

Information Technology and Innovation Foundation
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Reply Comments of ITIF
Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of:)	
)	
Promoting Efficient Use of Spectrum through)	ET Docket No. 22-137
Improved Receiver Interference Immunity)	
Performance)	
)	

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INTRODUCTION AND SUMMARY

The Federal Communications Commission (“FCC” or “Commission”) has promulgated a Notice of Inquiry (“NOI” or “Notice”) regarding receiver interference immunity performance as it relates to spectrum efficiency.¹ The Information Technology and Innovation Foundation (“ITIF”) appreciates this opportunity to reply to comments regarding the Commission’s efforts to ensure productive use of spectrum.² As radio frequencies become more crowded, the performance of receivers is a bottleneck for wireless productivity. As recent disputes have made clear, disagreements about whether harmful interference will occur and how the Commission should react to potential interference have sowed controversy and stymied the flow of spectrum usage rights to their most productive uses. Therefore, the NOI is timely and important, and the Commission should take the steps necessary to improve the interference immunity performance of receivers. In practice, however, this goal will not be achieved by direct regulation of design or technical standards for receivers across the board. Rather, the Commission should incentivize voluntary, industry-led standards and take a forward-looking approach to the future interference environment by establishing a clear framework for adjudicating

¹ *Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance*, ET Docket No. 22-137, Notice of Inquiry, (April 2022), <https://docs.fcc.gov/public/attachments/FCC-22-29A1.pdf> (NOI).

² Founded in 2006, ITIF is an independent 501(c)(3) nonprofit, nonpartisan research and educational institute—a think tank. Its mission is to formulate, evaluate, and promote policy solutions that accelerate innovation and boost productivity to spur growth, opportunity, and progress. ITIF’s goal is to provide policymakers around the world with high-quality information, analysis, and recommendations they can trust. To that end, ITIF adheres to a high standard of research integrity with an internal code of ethics grounded in analytical rigor, policy pragmatism, and independence from external direction or bias. See About ITIF: A Champion for Innovation, <https://itif.org/about>.

interference claims in the face of differential receiver quality. Key to this is facilitating transparency and collaboration among voluntary standards-setting bodies.

MANDATORY PERFORMANCE STANDARDS FOR RECEIVER EQUIPMENT WOULD BE IMPRACTICAL AND UNWISE

Unlike transmitters, the performance of a receiver is highly dependent on the particular environment in which it operates. Harmful interference is something that happens to a receiver in its environment, and as such depends on the total environment. Thus, as many commenters note, mandatory standards would be impractical to develop and ill-suited to the ultimate goal of greater interference immunity for receivers.³ Likewise, immunity to interference can be achieved in a number of ways, all of which depend on the type of service, the needs of particular applications, and the attributes of surrounding transmitters. Tradeoffs are inherent in this process, and operators and manufacturers of receivers may address these tradeoffs in different ways. As Professor Monisha Ghosh explains, “considering a single parameter, or even a set of parameters that define receiver performance, especially in the face of adjacent-channel interference can be difficult, if not impossible.”⁴ TechFreedom rightly describes these tradeoffs as “messy, and simply not readily amenable to top-down regulation.”⁵ Mandatory design standards for receivers would, in short, be like mandating the “correct” size and type of shoe without reference to the size of the feet that must wear it and where those feet will walk.

As the Notice and commenters note, incentives are the key driver of receiver performance.⁶ Adopting a one-size-fits-all approach that universally defines receiver parameters ahead of time would weaken these incentives by removing the ability of users to develop creative solutions or negotiate agreements to mitigate harmful

³ Mary Brown, “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” Cisco Systems, Inc., June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/10627009693276>, 5-6; Kara Graves, Thomas Power, and Scott Bergmann, “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” CTIA, June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/1062751530124>, 5-6.

⁴ Monisha Ghosh, “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” University of Notre Dame, June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/10628225352336>, 2.

⁵ James E. Dunstan, “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” (TechFreedom, June 2022), <https://www.fcc.gov/ecfs/search/search-filings/filing/106270964623886>, 6.

⁶ NOI at 3, 22, paras 4, 78; Mark Racek and Kumar Balachandran, “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” Ericsson, June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/10627152998789>, 7; Brown, “Improved Receiver Interference Immunity Performance,” 6; Jon Peha, “A New FCC Policy that Forces Consideration of the Harm Claim Threshold,” Carnegie Mellon University, June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/10627044503869>, 3.

interference. The Commission cannot know what innovative solutions might be developed tomorrow, so it should not foreclose them with prescriptive mandates today. The Commission also cannot know the optimal tradeoffs for every spectrum user in every band, and it should not try to force the myriad decisions into a rigid standard. Even if the Commission were capable of reaching a technically correct decision in every case, the rapidly changing nature of the wireless marketplace would likely render the ruling rapidly out of date.

Voluntary standards developed by and for those who use and coexist in the same or neighboring spectrum bands are a more fruitful path for improving receiver performance. Many commenters recognize this.⁷ Indeed, the services that have proved most resilient and immune to harmful interference are those with robust, private standards-setting bodies. Mobile carriers, for example, build their systems in accordance with protocols set by such bodies as the Third Generation Partnership (“3GPP”). The Commission should take advantage of the technological and engineering research undertaken by such bodies to address comprehensive interference concerns for the mobile wireless industry.

It is true that the current array of standards bodies does not always result in compatible standards between bands with unlike allocations.⁸ However, centralizing inter-service interference parameters with FCC equipment mandates would be just as unlikely, if not more so, to produce an optimal solution. The FCC should instead cultivate greater cooperation and transparency between industries and private standards bodies to encourage negotiated solutions in a dynamic marketplace.

THE COMMISSION SHOULD ENCOURAGE ALL PARTIES TO ACCOUNT FOR THE FUTURE INTERFERENCE ENVIRONMENT

Rather than focusing on the design of particular devices, the Commission should adopt policies that define rights within a given interference environment and encourage spectrum users to account for future changes in that environment.

Receivers Should Not Listen Out of Band, But This Is Insufficient to Address All Policy Challenges

As many commenters note, the Commission should make clear that it will not restrict transmissions that are in compliance with a valid license simply because receivers are inadequately protected from the foreseeable

⁷ Jennifer A. Manner, “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” EchoStar Satellite Services, LLC, and Hughes Network Systems, LLC, June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/10627648108668>, 2; Racek and Balachandran, “Improved Receiver Interference Immunity Performance,” 10; Patrick T. Welsh and Rachael M. Bender, “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” VERIZON, June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/106272567411650>, 8.

⁸ JP (Pierre) de Vries, “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” Silicon Flatirons Center, University of Colorado Boulder, June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/10627141851737>, 41.

interference environment.⁹ The onus is on the receiver to listen only to its assigned frequencies. The Commission can and should streamline and clarify when it will (and will not) use its enforcement power to protect receivers, but reforms to that process alone do not answer the question of what the content of the Commission’s standards should be.

Public Knowledge and the Open Technology Institute argue that the Commission should define a “standard receiver” and then only enforce protection for receivers that operate up to that standard, and only from interference that is not permitted by a Commission license.¹⁰ This proposal would be a productive step, but it also shifts the difficulty of setting receiver standards to surveying and defining a “standard receiver.” Moreover, in situations in which there are substandard receivers in the field for which interference is a real possibility, it has not proved practical for the Commission to overpower the interests of those receivers. For example, when the Commission found that terrestrial mobile service in the 3.7 GHz band would not cause harmful interference with “well designed” radio altimeters in the 4.2 GHz band, it explicitly stated “We expect the aviation industry to take account of the RF environment that is evolving below the 3980 MHz band edge and take appropriate action, if necessary, to ensure protection of such devices.”¹¹ This is tantamount to the FCC saying that it considers the receivers it studied to be “standard” and telling substandard altimeters that they should upgrade or operate at their own risk. Since this strong statement was not enough to avert the controversy that surrounds the ongoing rollout of 5G services in the C band, we should not expect similar Commission statements to resolve future disputes absent other reforms. In short, even when the Commission’s policy determination is correct, actualizing it requires something more than the right adjudication system.

The Commission Should Explore Harm Claim Thresholds

Harm-claim thresholds (HCT) would be a promising framework for driving Commission rulemakings to productive ends. By quantifying the harm experienced by a receiver with statistical methods, HCTs would shift the conversation about interference mitigation from the device alone to the environment in which both

⁹ Robert Vitanza, David J. Chorzempa and David L. Lawson, “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” AT&T Services, Inc., June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/1062768383254>, 3-7; Harold Feld and Michael Calabrese, “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” Public Knowledge and Open Technology Institute at New America, June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/106280574819511>, 5; Brown, “Improved Receiver Interference Immunity Performance,” 11-13; Dave Horne, Jayne Stancavage and Reza Arefi, “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” Intel Corporation, June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/10627977225852>, 6-7.

¹⁰ Feld and Calabrese, “Improved Receiver Interference Immunity Performance,” 12.

¹¹ Federal Communications Commission, *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, GN Docket No. 18-122, Report and Order, (March 2020), <https://www.fcc.gov/document/fcc-expands-flexible-use-c-band-5g-0>, para 395.

transmitters and receivers operate. To be sure, the process of determining what the right HCT parameters are will be difficult, but in any case, the idea itself provides a helpful language for all parties to speak in working out potentially harmful conflicts.¹² As advocates of harm-claim thresholds argue, they would permit the flexible and innovative approaches to mitigate harmful interference that would be foreclosed by prescriptive mandates.¹³ Therefore, the Commission should continue to explore instances in which HCT would be workable, starting first with a band in which interference concerns are relatively uncontentious so that the process for setting the HCT can be attempted in practice.

The Commission Should Collect and Share Information About Receivers and the Interference Environment

Ultimately, the underlying policy choices inherent in spectrum allocation need more transparency and collaboration from a variety of stakeholders. The NOI rightly notes that there is an “asymmetric information environment” between transmitters and receivers.¹⁴ The most concrete step the Commission could take now toward a forward-looking accounting for the interference environment is to collect information about receivers as they are deployed. Many commenters support increases in such disclosures.¹⁵ Verizon suggests “making relevant technical data available so that the Commission and stakeholders can fully analyze the RF

¹² Brown, “Improved Receiver Interference Immunity Performance,” 6-9; Peha, “New FCC Policy,” 3; Racek and Balachandran, “Improved Receiver Interference Immunity Performance,” 14; Welsh and Bender, “Improved Receiver Interference Immunity Performance,” 12.

¹³ Peha, “New FCC Policy,” 3; Racek and Balachandran, “Improved Receiver Interference Immunity Performance,” 14; Steve B. Sharkey, John Hunter, and Christopher Wiczorek, “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” T-Mobile USA, Inc., June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/106270456715325>, 8; de Vries, “Improved Receiver Interference Immunity Performance,” 26-28.

¹⁴ NOI pg. 15, 20, paras. 48, 66.

¹⁵ Vitanza, Chorzempa, and Lawson, “Improved Receiver Interference Immunity Performance,” 10; Welsh and Bender, “Improved Receiver Interference Immunity Performance,” 8, 10; Rick Chessen, Neal Goldberg, and Becky Tangren, “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” NCTA – The Internet & Television Association, June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/10627181186987>, pp. 15-16; Ghosh, “Improved Receiver Interference Immunity Performance,” 4; Racek and Balachandran, “Improved Receiver Interference Immunity Performance,” 13.

environment when making allocation decisions and developing technical rules.”¹⁶ NTIA enumerates several circumstances in which it has already undertaken such efforts.¹⁷

Transparency into the technical capabilities of receivers will allow the Commission to better anticipate the effects of future allocations and give engineers in the government and private sector greater opportunity to cooperate and tailor new systems to coexist. This reform also pairs well with voluntary, industry-led standards since such bodies are already engaged in formulating standards for new generations of technology and devices. Greater transparency should reveal more potential conflicts earlier in the policymaking process and allow for productive negotiations and technical solutions to disputes. Parties whose devices depend on spectrum should have no difficulty ascertaining the interference environment and, thus, no excuse for not constructing systems to be immune to harmful interference in that environment.

If, for example, 3GPP and RTCA had been in collaboration since the reallocation of the C Band for terrestrial mobile use had become the evident policy of the United States, both sides would have had a head start in preparing sub-par receivers well before the scheduled activation of mobile services. While other industries and regulators who depend on radio frequencies have an obligation to be more plugged into FCC decision-making, the FCC could promote the needed cooperation with more transparent and easily accessible information about receivers in the field and future changes to the interference environment.

CONCLUSION

The FCC’s approach to receivers is ripe for reform along many of the margins identified in the NOI. Many reforms are not mutually exclusive and would be beneficial if pursued together. The Commission should avoid rigid mandates that constrain the possibility of creative compromises. The goal of increased receiver quality requires a forward-looking policy that establishes a common language for adjudicating interference disputes and pushes spectrum users to account for future changes to the interference environment.

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¹⁶ Welsh and Bender, “Improved Receiver Interference Immunity Performance,” 9-10.

¹⁷ Josephine Arnold et al., “Comments to the FCC in the Matter of Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance,” National Telecommunications and Information Administration, June 2022, <https://www.fcc.gov/ecfs/search/search-filings/filing/1062896294033>, 3.