

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

In the Matter of)
)
Office of Engineering And Technology) ET Docket No. 16-191
Announces Technological Advisory Council)
(TAC) Noise Floor Technical Inquiry)

COMMENTS OF CTIA

I. INTRODUCTION AND SUMMARY.

CTIA¹ submits these comments in response to the Commission’s Public Notice requesting input on the Technological Advisory Council’s (“TAC”) inquiry into the current state of the radio spectrum noise floor.² CTIA shares the TAC’s concern that the sky-rocketing number of man-made devices in the marketplace may have altered the noise floor, causing interference to licensed services. To that end, CTIA generally supports initiatives by the TAC to study the impact that the proliferation in device usage has had on the radio spectrum noise floor. New measurement data may help enhance the Commission’s ongoing efforts to detect and remove interfering devices, and thus may play a helpful role in the enforcement context. CTIA

¹ CTIA® represents the U.S. wireless communications industry. With members from wireless carriers and their suppliers to providers and manufacturers of wireless data services and products, the association brings together a dynamic group of companies that enable consumers to lead a 21st century connected life. CTIA members benefit from its vigorous advocacy at all levels of government for policies that foster the continued innovation, investment and economic impact of America’s competitive and world-leading mobile ecosystem. The association also coordinates the industry’s voluntary best practices and initiatives and convenes the industry’s leading wireless tradeshow. CTIA was founded in 1984 and is based in Washington, D.C.

² *Office of Engineering And Technology Announces Technological Advisory Council (TAC) Noise Floor Technical Inquiry*, Public Notice, DA 16-676, ET Docket No. 16-191 (rel. June 15, 2016) (“Public Notice”). Throughout these comments, the term “noise” refers to unwanted radiofrequency (“RF”) energy generated by man-made sources.

urges caution, however, that investigation of the noise floor should not lead to the erosion of licensees' rights to fully utilize their spectrum, nor be leveraged to support the introduction of unlicensed or underlay experiments in the Commercial Mobile Radio Service ("CMRS") spectrum. The Commission's well established exclusive, flexible use licensing policies have been essential in promoting investment and innovation in CMRS spectrum, cementing the United States' leadership role in the global wireless industry. The TAC's noise inquiry should not infringe upon this tested and successful framework.

II. CTIA GENERALLY SUPPORTS EFFORTS TO STUDY THE RADIO SPECTRUM NOISE FLOOR.

There has been exponential growth in man-made device usage over the past 20 years. As the transition to 5G services begins and the Internet of Things ("IoT") becomes a reality, device usage will only continue to expand. Indeed, the IoT ecosystem is already growing at a breathtaking pace, with projections estimating that there will be 200 billion IoT devices in circulation by 2020.³

As the TAC notes, the explosive growth in the number of man-made devices in the marketplace may have led to changes in the radio spectrum noise floor.⁴ Several different kinds of devices, including incidental radiators and unintentional radiators, may contribute to the noise floor by generating unwanted RF emissions. Incidental radiators, like electric motors, light

³ See Intel, Guide to the Internet of Things, <http://www.intel.com/content/www/us/en/internet-of-things/infographics/guide-to-iot.html> (explaining that there will be around 26 smart objects for every human being on Earth). See generally Comments of Qualcomm Incorporated, GN Docket No. 14-177, at 1-2 (Jan. 27, 2016) (envisioning a new 5G ecosystem characterized by a number of new devices "not presently imaginable"); Ericsson Mobility Report, at 10 (Nov. 2015), <https://www.ericsson.com/res/docs/2015/mobility-report/ericsson-mobility-report-nov-2015.pdf> (discussing the surge in consumer electronic devices).

⁴ Public Notice at 1.

dimmers, and power supplies, for example, are not designed to generate or emit RF energy, but do so as a result of their operation.⁵ Unintentional radiators, on the other hand, are designed to generate RF energy for internal use or send RF signals by conduction, but are not intended to emit RF energy. Examples of unintentional radiators include high efficiency lights, computers, and garage door receivers. Both incidental and unintentional radiators may emit unwanted RF energy. Indeed, with the number of these devices on the rise, the TAC suspects that the radio spectrum noise floor may be growing.⁶

Anecdotally, CTIA believes that the increase in device usage has caused interference to licensed, exclusive use spectrum.⁷ As CTIA has explained, any unwanted signals, such as those from incidental or unintentional radiators, can cause serious degradation to wireless services.⁸ Mobile systems typically balance, as a design matter, grade of service, capacity, and coverage.⁹ Each of these qualities is inextricably bound to the noise environment in which the system operates. To make the most efficient use of licensed spectrum, CMRS systems are designed to operate down to the noise floor.¹⁰ An increase in unwanted RF energy emissions could disrupt

⁵ *Id.*

⁶ *Id.*

⁷ *See* Comments of CTIA – The Wireless Association, ET Docket No. 13-101, at 3-4 (Jul. 22, 2013) (“CTIA TAC White Paper Comments”) (discussing the impact of deploying low-cost devices and low-quality receivers on licensed spectrum operators). *See generally* Comments of the National Association of Broadcasters, MB Docket No. 13-249, at 6 (Mar. 22, 2016) (noting that the “ever-increasing noise floor” is degrading AM signal quality).

⁸ *See* Comments of the Cellular Telecommunications & Internet Association, ET Docket No. 03-237, at 6 (Apr. 5, 2004) (“CTIA ITemp Comments”).

⁹ *Id.*

¹⁰ *Id.*

this carefully calibrated balance and degrade the service provided to consumers.¹¹ In short, CMRS coverage, capacity, and throughput may all suffer from an increase in the noise floor.¹²

As an initial matter, rises in the radio spectrum noise level typically result in a reduction in coverage available to consumers. For mobile carriers, the reliable coverage area is mathematically defined by the ambient noise floor, the immunity of the receiver, and the transmit power of a given cell site.¹³ Growth in the noise floor thus leads to a reduction in a carrier's reliable service area. If a cell site is at the outer boundary of a carrier's system, the interference may result in lost coverage. Meanwhile, customers traveling between cells may experience more dropped calls.¹⁴ Moreover, a local rise in the noise floor can reach a point where the required carrier-to-interferer ratio exceeds the design specifications for a mobile device operating at the fringes of a cell site's reliable service area.¹⁵ In such a case, consumers may experience diminished voice quality, slower data transmission, and decreased coverage.

¹¹ *Id.* Moreover, as AT&T has explained, although some new air interfaces may provide increased spectral efficiency, they are often more sensitive to interference than legacy systems. Increases in the noise floor may thus pose greater problems as carriers continue to upgrade their systems. Comments of AT&T Inc., ET Docket No. 10-237, at 10 (Feb. 28, 2011).

¹² CTIA ITemp Comments at 8; *see also* Sprint Corporation Reply Comments, ET Docket No. 03-237, at 8, n. 28 (May 5, 2004) (“[E]ven marginal increases in the noise floor directly result in significant losses in system capacity and/or coverage.”) (internal citation omitted).

¹³ CTIA ITemp Comments at 6.

¹⁴ *Id.* at 9.

¹⁵ *Id.* at 6; *see also id.* at 8-9 (noting that for a fixed base station transmit power, some areas at the edge of the reliable service area will no longer carry a signal that meets the design specification for the signal-to-noise ratio of a mobile unit).

Increases in noise also may reduce the quality of end users' call experiences.¹⁶ During voice calls, an increased noise floor may sound like background auditory noise. For digital data transmissions, the result may be lost data packets that require retransmission. Further, as CTIA has explained, operators cannot compensate for increases to the noise floor simply by raising the transmit power of their base stations.¹⁷ Typically, cellular systems incorporate a pattern of frequency re-use that is built upon a predicted level of base-station-to-base-station interference.¹⁸ When a base station's power is increased, the amount of noise the bases station itself emits increases, causing interference to other base stations re-using frequencies nearby. Accordingly, frequencies may only be re-used at greater distances, limiting the number of frequencies available at any site and reducing overall system capacity. Put simply, "[a]ny increase to the noise floor . . . could wreak havoc on the operations of mobile broadband networks."¹⁹

In light of the proliferation of device usage and the detrimental impact that increased noise may have on wireless systems, CTIA welcomes efforts to study potential changes in the noise floor. As the TAC has observed, there is "limited available quantitative data" with which to analyze the current radio spectrum noise floor.²⁰ CTIA thus supports the TAC's proposal to investigate the noise floor to determine whether there are problems associated with increased incidental and/or unintentional radiator usage. To the extent that the TAC uncovers such

¹⁶ *Id.* at 8-9.

¹⁷ *Id.*

¹⁸ *Id.* at 9.

¹⁹ Reply Comments of AT&T Inc., ET Docket No. 10-237, at 4 (Mar. 28, 2011).

²⁰ Public Notice at 1.

problems, CTIA believes that the TAC should focus its inquiry on identifying where the issue exists spectrally, spatially, and temporally.

III. ANY NOISE MEASUREMENT DATA COLLECTED BY THE TAC SHOULD BE CONFINED TO USE IN THE INTERFERENCE ENFORCEMENT CONTEXT.

While CTIA supports investigating the radio spectrum noise floor, it believes that the Commission should restrict the use of any data collected to the interference enforcement context. In particular, the Commission should not allow the results of the TAC noise study to be used to support the introduction of unlicensed or other underlays in licensed CMRS spectrum if, for example, some parties seek to claim that such underlays can be accommodated within the noise floor of these spectrum bands. As CTIA and others have explained, spectrum underlays would undermine innovation and deter carriers from making capital investments in their licensed spectrum, negatively impacting the quality, coverage, and capacity of today's services to consumers.²¹ Likewise, interference from opportunistic sharing by unlicensed users in licensed spectrum would decrease spectral efficiency and limit overall network capacity.²²

By contrast, the Commission's current exclusive, flexible-use licensing model for CMRS spectrum has been essential in cementing the success of the wireless industry.²³ It was on exclusively licensed spectrum that the wireless industry successfully migrated to digital mobile, evolved from 2G to 3G service, and achieved global leadership in 4G LTE deployment and

²¹ See Comments of CTIA – The Wireless Association®, ET Docket No. 10-237, at 11-12 (Feb. 28, 2011) (“CTIA Dynamic Spectrum Comments”)

²² See *id.*

²³ See Comments of CTIA, GN Docket No. 14-177, at 11-12 (Jan. 28, 2016) (lauding the benefits of exclusive, flexible use licensing frameworks).

adoption.²⁴ Importantly, exclusive, flexible-use licensing provides licensees with sufficient certainty to justify the tremendous investment required to build out mobile networks.²⁵ Further, the Commission's exclusive-use licensing framework in the CMRS bands has allowed licensees to focus on managing intra-system interference, which leads to greater efficiency.²⁶

The TAC's noise floor data may help bolster the Commission's efforts to ensure that licensed operations are protected from interference that degrades service quality and reliability. In particular, the TAC's noise measurement data may provide important guidance to help the Commission detect and remove interfering devices from the marketplace. Moreover, it could inform whether the Commission should undertake an effort to review its regulations that apply to incidental and unintentional radiators. The TAC's noise study, however, should not be used to interfere with the proven successes of the Commission's exclusive, flexible-use licensing paradigm. As CTIA and others have made clear, it is imperative that the Commission facilitate a robust enforcement framework that protects primary licensed operations from harmful interference.²⁷

IV. CONCLUSION.

CTIA applauds the TAC for its timely proposal to study the current characteristics of the radio spectrum noise floor. As the TAC notes, the number and nature of man-made devices in

²⁴ *Id.*

²⁵ *See id.* at 13; *see also Mobile Broadband Spectrum: A Vital Resource for the U.S. Economy*, THE BRATTLE GROUP, at 12 (May 11, 2015) (noting that exclusively-licensed spectrum has generated \$400 billion in economic activity each year).

²⁶ *See* CTIA TAC White Paper Comments at 3.

²⁷ *See, e.g.,* CTIA Dynamic Spectrum Comments at 16-17 (noting the importance of an efficient and effective interference enforcement regime).

the marketplace has changed considerably over the past 20 years, without a corresponding investigative analysis. Although CTIA supports efforts to study the noise floor, it believes that the data the TAC collects should be limited to use in the interference enforcement context. The Commission should not allow the noise floor data the TAC collects to be used as a vehicle for launching a referendum on the Commission's highly successful exclusive, flexible-use licensing regime.

Respectfully submitted,

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