Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Principles for Promoting Efficient Use of Spectrum and Opportunities for New Services	)	ET Docket No. 23-122
	)	
	)	
Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance	)	ET Docket No. 22-137
	)	

POLICY STATEMENT

Adopted: April 20, 2023 **Released: April 21, 2023**

By the Commission: Chairwoman Rosenworcel and Commissioner Simington issuing separate statements.

I. INTRODUCTION

1. Meeting the spectrum demands of tomorrow requires a framework to make efficient, effective, and equitable use of the airwaves today. As spectrum bands grow more congested, our networks continue to require greater bandwidth to support next-generation applications like robotics, artificial intelligence, precision farming, augmented reality, and cloud computing. To build the networks of the future, the Commission must periodically take a fresh look at its spectrum management principles to guide stakeholders and keep pace with the state of the art. We seize that opportunity with this Policy Statement.

2. To maximize spectrum access and promote coexistence among different services, the Commission has traditionally regulated transmitters and their operations. Our transmitter rules are designed to enable a multitude of diverse services in spectral proximity without the risk of undue impairment. Technological advances in receiver resiliency, however, can also unleash new services without unnecessarily restricting transmitters in neighboring bands. As such, the properties of receivers, and their immunity to out-of-band interference in particular, offer an increasingly promising pathway to manage spectrum needs in a balanced and comprehensive way.

3. To pave the way for the next generation of radiofrequency technologies, this Policy Statement provides guidance on how the Commission intends to manage spectrum efficiently and effectively going forward.[1] In establishing such guidance, we set forth core principles that will help

[1] This Policy Statement is intended to help guide Commission decision-making and stakeholder action as the RF environment evolves and does not constitute rules. Accordingly, this Policy Statement is not binding on the Commission or other parties, and it will not prevent the Commission from making a different decision in any matter that comes to its attention for resolution. This Policy Statement does not intend to prejudge considerations in any particular proceeding regarding receiver performance, including the nature of the particular services involved, the requirements for effective performance of receivers for their intended uses, and how to address legacy receivers or the costs associated with replacing legacy receivers with more interference-resilient receivers. Furthermore, this Policy Statement relates to the Commission's management of non-Federal spectrum; it does not address issues relating to Federal spectrum. This Policy Statement provides guidance primarily on spectrum-management considerations for spectrally proximate services. Although this Policy Statement does not directly address co-

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inform the Commission's future actions and stakeholder expectations about interference from spectrally and spatially proximate sources. These principles, described below, fall into three general categories. *First*, the realities of interference, drawn from basic physics, should guide the reasonable expectations of receivers and transmitters on how best to operate in an increasingly noisy radiofrequency (RF) environment. *Second*, in light of these foundational realities, both receivers and transmitters share responsibility to take prophylactic action to reduce the likelihood and impact of harmful interference. *Finally*, robust quantitative data—including information about transmitters and receivers—will be highly probative in how we analyze the RF environment and evaluate the merits of interference-related claims. Holistically considering the unique roles of transmitters and receivers will help us better introduce new services that operate in spectral proximity in an evolving RF environment.

4. In developing this guidance, we have considered a rich body of technical literature on improving spectrum management, including from the Commission's Technological Advisory Committee (TAC), other governmental entities, industry, public-interest organizations, and commenters in response to our April, 2022 *Notice of Inquiry* (*NOI*).[2] The principles we describe below draw, with modification, from the TAC's *Basic Principles for Assessing Compatibility of New Spectrum Allocations* (*TAC Basic Principles*),[3] a 2015 white paper that recommends a set of Commission principles to address the role of transmitter and receiver performance and to establish express expectations of incumbent services and new spectrum users.[4]

5. The following are the principles articulated in this Policy Statement, which will be discussed in more detail:

Interference Realities

- *Interference and harmful interference are affected by the characteristics of both the transmitting service(s) and nearby receiving service(s) in frequency, space, and/or time.*
- *The electromagnetic environment is highly variable, and zero risk of occasional service degradation or interruption cannot be guaranteed.*
- *Services should plan for the spectrum environment in which they intend to operate, the service they intend to provide, and the characteristics of spectrally and spatially proximate operations. Planning should be ongoing and account for changes in spectrum operating environments.*

Shared Responsibilities

- *Transmitters authorized for use in a given service should be designed to minimize the amount of their transmitted energy outside of the service's assigned frequencies and authorizations.*
- *Receivers authorized for use in a service should, as a general matter, be designed to mitigate*

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channel spectrum sharing, we note that many of the technical and policy principles could be applied in those situations as well.

[2] *Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance*, __ FCC Rcd __, paras. 1-3, 33-36 (2022) (*NOI*).

[3] *See* TAC Spectrum and Receiver Performance Working Group, Basic Principles for Assessing the Compatibility of New Spectrum Allocations (Dec. 15, 2015) (*TAC Basic Principles*), https://transition.fcc.gov/bureaus/oet/tac/tacdocs/meeting121015/Principles-White-Paper-Release-1.1.pdf. The Commission's Technological Advisory Council (TAC) provides technical advice to the Commission. It is organized under the authority of the Federal Advisory Committee Act, and is comprised of a diverse array of leading experts that helps the FCC identify important areas of innovation and develop informed technology policies supporting America's competitiveness and job creation in the global economy. *See* https://www.fcc.gov/general/technological-advisory-council.

[4] *TAC Basic Principles* at 3 (Executive Summary).

interference from emissions from outside of their service's assigned frequencies or channels.

- *Radio transmitter and receiver system operators and equipment manufacturers should plan for and design error tolerant systems, using good engineering practices, to mitigate degradation from interference.*

Data-Driven Regulatory Approaches to Promote Co-Existence

- *Relevant information about services' transmitter and receiver standards, guidelines, and operating characteristics is needed to promote effective spectrum management and efficient co-existence.*
- *Quantitative analyses of interactions between services that are fact- and evidence-based, sufficiently robust, transparent, and reproducible are needed to better inform spectrum management decision-making.*
- *The Commission will explore, in future rulemakings, interference limits policies in particular spectrum bands to promote effective co-existence.*

II. BACKGROUND

6. The demand for spectrum continues to grow dramatically. Spectrum is a critical—but finite—input for services and technologies that are used by a wide array of stakeholders. Releasing more spectrum for advanced radiofrequency services helps promote the public interest by unlocking educational and vocational opportunities, enhancing American leadership and security, spurring domestic innovation, and promoting economic growth. Accordingly, as the Commission continuously evaluates opportunities to identify new sources of licensed, unlicensed, and shared spectrum to satisfy this growing demand, it must find ways to promote more intensive use of spectrum while ensuring coexistence among both new and existing services.[5]

7. Spectrum management is one of the Commission's core functions.[6] Because "greenfield" spectrum—unutilized spectrum immediately ready for deployment—is particularly scarce, different services have found themselves increasingly packed in closer spectral proximity. In ensuring that different services may co-exist, the likelihood of out-of-band harmful interference has played an important role in our decisional calculus.

8. Among other factors, our spectrum decisions and rules have highlighted the relevance of receiver performance in promoting co-existence among services. In some cases, we have required receivers to meet resiliency and immunity benchmarks—such as sensitivity levels, adjacent channel rejection ratios, and intermodulation rejection ratios—as a condition of claiming protection from other services.[7] In others, we have mandated receiver performance—through specific immunity requirements,[8]

[5] *See, e.g.,* Aspen Digital / Aspen Institute, Toward a National Spectrum Strategy, at 15-19 (Sept. 2022) (*Aspen Institute Report*), https://www.aspeninstitute.org/publications/toward-a-national-spectrum-strategy/.

[6] The Communications Act vests in the Commission broad authority to manage non-Federal spectrum, adopt spectrum rules and policies, issue spectrum licenses, and prescribe the nature of wireless services to be rendered. *See, e.g.*, 47 U.S.C §§ 301, 302a, 303, 309. *See also* 47 U.S.C. § 303(e) (allowing the Commission to "regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus"); *id.* § 303(f) (directing the Commission to "[m]ake such regulations not inconsistent with law as it may deem necessary to prevent interference between stations and to carry out the provisions of this chapter"); *id.* § (giving the Commission general rulemaking authority); *id.* § 154(i) (providing authority "to perform any and all acts, make such rules and regulations, and issue such orders").

[7] *See* 47 CFR § 90.672(b) (806-824 MHz and 900 MHz narrowband); 47 CFR § 27.1221(c) (2496-2690 MHz).

[8] 47 CFR § 87.151(c), (d) (Part 87 Aviation Service); 47 CFR § 15.117(f) (digital television receivers).

filtered receiver systems,[9] and industry standards[10]—to maintain quality of service expectations in noisy RF environments.

9. In April 2022, we issued an *NOI* seeking comment on promoting more efficient spectrum use by expressly reorienting the Commission's spectrum management framework to a holistic inquiry that considers *both* the transmitter *and* receiver components of wireless systems.[11] The *NOI* also invited comment on whether the Commission should issue guidance, such as a policy statement, on the role of receivers and receiver performance in spectrum management.[12] To inform such a policy, the *NOI* identified a considerable body of technical reports, white papers, and studies recommending how the Commission might enable more efficient spectrum use among a heterogenous set of operators and users.[13] We also observed that non-U.S. regulators have considered both transmitter and receiver performance as part of an overall approach to effective spectrum management.[14]

10. The *NOI* sought particular comment on the *TAC Basic Principles*, which recommended a set of Commission principles on the role that transmitter and receiver performance might play in decisions that may affect spectrally and spatially proximate services. Many commenters supported a Commission policy statement or more explicit guidance on our spectrum management framework.[15]

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[9] *See* 47 CFR §§ 27.1411(b)(5), 27.1412, 27.1413 (3.7-3.98 GHz FSS earth stations).

[10] 47 CFR §§ 80.7(d)(8), (10), (12) (maritime services), 47 CFR § 95.2989 (personal radio services).

[11] *NOI*, __ FCC Rcd __, paras. 1-3, 33-36. The *NOI* sought comment on three general approaches, and some combination thereof: (1) industry-led voluntary guidelines or standards, (2) Commission policy guidance, and (3) receiver performance mandates. *Id.* at __, paras. 78-147.

[12] *NOI*, __ FCC Rcd at __, paras. 93-136. As noted in the *NOI*, the Commission previously has issued policy statements aimed at guiding public considerations and advancing spectrum management pursuits. *Id.* at __, para. 110; *see Principles for Reallocation of Spectrum to Encourage Development of Telecommunications Technologies for the New Millennium*, Policy Statement, 14 FCC Rcd 19868 (1999) (guiding principles on Commission's spectrum management approaches going forward); *Principles for Promoting the Efficient Use of Spectrum by Encouraging the Development of Secondary Markets*, Policy Statement, 15 FCC Rcd 24178 (2000) (same).

[13] *See generally id.* at __, paras. 25-31, 93-96. *See, e.g.*, *TAC Basic Principles*, Silicon Flatirons Roundtable, "Receivers, Interference, and Regulatory Options" (Feb. 20, 2013) (*Silicon Flatirons Report on Receivers*), at 5, found at https://siliconflatirons.org/publications/receivers-interference-and-regulatory-options-4/; Silicon Flatirons Summit Report, "Efficient Interference Management: Regulation, Receivers, and Right Enforcement" (Jan. 10, 2012) (*Silicon Flatirons Report on Efficient Interference Management*), https://siliconflatirons.org/publications/efficient-interference-management-regulation-receivers-and-right-enforcement-2/; Evan Kwerel and John Williams, *Forward-Looking Interference Regulation*, 9 J. on Telecomm. & High Tech. L. 516-18 (2011), http://jthtl.org/content/articles/V9I2/JTHTLv9i2_DeVries.PDF; *Commerce Spectrum Management Advisory Committee Interference and Dynamic Spectrum Access Subcommittee Final Report*, at 61-66 (Nov. 8, 2010), https://www.ntia.doc.gov/files/ntia/publications/csmac_interferencecommitteereport_01102011.pdf; GAO Report 13-265, *Spectrum Management – Further Consideration of Options to Improve Receiver Performance* (*GAO Report on Spectrum Management*), at 34-37 (Feb. 2013), https://www.gao.gov/products/gao-13-265; PCAST Report to the President, *Realizing the Full Potential of Government-held Spectrum to Spur Economic Growth* (2012) (*PCAST Report*), at 33-38, 107-21, https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf;

[14] *NOI*, __ FCC Rcd at __, paras. 32, 117 (discussing regulatory approaches of the International Telecommunication Union (ITU) Radio Regulations (ITU-RR), the European Union Radio Equipment Directive (EU-RED), the United Kingdom's Ofcom, and others).

[15] *See, e.g.*, AT&T Comments at 1-8 & Reply at 1-2; NCTA Comments at 6-13; Ericsson Comments at 12-13; Intel Comments at 3-8; Nokia Comments at 9-10; Public Knowledge Comments at 8; Qualcomm Comments at 4; Verizon Comments at 9-11; de Vries Reply at ii; ITIF Reply at 2-3; Enterprise Wireless Alliance Comments at 4 (supports policy pronouncements as backdrop to voluntary industry efforts). *See also* Aspen Digital / Aspen Institute, *Toward a National Spectrum Strategy*, at 16-17, 21-26 (September 2022) (*Aspen Institute Report*),

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III. POLICY PRINCIPLES

11. This Policy Statement provides guidance within the context of three general categories. The first set of principles describe the physical realities of interference that apply to transmitters and receivers in all spectrum-based services.[16] The second set outlines the Commission's expectations about the shared responsibilities of transmitter and receiver systems to co-exist with other services in spectrally proximate bands. And the third highlights the importance of reliable data in the Commission's technical analysis of spectrum issues, including data about transmitters and receivers. These general categories and specific principles draw from the *TAC Basic Principles,*[17] which we find a suitable starting point because they represent the consensus thinking of the Commission's own expert advisory committee and are widely supported in the record in response to our *NOI*.

A. Interference Realities

12. *Interference and harmful interference are affected by the characteristics of both the transmitting service(s) and nearby receiving service(s) in frequency, space, and/or time.* While the types and sources of interference are myriad and complex, interference is at a minimum a function of transmitter and receiver characteristics.[18] Transmitters emit energy that can cause interference, and receivers can experience interference by processing such energy. For example, interference can be driven by a receiver's choice of protocol for interference immunity performance—that is, the receiver's ability to attenuate noise, unwanted emissions, and undesired signals.[19] Other factors can include the distance between the transmitter and receiver, the physical environment, relative antenna orientation, and the RF environment.[20]

13. Users and operators of both transmitters and receivers should recognize that interference is not solely a function of transmitter emissions. As one example, Commission rules may specify maximum power level and maximum unwanted emissions outside the authorized band. The range between a transmitter's fundamental power level and its unwanted out-of-band emissions is controlled to

(Continued from previous page) https://www.aspeninstitute.org/publications/toward-a-national-spectrum-strategy/ (calling for the Commission to provide guidance that considers receivers); 5G Americas, *Radio Frequency Receiver Performance* (February 2023) (*5G Americas Report*), found at https://www.5gamericas.org/wireless-receiver-performance/ (similar).

[16] In this Policy Statement, we use the term "service" broadly to include services and other authorized operations, including unlicensed device operations, that are authorized by the Commission. The Commission authorizes a variety of services (e.g., mobile and fixed terrestrial, satellite, commercial wireless, public safety, aviation, radionavigation, broadcast). The Commission also authorizes "unlicensed" operations under its Part 15 rules, although these operations are not technically "services" under our rules; unlicensed operations must adhere to strict technical and operational conditions, are not permitted to cause harmful interference to other authorized services and operations, and must accept interference from those other operations. 47 CFR § 15.5(c).

[17] *See TAC Basic Principles* at 1-2; *see generally id.*

[18] Interference sources include transmitters, components and processes within receivers, the environment, as well as non-linearities creating harmonics and intermodulation. *See generally TAC Basic Principles*. Undesired signals, unwanted emissions, and noise within a receiver may be caused by factors such as unwanted unintentional RF emissions from a nearby transmitter, receiver overload due to the receiver's inability to block (i.e., tune or cancel out) a nearby undesired transmitter's signal, environmental noise sources external to both the transmitter and receiver, and noise from components and interactions within the receiver.

[19] In this Policy Statement we generally use terms such as "emissions," "unwanted emissions," "interference," and "harmful interference" as they are defined in our regulations and are applied in our decisions. *See* 47 CFR § 2.1. Consistent with our rules, we use the term "undesired signals" in this Policy Statement to refer generally to intentional emissions that are undesired by a specific receiver, in contrast to the desired intentional emission(s) for that receiver. *See, e.g.*, 47 CFR §§ 22.970 (a)(1)(ii)(B), 90.672(a)(1)(ii)(B), 73.213 (a)(1), 73.827 (a)(1), 74.1203 (a)(3)(v), 15.118 (c)(2).

[20] *See generally TAC Basic Principles* at 7-13.

a large extent by the design of the transmitter system and establishes a reference power range of what receivers may need to tolerate. At the same time, the receiver system's design controls how it internally processes the range of in-band and out-of-band RF power/energy.[21] As another example, the strength of a potentially interfering signal directed at a receiver can be affected by the location and antenna orientation of the two systems. Energy that otherwise causes harmful interference may not have an adverse effect if the receiver attenuates or mitigates potential interference by incorporating filters, error correction, signal processing, or other measures. In either case, whether unwanted emissions or undesired signals constitute "harmful interference" will depend on the specific characteristics of the transmitter and receiver.

14. Accordingly, receiver characteristics, especially the dynamic range of desired and undesired power over which receivers are designed to operate, can be as important as transmitter characteristics in enabling efficient spectrum use and co-existence among different services.

15. *The electromagnetic environment is highly variable, and zero risk of occasional service degradation or interruption cannot be guaranteed*. RF energy is ubiquitous, whether caused by RF device emissions or natural noise sources. Even in the absence of human activity, numerous environmental RF factors can contribute to interference, including: atmospheric refraction, scattering fluctuations, thermal noise, precipitation and rain fade, terrain variation and ground reflection losses, propagation losses from multipath and reflection, propagation delay, rapid and slow signal variations, electromagnetic polarization change, and signal intermodulation.

16. The RF environment is also highly variable. Variations can be individually modeled to design transmitter and receiver systems that achieve a specified performance, based on the overall effect of an assumed RF environment. Spectrum users do, and should, consider the state of the art to mitigate potential harmful interference in an increasingly noisy and variable RF environment. For example, technological advances such as dynamic antenna directional beam steering and RF filter technology are intended to improve performance, notwithstanding fluctuations in the RF environment.

17. The likelihood of harmful interference should be assessed under a range of operating conditions, but not on an expectation of 100% service availability, or in contemplation of exceptional events. The level of interference protection afforded to particular services under the Commission's rules may vary, and some may require higher levels of service reliability than others.[22] A uniform or absolute expectation of service availability could preclude the introduction of valuable new services in the RF environment and undermine the efficient use of spectrum resources. The Commission routinely evaluates probable, real-world effects instead of worst-case hypotheses.[23] Given the complex interplay of radio

[21] There are exceptions to these general statements about transmitters and receivers, such as, the potential for intermodulation signals (new signals produced at different frequencies than the desired signals to be received) which can result from signals present in the environment independent of those produced by either transmitters or receivers. Non-linearities, harmonics, and intermodulation signals can also be produced within a transmitter or receiver. While the Commission will consider these exceptions as appropriate in future proceedings, they do not affect our underlying Policy Statement.

[22] *See NOI*, __ FCC Rcd at __, paras. 52-58 (discussing the differences in receiver performance and reliability requirements that apply to public safety, satellite, radionavigation, and other services). Several commenters emphasized that the Commission must in its spectrum management recognize that different types of services – including public safety, aviation, satellite, and passive scientific services – have particular mission or reliability needs that differ from others. *See, e.g.*, Boeing Comments at 6-11 (aviation); Deere Comments at 2-4 (GPS); GPS Innovation Alliance Comments at 1-4 (GPS); Lockheed Martin Comments at 3-8 (aviation GPS, satellite, radars); Motorola Solutions Comments at 4 (public safety); NPSTC Comments at 5, 13 (public safety); National Academy of Sciences CORF Comments at 2-4 (radioastronomy); Inmarsat Reply at 2 (satellite); *see also* Utilities Technology Council et al. *Ex Parte* (filed Apr. 13, 2023) (critical infrastructure services). *See also TAC Basic Principles* at 12-13 (discussing service outages and noting the varying service needs/requirements, such as the higher reliability needs of public safety compared to cellular services).

[23] *See, e.g.*, *In the Matter of Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, 35 FCC Rcd 3852 (2020) (recognizing the importance of service rules based on sound

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service operations, completely eliminating interference is often unrealistic and unachievable. We encourage spectrum users to plan accordingly as they design and implement systems to ensure that they operate under expected, or even exceptional, conditions, in a changing RF environment.

18. *Services should plan for the spectrum environment in which they intend to operate, the service they intend to provide, and the characteristics of spectrally and spatially proximate operations. Planning should be ongoing and account for changes in spectrum operating environments*. Because spectrum use has become more intensive, the Commission will expect service operators and equipment manufacturers to plan not only for interference in the current RF environment, but also for an RF environment that can reasonably be expected to change. As one example of a factor that the Commission may take into account going forward, the ITU Radio Regulations note that transmitters and receivers should be designed to account for the technical characteristics of transmitter and receiver equipment likely to be employed in spectrally proximate bands.[24]

19. Operators and users of spectrum should understand that the Commission will continue to evaluate how best to introduce new services in spectrally proximate bands. In these proceedings, the Commission intends to consider the immunity of receivers and their ability to reject undesired and unwanted signals.[25] With the introduction of new services in spectral proximity, accounting for reasonably foreseeable changes to the RF environment remains critical.[26]

B. Shared Responsibilities

20. Operators, users, and equipment manufacturers are expected to consider how to accommodate a changing RF environment as services are deployed more closely in spectral distance. The Commission intends to be proactive in supporting "good neighbor" policies that promote more efficient and effective co-existence among spectrum users. Depending on the specific circumstances, we may consider whether spectrum users should be expected to make improvements to transmitters and receivers over time to mitigate the potential for harmful interference from spectrally proximate services.

21. Many receivers in operation today were built to perform in a static RF environment. They may not be designed to withstand potential interruption or degradation from changes in the current RF environment. Furthermore, operators or users of such receivers may not be proactive in replacing or updating their equipment to improve resiliency.

22. Going forward, the Commission intends to consider the respective responsibilities of transmitting and receiving services. We note broad support for an approach focusing on shared

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engineering principles and reliable technical data rather than exceptional cases, and focusing on the likelihood and severity of harmful interference based on realistic deployment models), *affirmed AT&T v. FCC*, No. 20-1190 (D.C. Cir. 2021) (*6 GHz Order*).

[24] ITU Radio Regulations (ITU-RR) 3.3 ("Transmitting and receiving equipment intended to be used in a given part of the frequency spectrum should be designed to take into account the technical characteristics of transmitting and receiving equipment likely to be employed in neighbouring and other parts of the spectrum, provided that all technically and economically justifiable measures have been taken to reduce the level of unwanted emissions from the latter transmitting equipment and to reduce the susceptibility to interference of the latter receiving equipment.").

[25] *NOI*, __ FCC Rcd at __, paras. 17-18.

[26] *See, e.g.*, *TAC Basic Principles* at 8-9; *Silicon Flatirons Report on Efficient Interference Management* at 8-11; AT&T Comments at 5-6; CTA Comments at 14-15; Intel Comments at 5; ITIF Reply at 5. *See also* Ofcom, "Supporting the UK's wireless future – Our spectrum management strategy for the 2020s" (Ofcom Report on Spectrum Management) at 23 (section 3.58) (encouraging spectrum neighbors to be "good neighbours" [sic] by, among other things, adopting and promoting approaches in which wireless systems are more resilient to interference from their neighbours, and encourage spectrum users to recognize the benefits of planning for an evolving radio environment in which they operate), found at https://www.ofcom.org.uk/__data/assets/pdf_file/0017/222173/spectrum-strategy-statement.pdf.

responsibilities. The TAC recommends greater clarity about the shared responsibilities of receivers and transmitters to address interference concerns, which will enable better spectrum management. So do commenters in response to the *NOI*. The ITU, the European Union, and Ofcom, for their part, have recognized the shared responsibilities of transmitters and receivers to support efficient spectrum use.[27]

23. *Transmitters authorized for use in a given service should be designed to minimize the amount of their transmitted energy outside of the service's assigned frequencies and authorizations*. We reaffirm our long-standing approach that transmitters associated with a service should be designed to minimize unwanted emission outside of the service's authorized frequencies. The TAC and commenters also emphasize the need for transmitters to minimize the amount of out-of-band emissions to the greatest extent practical.[28] The ITU Radio Regulations and the EU RED also emphasize that transmitters should, as far as practical, be based on the most recent technological advances.[29]

24. The Commission regulates transmitter emissions throughout its service rules. Transmitters must meet specified performance and operational parameters, which typically limit emissions outside of the authorized service band.[30] These service rules often have been the primary means by which the Commission protects spectrally and spatially proximate operations from harmful interference.[31] The Commission plans to continue with this approach, and going forward we also expect to consider whether transmitters can include design features that provide additional ways to minimize the potential to cause harmful interference. Further, as transmitter technologies improve with respect to interference mitigation, we encourage service providers to deploy improved transmitters to the extent practical.

25. Based on our experience, we expect further generational improvements in transmitter technologies. We also anticipate developments, such as cost reductions, performance improvements, and new industry-led standards, that will make deployment of advanced transmitters more feasible. We will consider whether improved transmitters should be deployed in certain bands. As one example, we

[27] *See, e.g.*, ITU-RR 3.3 (discussed above); EU RED Article 3.2 ("Radio Equipment shall be so constructed that it both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference."); *EU Radio Equipment Directive 2014/53/EU* at L 153/63, No. 10 ("In order to ensure that radio equipment uses the spectrum efficiently and supports the efficient use of radio spectrum, radio equipment should be constructed so that, in the case of a transmitter, … it generates radio wave emissions that so not create harmful interference, while unwanted radio waves emissions generated by the transmitter (e.g., in adjacent channels) … should be limited to such a level that, according to the state of art, harmful interference is avoided; and, in the case of receivers, it has a level of performance that allows it to operate as intended and protects it against the risk of harmful interference, in particular from shared or adjacent channels, and, in so doing, supports improvements in the efficient use of shared or adjacent channels"); Ofcom Report on Spectrum Management at 24 (sections 3.66-3.69) (encouraging spectrum users to be more resilient to interference).

[28] *See, e.g., TAC Basic Principles* at 17-18; Intel Comments at 8.

[29] *See* ITU RR 3.2 ("as far as compatible with practical considerations, the choice of transmitting, receiving, and measuring equipment shall be based on the most recent advances"); ITU RR 3.3 (discussed above); EU RED Article 3.2 (discussed above).

[30] While transmitters are designed to emit RF energy in the channels and/or frequency band(s) in which the associated service is authorized, a design artifact of practical filters results in some energy outside of those channels or frequencies. These out-of-channel or out-of-band emissions are called unwanted emissions (i.e., spurious and out-of-band emissions) and such unwanted emissions can cause undesired interference to adjacent or nearby users, including potentially harmful interference to receivers.

[31] *See, e.g.*, *NOI*, __ FCC Rcd at __, para. 60.

anticipate examining whether a transmitter can reduce unwanted emissions without degrading quality of service. Such technologies may facilitate more tailored limits for allowable emissions.[32]

26. *Receivers authorized for use in a service should, as a general matter, be designed to mitigate interference from emissions from outside of their service's assigned frequencies or channels*. Although we have adopted receiver standards,[33] we generally do not require receivers to meet specific design or performance criteria. As a result, some receivers may be designed only to operate in the then-extant RF environment. These legacy receivers in deployment do not reflect the state of the art and may be vulnerable to spectrally proximate sources of undesired emissions. Given the variability in receiver vulnerability, some receivers in use may be more robust than others to changes in the RF environment.

27. Receivers' insufficient robustness to new sources of spectrally proximate emissions has complicated recent Commission efforts to introduce beneficial new services.[34] Commenters recommend Commission guidance to promote efficient spectrum use by clarifying the need for receiver interference immunity to new sources of spectrally proximate emissions,[35] and the level of interference protection that will be afforded as technology and the RF environment evolves.[36]

28. Operators and users should not assume that receivers designed for their original RF environment will remain categorically protected in the future as the Commission endeavors to authorize important new services. It is not the policy of the Commission to always provide interference protection to the worst (*i.e.*, least selective) performing receivers, particularly when it is technically feasible and practical, over an appropriate amount of time, for receivers to perform their required functions with significantly more interference immunity.[37] Indeed, the ITU and EU RED also emphasize that receivers should, as far as practical, be based on the most recent technological advances.[38]

29. Accordingly, we encourage stakeholders to design receivers that not only meet their services' needs, but also mitigate the impacts from undesired signals outside of their services' assigned

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[32] For example, these types of emission limits could include: tighter out-of-band emission limits (frequency); antenna elevation angle emission masks for terrestrial service transmitters to protect aeronautical and space-based receivers (spatial); and scheduling emissions at times that will not interfere with reception times of receivers (temporal).

[33] *See supra* note 8; *NOI*, __ FCC Rcd at __, paras. 7-16.

[34] *See NOI,* __ FCC Rcd at __, para. 18.

[35] *See, e.g.*, *TAC Basic Principles* at 14 ("Receivers are responsible for mitigating interference outside their assigned channels."); AT&T Comments at 3-4 (receivers are responsible for mitigation of interference outside their assigned channels, and radio systems should only use the spectrum they are authorized); Intel Comments at 7 (receivers should be designed, selected, and operated in a manner that takes into account harmful interference from outside the authorized frequencies); NCTA Comments at 7-8; Public Knowledge Comments at 5-8; Verizon Comments at 9-10.

[36] *See, e.g.,* Kwerel and Williams, 9 J. on Telecomm. & High Tech. L. at 516-18; AT&T Reply at 6 (receiver users cannot treat the use of spectrum outside their authorized band as a public right, and should continuously review the evolution of radio use and reevaluate receiver performance in light of these changes); Nokia Comments at 2 (incumbent protection based on previous assumptions (or lack of assumptions) should not be perpetual); Verizon Comments at 10.

[37] *See, e.g.*, *Expanding the Economic Innovation Opportunities of Spectrum Through Incentive Auctions*, GN Docket No. 12-268, Second Report and Order and Further Notice of Proposed Rulemaking, 29 FCC Rcd 13071 (2014) at 13088-89, 13093-96, paras. 34-35, 42-47 (inference protection not afforded to one type of receiver that has not as interference-immune as other types of receivers).

[38] *See, e.g.*, ITU RR 3.3 (discussed above); ITU RR 3.13 (among other things, the performance characteristics of receivers "should be adequate to ensure that they do not suffer from interference due to transmitters situated at a reasonable distance"); *EU Radio Equipment Directive 2014/53/EU* at L 153/63, No. 10 (discussed above); EU RED Article 3.2 (discussed above); CEPT/Electronic Communications Committee (ECC) Report 310 at 16 (§3.5), found at https://docdb.cept.org/document/13606.

frequencies. Further, as new receiver technologies are developed with improved interference immunity, and as legacy equipment is being replaced over time, we encourage service providers periodically to deploy receivers that reflect the latest technical improvements.

30. The Commission will in future proceedings examine the manner in which receivers are being deployed, operated, and maintained. Such examination could include whether receivers are, or should be, designed with due consideration of a changing RF environment from spectrally proximate emissions. In considering whether and when we must protect receivers from out-of-band emissions, we anticipate that improved receiver interference immunity performance will play a key role.

31. Going forward, we plan to examine a number of factors relating to the foregoing questions, including but not limited to: (a) whether receivers in an authorized service are sufficiently designed to mitigate undesired signals from outside of their service's assigned frequencies, irrespective of location; (b) the extent to which receivers can self-protect by minimizing performance degradation and employing filters with sufficient selectivity to withstand a range of undesired signal strength and unwanted emissions from spectrally proximate services; (c) the state of the art in receivers deployment and the passage of time since relevant equipment was last upgraded; (d) the scope and scale of legacy receivers in active operation; and (e) the practicality and feasibility of upgrading to receivers that better withstand changes to the RF environment.

32. Examining these and other factors will help ensure that future receivers can accommodate the introduction of new services in spectrally proximate bands. Our approach will include review of the prospect for development of receivers that have improved interference immunity, including industry-led efforts to promote greater resilience that enables effective co-existence. We believe that adopting these general, forward-looking considerations with respect to receivers will advance our overall goal of promoting more efficient and effective spectrum use. Any future decisions will consider receiver performance based on the facts and circumstances of each individual proceeding.

33. *Radio transmitter and receiver system operators and equipment manufacturers should plan for and design error tolerant systems, using good engineering practices, to mitigate degradation from interference*. The TAC, several reports and studies, and commenters have emphasized the importance of good engineering practices concerning equipment and systems to promote more effective and efficient co-existence among spectrum users.[39]

34. A range of engineering and design techniques are presently available to help satisfy the performance and reliability expectations of receiver equipment. They include analog and digital filtering, antenna design, adaptive modulation and coding techniques with error correction, dynamic frequency selection, automatic gain control, intermodulation rejection, and countless other methods to accommodate a highly variable and complex spectrum environment. Implementation margins of various types[40] may be employed to ensure minimal degradation to a receiver's desired signal in relation to unwanted emissions and undesired signals to reduce interference risk. Margins are important to accommodate and balance the variable and statistical nature of interference protection.

35. As a matter of general practice, the Commission does not dictate or mandate the use of specific techniques, nor does it design radio systems or specify how device manufacturers should develop

[39] *See, e.g.*, *TAC Basic Principles* at 15-17 (realities of current and future spectrum use prescribe the need for a robust radio system, including the incorporation of practical mitigation techniques into the radio system that would be considered good engineering practice); AT&T Comments at 9; Qualcomm Comments at 9-10 (FCC should require good engineering practices for receiver designs); NCTA Reply at 5. *See also* ITU RR 3.2 (as far as compatible with practical considerations, the choice of transmitting, receiving, and measuring equipment shall be based on the most recent advances in the technique as indicated).

[40] These may include implementation margins for component manufacturing variation, thermal environmental variation, fading margins for RF environment variations, body loss, polarization mismatch, antenna gain variations, etc.

their equipment. However, the Commission does consider the upper and lower bounds of RF power levels over which transmitters and receivers are expected to operate. We consider practical and realizable ranges of both desired and undesired RF signal output and input power when establishing our technical service rules. The Commission also will look for system operators to employ good engineering techniques and best practices where such techniques would facilitate better service reliability to its users.

C. Data-Driven Regulatory Approaches to Promote Co-Existence

36. Sufficient technical information on current and proposed systems, including robust interference analyses and receiver and transmitter performance, will be expected from stakeholders to help the Commission discharge its spectrum management functions more effectively. In addition, the Commission intends to further explore flexible regulatory approaches, such as interference limits.

37. *Relevant information about services' transmitter and receiver standards, guidelines, and operating characteristics is needed to promote effective spectrum management and efficient co-existence*. As the Commission seeks to introduce new services, relevant information about current and proposed systems—including transmitters, receivers, and their respective characteristics—is essential. Recent Commission proceedings also underscore the importance of this kind of information to evaluate the RF environment and make decisions about the manner in which new services can be introduced successfully.[41] The TAC, numerous reports and studies, and commenters also agree that this information is important to promote effective spectrum management.[42] In some situations, however, this level of detail has not been made available.[43]

38. Going forward, the Commission will consider whether to require disclosure of relevant information on transmitter, receiver, and system characteristics associated with particular services. In some cases, such disclosure may enable the Commission to more effectively perform its responsibilities, evaluate potential harmful interference concerns, and optimize effective and efficient outcomes in its decision-making. Determining compatibility requires that the Commission have sufficient relevant information about the various potentially affected transmitters and receivers, as well as systems communication parameters. Only then can the Commission consider the full range of possible solutions, such as how legacy receivers should be addressed.

39. The Commission anticipates that sufficiently detailed information that would inform robust analyses about potential harmful interference concerns would be needed.[44] With respect to

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[41] *See supra* notes 7-11 *NOI*, __ FCC Rcd at __, para. 18.

[42] *See, e.g.*, *TAC Basic Principles* at 18 (determination of compatibility requires information about the transmitters and receivers, as well as systems communication parameters; recommends that services under FCC jurisdiction be expected to disclose the relevant standards, guidelines and operating characteristics of their systems to the Commission if they expect protection from harmful interference); AT&T Comments at 10-12; 5G Americas Comments at 3 (detailed parameters on how both transmitting and receiving systems operate must be understood in order for improvements in spectrum efficiency); CTA Comments at 15; Ericsson Comments at 13; Virginia Tech Comments at 4-5; Monisha Ghosh Comments at 4 (imperative that characteristics of systems be disclosed fully to the Commission); Verizon Comments at 10-11. *See also Aspen Institute Report* at 38 (any party requesting receiver protection must have disclosed their receiver characteristics in a publicly accessible Commission database); *5G Americas Report* at 14; CEPT/ECC Report 310 at 15-16. *Cf.* NTIA Comments at 3-4 (NTIA gathers receiver characteristics information in its certification process); RTCA Comments at 3 (RCTA plans to catalog all existing receiver performance requirements).

[43] *See, e.g.*, *Silicon Flatirons Report on Efficient Interference Management* at 8-9; *Silicon Flatirons Report on Receivers* at 5-6; *GAO Report on Spectrum Management* at 27; ITIF Reply at 7; *cf.* Bykowsky/Sharkey Reply at 1-2, 6-7 (Commission should pursue a solution to promotes disclosure of requisite information so that radio system operators and receiver manufacturers can develop market solutions).

[44] *NOI*, __ FCC Rcd at __, para. 68 (noting that disclosure of proprietary, classified, or confidential information would be addressed in particular spectrum proceedings).

transmitters, relevant information could include information on the spectrum mask, emission type, power level, the range of antenna height above average terrain, anticipated antenna gain, antenna pattern, antenna direction, service coverage area, etc. For receivers, relevant information could include details concerning the filter masks and blocking dynamic range to limit out-of-band signals carried through the receiver chain, interference resiliency, receiver selectivity, intermodulation rejection, noise figure/factor, and signal-to-interference-noise (SINR) requirements,[45] as well as the extent of variation among receivers or receiver classes, and other information on legacy receivers that would enable an informed consideration of harmful interference concerns.[46]

40. Disclosing such information also would help inform and incentivize industry-led initiatives. The Commission supports voluntary industry efforts to promote more efficient use of spectrum. We believe that a combination of approaches—a policy statement and voluntary industry-led efforts—represent be the best means to promoting our spectrum management goals.[47]

41. *Quantitative analyses of interactions between services that are fact- and evidence-based, sufficiently robust, transparent, and reproducible are needed to better inform spectrum management decision-making*. The Commission expects proponents of a harmful interference claim to supply sufficiently complete, transparent, and reproducible quantitative analytical models of the interactions between radio services, with respect to transmitter and receiver performance characteristics and the RF environment. Stakeholders that supply such evidence are more likely to present a compelling case than those that do not. These expectations, particularly in complex proceedings, will better enable the Commission and stakeholders to make evidence-based determinations about spectrum management.[48]

42. Transparent and reproducible quantitative analyses best inform the Commission's decision-making. Transparency—particularly about transmitters, receivers, and degradation metrics—gives stakeholders and the Commission the ability to validate the fidelity of interference models and ensure that they represent realistic operating conditions and scenarios, with balanced protection criteria.

43. The most useful comprehensive quantitative analyses provide information on more than just a narrow set of receivers or transmitters without regard to whether they are fairly representative of deployed and operational radio equipment, or only some undisclosed subset of them. Underlying assumptions should be transparent and should not disregard inherent variations in the RF environment or typical conditions. Furthermore, while lab measurements (e.g., for certifying compliance with equipment authorization rules) may be germane, they may not always capture the real-world operations or conditions of deployed systems. For a comprehensive analysis of equipment, measurements taken at appropriate sensitivity levels to depict actual performance will better inform Commission decision-making.

44. The Commission will encourage, if necessary, cross-industry information sharing and collaboration. While fundamental radio physics is common across many radio services, Commission

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[45] *NOI*, __ FCC Rcd at __, para. 67 (seeking comment on receiver characteristics that would be relevant if the Commission were to require that information on receiver characteristics be made available). CEPT/ECC Report 310 defined receiver characteristics as: receiver noise floor, sensitivity, linearity, dynamic range, protection ratio, selectivity (including adjacent channel selectivity), blocking and overloading (including intermodulation rejection), and spurious response rejection. CEPT/ECC Report 310 at 17-34.

[46] *See NOI*, __ FCC Rcd at __, paras. 59-70; *see id.* at __, paras. 115-16 (seeking comment on the TAC proposal to require disclosure of relevant standards, guidelines, and operating characteristics of systems); *TAC Basic Principles* at 18-19 (describing what might constitute relevant information).

[47] *NOI*, __ FCC Rcd at __, para. 79.

[48] *See, e.g.*, *TAC Basic Principles* at 23-26; AT&T Comments at 10-12. *See Aspen Institute Report* at 26 ("[g]ood policy requires a transparent, collaborative, and trust-based decision-making process based on science, engineering, [and] economics"); *5G Americas Report* at 13-15.

guidance may be needed to align cross-industry engineering analyses where terminology, methods, metrics and norms may be different, and conflicts of interest may inhibit information sharing. Where necessary, confidential data may be shared with the Commission under protective order, which can protect the confidentiality of stakeholder proprietary information while allowing data analysis results to be disclosed at granular categorical levels of transmitter output and receiver input power levels. Analytical models should be reproducible so that the conditions and results of such models can be validated by multiple diverse stakeholders. Disclosing receiver and transmitter performance parameters (such as spectrum masks and input power limits at which receiver degradation metric(s) are satisfied) can be important to develop a clear understanding of the range of RF power tolerances and the performance of different categories of transmitters and receivers.

45. *The Commission will explore, in future rulemakings, interference limits policies in particular spectrum bands to promote effective co-existence*. To advance our spectrum management goal of promoting co-existence among services, the Commission will explore whether to apply interference limits policies to quantify a service's interference-related rights with regard to the transmitter and receiver operations when different services operate in close proximity.

46. An interference limits approach could better help evaluate tradeoffs between receiver and transmitter performance among spectrum users, without receiver performance mandates.[49] We sought comment in particular on various considerations of an interference limits approach,[50] with many commenters supporting further examination[51] and others raising concerns in certain situations.[52]

47. We intend to explore applying interference limits approaches in future proceedings. As we examine possible models for interference limits, the following factors, among others, will be relevant: (a) the particular bands and services at issue; (b) proceeding-specific technical considerations; and (c) the rights and protections that might attach to incumbents and new entrants.

IV. CONCLUSION

48. With this Policy Statement, we restate and update our framework for a balanced spectrum management approach that comprehensively evaluates both transmitter and receiver performance. This framework is intended to help guide Commission decision-making and stakeholder action as the RF environment evolves. We are confident that refreshing our spectrum management policies for the state of the art will advance the efficient and effective use of our nation's spectrum,

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[49] *See NOI*, __ FCC Rcd at __, paras. 119-21. In seeking comment, we discussed the TAC's White Papers on interference limits and the harm claim thresholds approach; we noted that the "harm claim threshold" approach represented a particular form of an interference limits approach. *Id. See generally* TAC Receivers and Spectrum Working Group, "Interference Limits Policy – The use of harm claim thresholds to improve the interference tolerance of wireless systems," (Feb. 6, 2013) (*White Paper on Interference Limits Policy*), found at https://transition.fcc.gov/bureaus/oet/tac/tacdocs/WhitePaperTACInterferenceLimitsv1.0.pdf; TAC Spectrum / Receiver Performance Working Group, "Interference Limits Policy and Harm Claim Thresholds: An Introduction" (Mar. 5, 2014) (*White Paper on Harm Claim Thresholds*), found at https://transition.fcc.gov/bureaus/oet/tac/tacdocs/meeting61014/InterferenceResolution-Enforcement-Radio-Noise-White-Paper.pdf.

[50] *See id.* at __, paras. 122-36; *see generally* TAC *White Paper on Interference Limits Policy*; TAC *White Paper on Harm Claim Thresholds.*

[51] *See, e.g.*, AT&T Comments at 8 (supporting exploration of approach); Nokia Comments at 9 (approach holds promise but poses challenges); Verizon Comments at 11 (approach holds promise and needs further study); de Vries Comments at 50 (supports use of harm claim thresholds approach); Ericsson Comments at 14 (approach holds promise and further study is warranted); ITIF Reply at 5-6. *See also PCAST Report* at 33 (supporting consideration of a harm claim thresholds approach); *5G Americas Report* at 16-17.

[52] *See, e.g.*, Garmin Comments at 9 (particular concerns about applying the approach with respect to navigation services such as GPS); Lockheed Martin Comments at 5 (same).

promote co-existence among services, and facilitate the development and rapid deployment of new technologies, products, and services for the benefit of the public.

FEDERAL COMMUNICATIONS COMMISSION

Marlene H. Dortch
Secretary

STATEMENT OF
CHAIRWOMAN JESSICA ROSENWORCEL

Re: *Principles for Promoting Efficient Use of Spectrum and Opportunities for New Services,* ET Docket No. 23-122; *Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance*, ET Docket No. 22-137, Policy Statement
(April 20, 2023)

Wireless spectrum is a scarce resource. But when we put this limited resource to creative use, we can expand communications for all, foster innovation, and support our economic and national security. Our history is full of examples of us doing just that. It's why in the United States our spectrum policies have long led the wireless world. After all, it was nearly three decades ago that the Federal Communications Commission took the academic ideas of Ronald Coase and ushered in a whole new era of spectrum auctions. We also pioneered the use of unlicensed spectrum—the airwaves we now know and use every day as Wi-Fi. More recently, we blazed a trail for two-sided incentive auctions and dynamic spectrum sharing. With each of these efforts, we took spectrum scarcity and turned it into abundance.

We need to do it again.

Today, more of our civic and commercial life relies on wireless technologies than ever before. Commercial spectrum bands are increasingly crowded. This congestion is making it harder to make room in our skies for new technologies and new services. But we have to find a way, because no one wants opportunity and innovation to grind to a halt. We need smarter policies—policies that promote more efficient use of this scarce resource. I've called it an abundance agenda.

That's why one year ago, almost to the day, we launched our inquiry into wireless receiver performance. We did so because we recognized that to date, most discussions of spectrum efficiency have been a one-way effort. They focus almost exclusively on transmitters. To avoid harmful interference, we typically have rules about how and when transmitters can operate.

But wireless communications systems involve transmitters *and* receivers. It's a two-way proposition. Both are vital. Both matter.

So today we begin to rethink our approach to spectrum policy and move beyond just transmitters to consider receivers, too. That's because receivers that are not sufficiently resilient can make it more difficult to introduce additional services in the same or adjacent airwaves. They can diminish the spectral environment and shut out new uses before they even begin.

There is too little in our existing spectrum policies that recognizes this truth.

That's where today's Policy Statement comes in. Drawing upon the work of the Commission's Technological Advisory Council, this Policy Statement sets out nine principles to provide guidance on how we will approach questions of spectrum management going forward. These principles are based on a recognition of the physical realities of interference, an expectation that responsibility for spectrum coexistence is shared on both sides of a communications system, and a firm belief in data-driven policy making.

At the same time, this Policy Statement recognizes that there is not a one-size-fits-all approach to spectrum management and different systems and different use cases have different needs. But this Policy Statement identifies a framework the Commission will seek to apply as we strive for greater efficiency

and effectiveness in increasingly congested spectrum.

Finally, this is just a first step. We will continue to review the record developed in last year's Notice of Inquiry and will learn from our experience operating under this Policy Statement, as we consider further actions to once again turn spectrum scarcity into abundance. I look forward to making progress.

I want to thank Commissioner Simington, for his enthusiasm and work on this subject. I also want to thank the staff who worked on this effort, including Edwin Abrazado, Damian Ariza, Bahman Badipour, Martin Doczkat, David Duarte, Miguel Gallegos, Michael Ha, Sayed Hasan, Ira Keltz, Matthew Miller, Paul Murray, Nick Oros, Bob Pavlak, Siobahn Philemon, Ron Repasi, Aniqa Tahsin, and Sean Yun of the Office of Engineering and Technology; Baron Chan, Tom Derenge, Madelaine Maior, Roger Noel, Blaise Scinto, Arpan Sura, Joel Taubenblatt, Jennifer Tomchin, Mary Claire York, and Janet Young of the Wireless Bureau; Jim Schlichting of the International Bureau; Zenji Nakazawa of the Public Safety and Homeland Security Bureau; Jonathan Campbell, Even Kwerel, Paul Lafontaine, Cher Li, Kate Matraves, Giulia McHenry, Mark Montano, Don Stockdale, and Aleks Yankelevich of the Office of Economics and Analytics; and Deborah Broderson, Doug Klein, and Bill Richardson of the Office of General Counsel.

STATEMENT OF
COMMISSIONER NATHAN SIMINGTON

Re: *Principles for Promoting Efficient Use of Spectrum and Opportunities for New Services,* ET Docket No. 23-122; *Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance*, ET Docket No. 22-137, Policy Statement (April 20, 2023)

The Policy Statement we adopt today lays out a common sense approach for how the Commission will conduct spectrum management going forward—in what is in my opinion the only common sense way to do so—by measuring and managing the efficient use of spectrum by *both* transmitters and receivers. As I've said numerous times, there is much value in getting to a place where conflicts such as the C-Band altimeter fight are headed off at the pass and spectrum allocation and deployment processes become smooth and orderly endeavors. This item takes that first step, and paves the way for a framework to accomplish this.

The principles laid out in the Policy Statement will enable the FCC to identify potential interference issues in bands adjacent to new commercial spectrum, in advance, and to define clear rights regarding interference protection. Clear rights provide incentives for innovation and collaboration among spectrum users in a way that avoids technical regulatory mandates, which can often be misguided, imprecise and overly burdensome.

Looking forward, I am eager to see an NPRM where the Commission proposes a procedural framework for implementing these principles on a band-by-band and service by service basis. To address the overarching "one-size-fits-all" and band and service-specific concerns raised in the record of the NOI, this proposal will create procedures to implement what I like to refer to as "band-specific performance boundaries" or technical parameters, such as OOBE for transmitters or, for receivers, an emissions mask. These would be applied to both transmitters and receivers. These parameters, or principles, or band-specific performance boundaries—call them what you will—would become part of the FCC's standard analysis when considering a new band for commercial use, or reallocating a commercial band for a new use.

This approach allows for maximum industry feedback and input because the FCC's current process is to seek comment on the service rules for each band through notice and comment rulemaking. This would not change in my view. It would just be expanded to seek comment on parameters applicable to receivers. Band-specific performance boundaries should be technology agnostic, and otherwise governed by the characteristics of the particular spectrum band where applied. They are congruent with a flexible use model and could foster easier spectrum sharing by creating additional efficiencies in a band.

Band specific performance boundaries would establish operational thresholds as part of the service rules that *both* transmitters and receivers must adhere to in a given band and any operations falling outside those boundaries would not be protected from interference.
This approach addresses commenter concerns while also allowing the FCC to execute on the vision laid out in this Policy Statement. I look forward to this next step.

I would like to thank the staff of OET for all of their diligent work on this item. I am very happy to support it. Thank you.