficiency in the use of spectrum. With the proper modifications, these principles, along with other tools available to the Commission, could be useful in certain instances in improving the compatibility of services that operate under new and even existing spectrum allocations. CTA therefore encourages the TAC to continue to develop and refine these spectrum recommendations.

As part of this further examination, the TAC should consider how industry can help to prevent and resolve interference disputes. Specifically, the TAC should consider how industry-led processes can best promote efficient use of spectrum. The expertise of incumbent and potential users of a band as well as that of users and potential users of affected adjacent bands positions industry to identify band-by-band interference limits that incentivize improved spectral efficiency while avoiding solely top-down and potentially innovation-stifling government mandates. Utilizing industry's expertise will help preserve manufacturers' and service providers' design flexibility, incentivize improvements in receiver performance, and avoid jurisdictional challenges, all of which ultimately benefits consumers.

II. SPECTRUM IS A KEY ENABLER OF THE LATEST INNOVATIVE CONSUMER TECHNOLOGIES

Consumer demand to communicate, consume content, and connect things is stretching the limits of current communications technologies and networks. As next-generation

technologies and Internet of Things devices become widely adopted and integrated into consumers' lives, demand for bandwidth, which already is extraordinary, is expected to explode in the coming years.³ According to one estimate, per capita devices and connections in North America will average 12.9 in 2021, up from 7.7 in 2016.⁴ To connect the billions of devices that will be in use by 2020, wireless networks will need to greatly increase their capacity.⁵

The economic implications of this spectrum crunch are considerable. Access to spectrum is critical to the consumer technology industry, which contributes approximately ten percent to the nation's GDP.⁶ Looking into the future, the new products and services generated as a result of Fifth Generation ("5G") wireless technologies will have significant economic impacts. For example, a study by IHS Markit on behalf of Qualcomm found the "value chain" associated with 5G technology could generate \$3.5 trillion in revenue and support 22 million jobs between 2022 and 2035.⁷ To recognize these benefits, access to spectrum is critical.

To meet the growing demand for wireless bandwidth, the Commission must continue to explore options both to make additional spectrum available *and* to make spectrum use more

³ See, e.g., CTA, *Internet of Things: A Framework for the Next Administration*, White Paper, at 6 (Nov. 2016) ("CTA IoT Paper"), <https://www.cta.tech/cta/media/policyImages/policyPDFs/CTA-Internet-of-Things-A-Framework-for-the-Next-Administration.pdf>.

⁴ Cisco, *The Zettabyte Era: Trends and Analysis*, White Paper, at Table 2 (July 2017), <http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/vni-hyperconnectivity-wp.pdf>.

⁵ Murray Slovic, *5G: The Mobile Tech of 2020*, CTA It is Innovation, at 20, 22 (Nov./Dec. 2014), <http://mydigimag.rrd.com/publication/?i=232265> (estimating that networks in 2020 will require capacity that is "at least 1,000 times the capability that exist[ed]" in 2014.).

⁶ See PricewaterhouseCoopers, *U.S. Economic Contribution of the Consumer Technology Association*, at E-2, 10 (Aug. 2016), <http://www.cta.tech/cta/media/ResearchImages/U-S-Economic-Contribution-of-the-Consumer-Technology-Sector-2016.pdf>.

⁷ IHS Economics & IHS Technology, *The 5G economy: How 5G technology will contribute to the global economy* at 18 (Jan. 2017), <https://www.qualcomm.com/documents/ihs-5g-economic-impact-study>.

efficient. CTA’s member companies deeply appreciate the Commission’s many ongoing efforts to increase spectrum available for licensed and unlicensed use. The Commission has made significant strides in recent years towards identifying additional spectrum bands for such use and – as CTA has noted recently – efforts along these lines should continue.⁸ Moreover, to help the consumer technology industry plan for the efficient use of spectrum bands in the pipeline, CTA urges the Commission to issue a roadmap for the release of spectrum moving forward.⁹

Yet, as CTA previously has noted, the release of additional spectrum for mobile broadband may not be sufficient to solve our nation’s spectrum crunch.¹⁰ Moving forward, the Commission also must continue to explore options to make spectrum use more efficient. Bodies such as the TAC are instrumental in exploring this issue. By finding ways to promote efficient spectrum use, the Commission can help satisfy consumer demand for connectivity and continue to fuel innovation and economic growth in the consumer technology industry.

III. CTA COMMENDS THE TAC FOR ITS COMMITMENT TO PROMOTING THE EFFICIENT USE OF SPECTRUM THROUGH THE FLEXIBLE APPLICATION OF SPECTRUM MANAGEMENT PRINCIPLES

CTA applauds the TAC’s efforts to achieve more efficient and effective spectrum use. The TAC’s *Basic Spectrum Management Principles* provide a useful starting point for promoting increased spectrum efficiency and will benefit from further refinements. For example, the TAC’s recommended principles appropriately recognize the role of receiver performance in

⁸ See Comments of the Consumer Technology Association, GN Docket No. 14-177, at 3-5 (Jan. 23, 2018).

⁹ See *id.* at 5 (noting that “[a] roadmap will provide the consumer technology industry the clarity necessary to plan for commercial development and deployment of 5G products and service that will use new spectrum bands....”).

¹⁰ See Comments of the Consumer Electronics Association, ET Docket No. 13-101, at 4 (July 22, 2013) (“CTA 2013 TAC White Paper Comments”). For clarity, we use the name “CTA,” even when previously filed comments were under the Consumer Electronics Association name.

optimizing spectrum use, noting that the efficient and fair allocation of spectrum requires “finding a balance between the rights and responsibilities of both transmitters and receivers.”¹¹

As CTA previously has observed, the Commission traditionally has sought to minimize interference by establishing specific technical parameters controlling the emissions and geographic locations of transmitters.¹² However, relying solely on transmitter limits to minimize interference is not likely to be successful in today’s spectrum-constrained environment because tighter optimization of spectrum use is needed.¹³ Both transmitter operation and receiver performance impact the amount of interference a receiver can tolerate, and therefore both transmitters and receivers are relevant to increasing spectrum efficiency.

The TAC also correctly recognizes the need for flexibility in applying any such principles to radio services, explaining that the *Basic Spectrum Management Principles* should not result in a one-size-fits-all, “concrete set of regulations that fit all radio services in the same way.”¹⁴ Indeed, the differences between the requirements of various types of systems actually *necessitate* a flexible approach in applying these principles. Consequently, to the extent that the TAC makes any final recommendations for spectrum management principles, the Commission should consider such principles on a case-by-case basis as it seeks to promote the efficient use of spectrum.

¹¹ See Notice, 32 FCC Rcd at 10160; TAC, *Basic Principles for Assessing Compatibility of New Spectrum Allocations*, TAC White Paper (Release 1.1, Dec. 11, 2015), <https://transition.fcc.gov/bureaus/oet/tac/tacdocs/meeting121015/Principles-White-Paper-Release-1.1.pdf>.

¹² See CTA 2013 TAC White Paper Comments at 5.

¹³ See *id.*

¹⁴ See Notice, 32 FCC Rcd at 10162.

IV. THE “BASIC SPECTRUM MANAGEMENT PRINCIPLES” WOULD BENEFIT FROM FURTHER REFINEMENTS BY THE TAC

The TAC’s *Basic Spectrum Management Principles* are a positive first step in achieving greater spectrum efficiency. However, CTA urges the TAC to give further consideration to certain aspects of these principles. In particular, the principles would benefit from further refinement to avoid any unintended consequences that may result from their implementation. As the TAC further explores and makes improvements to these principles, CTA highlights three issues that the TAC should incorporate into this “harder look.”

For instance, the TAC’s second principle is potentially overly broad, requiring planning for non-harmful interference against “any changes that occur in the future.”¹⁵ Although CTA agrees that products and services should be robust, the TAC should consider some boundary regarding future-proofing products and services against *all changes for all time*. Given the rapid changes in technology, radio services may not be able to entirely plan for the unknown. Even today, the world is on the cusp of next-generation technology that offers new possibilities and innovations.

Furthermore, the TAC’s third principle should be reworded to reflect that the electromagnetic environment is “variable,” not “unpredictable” – the latter implying that we do not know enough about the environment to make meaningful predictions.¹⁶ The Commission, industry, and the academy have tools to understand the electromagnetic environment and, generally, understand events within a range even if we may not know a particular value at a particular time.

¹⁵ *Id.* at 10161 (“All [radio] services should plan for non-harmful interference from signals that are nearby in frequency, space or time, both now and for any changes that occur in the future”).

¹⁶ *Id.*

Finally, the TAC should further consider its seventh principle, recommending that radio operators be required to disclose relevant standards and system characteristics in exchange for an expectation of protection from harmful interference.¹⁷ In particular, the TAC should give careful consideration to requirements regarding the disclosure of proprietary or other sensitive information. CTA intends to participate in the TAC's further exploration of these principles.

V. INDUSTRY-DEVELOPED, BAND-BY-BAND INTERFERENCE LIMITS COULD HELP PROMOTE THE EFFICIENT USE OF SPECTRUM

As part of the TAC's hard look at its proposed principles, it also should consider ways in which industry can help promote the efficient use of spectrum. In particular, and as CTA has stated previously, industry, rather than the Commission, may be well positioned to determine appropriate interference limits.¹⁸ Under such an approach, industry – with Commission input as needed – would generate band-by-band signal strength profiles identifying the amount of interference that receivers are expected to tolerate. Likewise, the TAC should consider whether industry could lead a risk-informed-interference-assessment.¹⁹

By letting industry lead in developing these tools, the Commission will help ensure that limits are driven by consensus, informed by technological concerns, and guided by industry expertise while avoiding top-down, government-designed mandates that may stifle innovation. Because there is no single set of general interference limits applicable across all bands and all

¹⁷ *Id.* (“Services under FCC jurisdiction are expected to disclose the relevant standards, guidelines and operating characteristics of their systems to the Commission if they expect protection from harmful interference”).

¹⁸ *See* CTA 2013 TAC White Paper Comments at 11 (“Industry, with input as needed from the Commission, should manage interference limits by establishing signal strength profiles and the associated harm claim thresholds.”); *Notice*, 32 FCC Rcd at 10163 (“Principle #8 states that the Commission may apply Interference Limits to quantify rights of protection from harmful interference.”).

¹⁹ *Notice*, 32 FCC Rcd at 10164 (“The TAC has recommended that the Commission adopt risk-informed interference assessment and statistical service rules more widely.”).

applications, interference limits must be developed utilizing a band-by-band approach.²⁰ For any particular band, the incumbent and future potential users of the band, as well as users and potential users of affected adjacent bands, should be the key stakeholders in proposing interference signal strength profiles and interference limits for that band.²¹ These groups will best understand the “characteristics of the band and the needs of the existing and anticipated applications.”²²

Interference limits would benefit equipment manufacturers, service providers, innovators, and consumers.²³ For example, interference limits can provide incentives to improve receiver performance. By clearly defining the level of interference below which a receiver will not be legally protected from adjacent and co-channel existing and new services, interference limits will encourage manufacturers to improve receiver performance, and thereby further increase spectral efficiency.

In addition, interference limits would give equipment manufacturers and service providers much needed predictability regarding the spectral environment they can expect when designing products and services. Increased predictability will allow device manufacturers and service providers to specify and design devices with the confidence that these devices, once deployed in the marketplace, will provide the level of service expected by consumers. This predictability will particularly benefit emerging technology markets, where there already is a

²⁰ See CTA 2013 TAC White Paper Comments at 11.

²¹ See *id.* at 3.

²² *Id.*

²³ *Id.* at 3-4.

large amount of uncertainty present. By maximizing predictability and reducing risk, proponents of emerging technologies will be able to attract investments and drive innovation.²⁴

Industry-developed interference limits also will help foster innovation. Specifically, interference limits would preserve device manufacturers' and service providers' ability to evaluate receiver design trade-offs based upon market forces and technological considerations. And because these limits would be developed through industry expertise, limits would be established with an eye towards maximizing flexibility and driving innovation.

Moreover, reliance on industry-recommended interference limits would put Commission actions on a more solid legal footing. Although the *Spectrum Management Principles* correctly recognize the relevance of both transmitters and receivers in mitigating interference, there remains an open question as to how the Commission could implement principles related to receiver performance.²⁵ While the Communications Act of 1934, as amended, gives the Commission plenary authority over *transmitters* of radio frequency energy, it withholds from the Commission general authority to regulate *receivers*. Thus, the Commission must tread carefully in adopting rules based on the TAC's recommended principles through the adoption of receiver performance mandates – as opposed to relying on industry-recommended interference limits – its decision could be susceptible to challenge as outside the agency's jurisdiction.²⁶

These types of questions demonstrate that an industry-driven approach may have appeal over a wholly regulatory approach. Inter-industry agreements could effectively drive compliance

²⁴ *Id.* at 7 (“Maximizing predictability and reducing risk is particularly important to attracting investment in new and emerging technologies.”).

²⁵ *See Notice*, 32 FCC Rcd at 10161 (“Principle #4 – Receivers are responsible for mitigating interference outside their assigned channels” and “Principle #6 – Transmitters are responsible for minimizing the amount of their transmitted energy that appears outside their assigned frequencies and licensed areas.”).

²⁶ CTA 2013 TAC White Paper Comments at 9.

with interference limits and provide a streamlined non-regulatory process for any necessary updates to band-specific limits.²⁷ Although well intentioned, “regulations[s] often fail to keep up with ever-evolving technology,” but “[s]elf-regulation is nimble, and can be more easily updated to address changes in the marketplace and technology.”²⁸ Thus, not only would an industry-driven approach stand on more solid legal footing, it also would be more agile as technologies develop and evolve.

VI. CONCLUSION

CTA thanks the Commission for seeking comment on the TAC’s recommendations to address the increasing challenges of efficient and fair allocation of spectrum in congested RF environments. CTA urges the TAC to continue to refine its spectrum principles and recommendations while also considering how industry can help promote the efficient use of spectrum.

Respectfully submitted,

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²⁷ *Id.* at 11-12.

²⁸ *CTA IoT Paper* at 9.