

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

Office of Engineering and Technology Invites)
Comments on Technological Advisory Council) ET Docket No. 13-101
(TAC) White Paper and Recommendations for)
Improving Receiver Performance)
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**COMMENTS OF
THE CONSUMER ELECTRONICS ASSOCIATION**

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EXECUTIVE SUMMARY

Improving receiver performance is key to addressing a spectrum environment where more wireless systems must operate in close proximity to meet the needs of ever increasing consumer demand. As consumer demand for wireless data grows, the nation's airwaves are becoming ever more tightly utilized. As a result, efficient spectrum use is more critical than ever. Packing more communications into the same amount of available spectrum requires better handling of interference between different systems operating in the same and adjacent bands. Traditionally, the focus for minimizing interference has been on transmitters, but receivers also play a role in the effective use of spectrum.

Interference limits for receivers structured as harm claim thresholds, as proposed in the TAC White Paper, can be a critical element of the overall solution to spectrum congestion. Under this approach, industry would establish band-by-band signal strength profiles setting the amount of interference that receivers are expected to tolerate. The FCC would reject interference claims where the interference was below this threshold. Such harm claim thresholds can enable more efficient use of spectrum and facilitate making spectrum available for new services, benefiting consumers. Harm claim thresholds would give equipment manufacturers and service providers much needed predictability regarding the spectral environment they can expect when designing products and services. Such predictability is particularly important in emerging technology markets, where it enables new entrants to attract investment and drive innovation. Furthermore, harm claim thresholds would preserve device manufacturers' and service providers' ability to evaluate receiver design trade-offs based upon market forces and technological considerations. Harm claim thresholds also can provide incentives to improve receiver performance and thereby further increase spectral efficiency. Finally, a harm claim threshold approach is less susceptible to jurisdictional challenges on appeal than alternative approaches such as receiver performance mandates.

Industry, with Commission input as needed, should manage interference limits by establishing band-by-band interference signal strength profiles based on the characteristics of the band and the needs of the existing and intended applications. No single harm claim threshold will fit all bands and applications; a band-by-band approach is necessary. For any particular band, the incumbent users of the band as well as users of affected adjacent bands should be the primary stakeholders and developers of interference signal strength profiles and harm claim thresholds for that band.

For these reasons, OET should further explore how it can support and promote industry development of receiver performance measurements including interference signal strength profiles that can be used to establish harm claim thresholds appropriate for various spectrum bands and applications. If the Commission should adopt a harm claim threshold approach, it should consider on a band-by-band basis whether such thresholds are more appropriately housed in Commission regulation or in inter-industry agreements.

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The Consumer Electronics Association (“CEA”) hereby responds to the Office of Engineering and Technology’s (“OET”) *Public Notice*¹ seeking comment on a recent Technological Advisory Council (“TAC”) white paper² regarding the role of receivers in the efficient use of spectrum. CEA supports efforts to improve receiver performance to achieve more efficient use of spectrum, and specifically supports the TAC white paper’s proposal to establish harm claim thresholds as one option to achieve that goal. Such thresholds will enable manufacturers and service providers to balance receiver performance characteristics, design constraints, and consumer needs in a spectrum environment that grows more congested every day. Consistent with the recent Presidential Memorandum³ urging the FCC to develop measures

¹ *Office of Engineering and Technology Invites Comments on Technological Advisory Council (TAC) White Paper and Recommendations for Improving Receiver Performance*, Public Notice, 28 FCC Rcd 5274 (OET 2013) (“Public Notice” or “PN”).

² FCC Technical Advisory Council, INTERFERENCE LIMITS POLICY: THE USE OF HARM CLAIM THRESHOLDS TO IMPROVE THE INTERFERENCE TOLERANCE OF WIRELESS SYSTEMS (Feb. 6, 2013) (“TAC White Paper”), *available at* <http://transition.fcc.gov/bureaus/oet/tac/tacdocs/WhitePaperTACInterferenceLimitsv1.0.pdf>.

³ Presidential Memorandum on Expanding America’s Leadership in Wireless Innovation, 78 Fed. Reg. 37431, 37434 § 5 (June 20, 2013).

to encourage the design of receivers that will allow for reasonable use of adjacent spectrum, OET should explore how it can support and promote industry development of harm claim thresholds appropriate to various spectrum bands and applications. If the Commission decides to adopt a harm claim threshold approach, it should consider on a band-by-band basis whether such harm claim thresholds are more appropriately housed in Commission regulation or in inter-industry agreements.

I. INTRODUCTION

Performance-based interference limits can enable more efficient use of spectrum and facilitate making spectrum available for new services. As providers work to pack more data and services into the nation’s airwaves to meet the high and growing consumer demand for wireless data, they must minimize interference between different systems operating in the same and adjacent bands in order to maximize efficiency. Traditionally, regulators and manufacturers have addressed interference concerns by setting limits on devices that *transmit* wireless signals. However, the design and performance of *receivers* – in particular, how well they handle interference – also affects spectrum efficiency, and therefore should be included in the Commission’s efforts to maximize the efficient use of spectrum.

To address the impact of receivers on spectrum efficiency, the TAC White Paper proposes the use of one particular type of interference limit policy: harm claim thresholds. Like other interference limit policies, harm claim thresholds describe the environment in which a receiver must operate without specifying how the receiver must perform in that environment. Specifically, the harm claim threshold approach relies on a pre-established “received signal strength profile that, if exceeded at a specific percentage of locations and times within a measurement area, allows a claim for harmful interference to be made; or conversely, the

interference below which an assignee has no enforcement recourse at the FCC.”⁴ That is, an operator experiencing interference above the harm claim threshold could claim harm from other systems.⁵ Below this threshold, receivers would be responsible for filtering or otherwise dealing with interfering signals.⁶

Harm claim thresholds would permit spectrum use to evolve while providing equipment manufacturers and service providers much needed predictability regarding the spectral environment they can expect when designing products and services, attracting investment and driving innovation. Harm claim thresholds also can incentivize improved receiver performance and thereby further increase spectral efficiency. A harm claim threshold approach is less susceptible to jurisdictional challenges on appeal than alternative approaches such as receiver performance mandates. Perhaps most critically, a harm claim threshold approach will achieve all of these benefits while preserving device manufacturers’ and service providers’ freedom to evaluate trade-offs in receiver design based upon market forces and technological considerations.

Industry, with Commission input as needed, should manage interference limits by establishing band-by-band interference signal strength profiles and the corresponding harm claim thresholds. It is important to note that no single harm claim threshold will fit all bands and applications, and the FCC should not seek to establish such a universal threshold. For any particular band, the incumbent users of the band as well as users of affected adjacent bands should be the primary stakeholders and developers of these thresholds, based on their knowledge of the characteristics of the band and the needs of the existing and anticipated applications. For

⁴ TAC White Paper at 8.

⁵ *Id.* at 8-9.

⁶ *Id.*

its part, the Commission should consider, on a band-by-band basis, whether and how the thresholds should be incorporated into Commission rules, or if incorporating harm claim thresholds into intra-industry agreements is more appropriate.

II. A HOLISTIC SPECTRUM MANAGEMENT APPROACH THAT EVALUATES RECEIVER PERFORMANCE WILL FURTHER PROMOTE THE EFFICIENT USE OF SPECTRUM

The Commission should promote improved receiver performance as one way to efficiently use increasingly scarce spectrum resources. The FCC has made significant strides toward identifying additional spectrum for mobile broadband, yet the spectrum crunch remains a major challenge for our nation.⁷ The FCC should therefore explore all opportunities to increase efficient spectrum use, as CEA has previously advised.⁸

⁷ Americans consume broadband capacity at a massive and increasing rate, placing ever more demand on mobile networks. See Julius Genachowski, Chairman, FCC, Remarks at VOX Media Headquarters, *Winning the Global Bandwidth Race: Opportunities and Challenges for the U.S. Broadband Economy*, at 10 (Sept. 25, 2012), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-316462A1.pdf (“U.S. mobile data traffic grew almost 300% [in 2011], and driven by 4G LTE smartphones and tablets, traffic is projected to grow an additional 16-fold by 2016. With this exponential growth, demand for our wireless capacity is on pace to exceed supply, even with significant new spectrum coming online.”); CTIA, SEMI-ANNUAL WIRELESS INDUSTRY SURVEY RESULTS DECEMBER 1985 – DECEMBER 2012 at 9 (reporting that consumer mobile data traffic in the U.S. has skyrocketed more than 275% since 2010), http://files.ctia.org/pdf/CTIA_Survey_YE_2012_Graphics-FINAL.pdf; Cisco, *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2012–2017* at 3 (Feb. 6, 2013) (predicting global mobile data traffic growth of at least 66% year-over-year from 2012-2017), http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white_paper_c11-520862.pdf. With demand exploding, allocating more spectrum for commercial mobile broadband use is critical; the U.S. is expected to have a spectrum deficit of nearly 300 MHz in 2014. FCC Staff Technical Paper, *Mobile Broadband: The Benefits of Additional Spectrum*, at 2, 18 (Oct. 2010), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-302324A1.pdf.

⁸ Comments of the Consumer Electronics Association, ET Docket No. 13-49, at 2 (filed May 28, 2013); Comments of the Consumer Electronics Association, GN Docket No. 12-354, at 5 (filed Feb. 20, 2013).

Receiver performance is just such an opportunity. The FCC has traditionally sought to minimize interference by establishing specific technical parameters controlling the emissions of and geographic locations of transmitters. Relying solely on transmitter limits to minimize interference, however, is not likely to be successful in today's spectrum-constrained environment because tighter optimization of spectrum use is needed. 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. In particular, promoting the deployment of spectrally efficient receivers in new and existing allocations will help ensure that spectrum can be repurposed for other uses, such as mobile broadband, without upsetting the established expectations of incumbents in the bands.

The Commission itself has long recognized the need to address receiver performance. More than ten years ago, the Commission noted that “the dramatic increases in the overall demand for spectrum based services, rapid technical advances in radio systems, ... and the need for increased access to the limited supply of spectrum in recent years are straining the effectiveness of the Commission’s longstanding spectrum policies” including its traditional exclusive focus on transmitter performance.⁹ What was true in 2003 regarding spectrum congestion and increasing demand is exponentially more so today.

⁹ *Interference Immunity Performance Specifications for Radio Receivers*, Notice of Inquiry, 18 FCC Rcd 6039, 6041 (2003). While CEA opposed the NOI’s proposed regime of mandatory receiver performance standards, CEA agrees with the important role of receiver performance in the efficient use of spectrum. *See generally* Comments of the Consumer Electronics Association, ET Docket No. 03-65; MM Docket No. 00-39 (filed July 21, 2003) (“CEA Interference Immunity Comments”).

III. HARM CLAIM THRESHOLDS OFFER NUMEROUS BENEFITS TO CONSUMERS, POLICYMAKERS, AND INDUSTRY

A harm claim threshold approach, as proposed in the TAC White Paper, is one viable method of addressing receiver performance issues. A harm claim threshold approach offers several advantages: (1) it provides business and operational predictability while permitting the evolving use of spectrum; (2) it incentivizes improved receiver performance; (3) it benefits consumers; and (4) it is less susceptible to jurisdictional challenges. Critically, the harm claim threshold approach achieves these benefits while preserving manufacturers' and service providers' ability to design equipment based on market forces and technological considerations.

A. HARM CLAIM THRESHOLDS PROVIDE MUCH NEEDED PREDICTABILITY TO DEVICE MANUFACTURERS, SERVICE PROVIDERS, AND INVESTORS WHILE PERMITTING SPECTRUM USE TO EVOLVE

Harm claim limits can help reduce business risk and operational uncertainty and thereby spur investment and innovation while permitting spectrum use to evolve. As wireless communications continue to proliferate and spectrum becomes more congested, the physical radio frequency ("RF") environment becomes less certain and more risky, and it can be difficult or impossible to predict how transmitters and receivers may perform over time. This is particularly true where the use of adjacent spectrum bands might change as the FCC seeks to repurpose additional spectrum for wireless broadband. Receiver performance approaches such as harm claim thresholds would allow the FCC to repurpose spectrum while providing a more predictable future RF environment.

Increased predictability has several benefits. First, it would 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 also would enable businesses to better estimate the costs of equipment

development and deployment. Maximizing predictability and reducing risk is particularly important to attracting investment in new and emerging technologies, where there already is a large amount of uncertainty present.

Harm claim thresholds also would reduce the number of interference disputes requiring FCC resolution by drawing clear lines between the rights of adjacent and co-channel operators. Vague standards as to what constitutes unacceptable harmful interference often results in parties seeking FCC resolution of the dispute, and typically results in a lengthy and costly process. In contrast, clear and unambiguous delineation of rights through harm claim thresholds will reduce the number of disputes that may be raised, facilitate prompt resolution by the FCC of valid claims, and promote private resolution of interference-related disputes.

B. HARM CLAIM THRESHOLDS INCENTIVIZE IMPROVEMENTS IN RECEIVER PERFORMANCE

Harm claim thresholds would enable manufacturers to design devices that satisfy the requirements of the operating environment and provide the necessary level of service to consumers. 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, harm claim thresholds would encourage manufacturers to improve receiver performance where needed to ensure a desired level of service.

Similarly, this approach allows manufacturers and service providers to avoid unnecessary costs associated with ongoing receiver improvements beyond the level necessary to promote the spectrally efficient future use of adjacent spectrum. Once a receiver meets the selectivity target of the harm claim threshold, making a device even more selective would not increase the potential spectral efficiency of adjacent spectrum use; rather, further improvements would needlessly increase costs, which may ultimately be passed through to consumers.

Harm claim thresholds should work effectively in all situations, including decoupled and unlicensed receivers.¹⁰ An industry-established harm claim threshold for a frequency band will incentivize manufacturers of receivers to meet or exceed those specific thresholds to fulfill their internal requirements and to satisfy their customers' needs. First, manufacturers, who must verify the work of their own designers, typically use such published specifications in their internal product requirements, verify prototypes against these specifications, and then perform similar testing on units on the factory line prior to shipping product. Second, similar requirements are often agreed upon and enforced between vendor and supplier by purchase order and contract. These principles apply equally to decoupled and unlicensed receivers, making harm claim thresholds a useful and effective adjunct in an already existing, time-tested and ubiquitous industry process.

C. HARM CLAIM THRESHOLDS BENEFIT CONSUMERS

Harm claim thresholds benefit the consumer in at least three ways. First, harm claim thresholds create a radio frequency environment that permits the manufacturer to offer a product that performs in a predictable and reliable fashion. Second, because the manufacturer can be assured of a particular RF environment, the consumer is not paying additional cost for a product that must be capable of and subject to ongoing attempts to increase robustness as the RF environment changes. Third, harm claim thresholds will increase spectrum efficiency, improving the quality of service to consumers.

¹⁰ *Cf.* TAC White Paper at 34. While the paper suggest that receiver standards may be appropriate in the context of decoupled and unlicensed devices, as demonstrated herein, those additional measures are unnecessary.

D. HARM CLAIM THRESHOLDS ARE LESS SUSCEPTIBLE TO JURISDICTIONAL CHALLENGE THAN RECEIVER MANDATES

Unlike proposals to impose detailed mandates to regulate the performance of receivers, harm claim thresholds are consistent with the Commission’s authority under the Communications Act of 1934, as amended (the “Act”). The Act gives the Commission plenary authority over transmitters of radio frequency energy, but withholds from the Commission general authority to regulate receivers.¹¹ Thus, imposition of receiver performance mandates would be susceptible to challenge as outside of the FCC’s jurisdiction.

In contrast, industry-established harm claim thresholds would not mandate any particular receiver performance characteristics; instead, such thresholds would be industry driven and would merely establish the minimum levels of interference at which administrative remedies become available. Harm claim thresholds therefore offer the Commission a more appropriate means to incentivize improved receiver performance, protect against harmful co-channel and adjacent channel interference, and resolve interference-related disputes.

E. HARM CLAIM THRESHOLDS PRESERVE MANUFACTURERS’ AND SERVICE PROVIDERS’ FREEDOM TO DESIGN EQUIPMENT BASED ON MARKET FORCES AND TECHNOLOGY CONSIDERATIONS

Harm claim thresholds would achieve the benefits described above while still allowing manufacturers and service providers to design products based on their substantial business and technical expertise. Harm claim thresholds would not mandate any particular technology design or any other technical parameters. Instead, manufacturers and service providers would remain free to design and build devices that best balance performance, form-factor, cost, protection from

¹¹ *See, e.g.*, 47 U.S.C. §§ 301, 303(e). When enacting the provision now codified at 47 U.S.C. § 303(s), Congress rejected authorizing the Commission to set “minimum performance standards” for television receivers. *See* Comments and Reply Comments of CEA in MM Docket No. 00-39 (filed May 17, 2000 and June 16, 2000, respectively).

interference, and other market forces, taking into consideration the most recent technological advances. Receivers not sufficiently robust to reject interference below the established harm claim threshold would not limit evolving uses in adjacent spectrum bands. Thus, this approach properly leaves the design of devices and the establishments of technology standards to manufacturers and service providers, who are best equipped to balance their interests while preserving opportunities in adjacent bands.

An industry-defined harm claim threshold approach is consistent with the Commission's highly successful light regulatory touch policy toward wireless services, under which the Commission avoids dictating specific applications or technologies for wireless licensees. Under that light regulatory touch the industry has achieved significant improvements in efficient spectrum use through new generations of wireless technology and through innovative network architecture solutions such as cell-splitting and frequency reuse. The Commission can continue this success by permitting industry to establish harm claim thresholds to improve receiver performance.

Industry-defined receiver performance measures also promote innovation better than government mandated design and operation of receivers. Such government receiver mandates face the perpetual challenge of all government mandates in the technology sector: government policy cannot adapt to changing business and technological advances as rapidly as can industry, and therefore government regulations quickly become outdated and even counterproductive. This is particularly true in rapidly evolving industries like wireless communications. In fact, changing static government standards is often a glacially slow process that chills innovation. As CEA has previously argued, "FCC-adopted standards would weaken or remove marketplace incentives for technological innovation because of the delay that would be caused by requiring

navigation of the regulatory hurdles of notice-and-comment rulemaking to implement changes.”¹² Furthermore, government technology mandates are often expensive and can freeze out new entrants. A harm claim threshold approach would avoid these problems.

IV. INDUSTRY, WITH APPROPRIATE FCC INPUT, SHOULD DEVELOP THE HARM CLAIM THRESHOLDS ON A BAND-BY-BAND BASIS

Industry, with input as needed from the Commission, should manage interference limits by establishing signal strength profiles and the associated harm claim thresholds. By letting industry take the lead in developing harm claim thresholds and the underlying signal strength profiles, the FCC will help ensure that standards are driven by consensus, technological concerns, and industry expertise.

Because there is no single set of general interference limits appropriate across all bands and all applications, harm claim thresholds and the underlying signal strength profiles should be established on a band-by-band basis by the affected industry stakeholders. Such stakeholders should include incumbent users in the band for which the harm claim thresholds are being established, as well as incumbent users in the potentially affected adjacent bands. Such parties are best informed about incumbent and future applications in the affected bands.

Any harm claim threshold process should result in thresholds that consist of a small number of parameters that are not system-specific. However, these generic parameters should be supplemented by additional parameters as needed on a case-by-case basis. Industry participants are best informed as to when and what type of additional parameters might be needed to accommodate certain incumbent applications.

While the TAC White Paper generally contemplates some form of FCC regulation to implement harm claim thresholds, at least some harm claim thresholds might be more

¹² CEA Interference Immunity Comments at 5.

appropriately embodied in inter-industry agreements than in regulation. Such inter-industry agreements could effectively drive compliance with the established thresholds, bringing all the benefits of that approach while offering a more streamlined, non-regulatory process for updating the thresholds when necessary. Therefore, to the extent that the Commission embraces a harm claim threshold approach, it should consider on a band-by-band basis whether it is necessary to incorporate specific harm claim thresholds into regulation in order to achieve the desired benefits.

V. CONCLUSION

The harm claim thresholds approach as proposed by the TAC White Paper holds promise as an important tool in the Commission's efforts to encourage efficient spectrum use. The harm claim thresholds approach promises to permit spectrum use to evolve while providing manufacturers and service providers with a more predictable interference environment. This approach would preserve manufactures' and service providers' design flexibility, incentivize improvements in receiver performance, avoid jurisdictional challenges, and ultimately benefit consumers. OET should further explore how it can support and promote industry development of receiver performance measures including harm claim thresholds as appropriate for various spectrum bands.

Respectfully submitted,

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