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FCC Notice of Inquiry: The Role of Receiver Performance in Promoting More Efficient Spectrum Use

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I. Summary

On April 21, the Federal Communications Commission (the FCC) voted to approve a Notice of Inquiry (NOI) that will review the role of receiver performance in the FCC's spectrum management responsibilities.[1] As spectrum use across the radio frequencies (RF) becomes more concentrated and services are packed more closely together on the spectrum and geographically, the FCC is considering policies that can affect the efficiency of all wireless systems.[2] While the FCC has long relied on rules establishing particular transmitter requirements to promote spectrum efficiency and more intensive use, receiver performance can also significantly affect the FCC's ability to introduce new services in the same or nearby frequencies.[3] Specifically, the FCC is concerned that receivers without sufficient interference immunity performance can diminish opportunities for innovative spectrum use and constrain future development.[4] The FCC intends that the NOI will:

- Develop an up-to-date record on the role of receivers in spectrum management, and, where necessary, inform how the FCC will best promote improvements in receiver immunity performance.
    - This includes the consideration of efforts, reports, studies, and recommendations, including several of the FCC's Technological Advisory Council (TAC) white papers offering recommended actions the FCC should consider.
- Lay the foundation for future FCC actions that promote improvements in receiver performance that will aid in making spectrum management more effective and provide more benefits to the American public.
    - Consideration of receiver interference performance specifications could be in the form of industry-led voluntary measures, FCC policies and guidance, or regulatory requirements (or a combination of these approaches) in particular frequency bands or services, or across bands and services.[5]

II. Background

In 2003, the FCC adopted an NOI to begin "consideration of incorporating receiver interference immunity performance specifications into its spectrum policy on a broader basis."[6] The FCC sought comment on issues regarding receiver performance parameters, the current RF environment, and receiver interference immunity

performance, etc.[7] Several commenters to the 2003 NOI supported the FCC further exploring interference immunity performance standards and agreed that improved receiver performance could help improve spectrum efficiency and ensure greater access to spectrum for all users; they differed, however, on the appropriate approach on how to implement them with particular bands.[8] In 2007, the FCC terminated the proceeding since the passage of time made the record outdated.[9]

Generally, the FCC's regulation of transmitters has at least implicitly provided for an RF environment that affects receiver performance insofar as the receivers must have the technical capability to process transmissions.[10] In some instances, the FCC has more directly addressed regulated receiver performance through performance standards and initiatives for 800 and 900 MHz bands, digital television signals, radio services, and maritime and aviation services.[11] In more recent proceedings, the FCC has focused on receiver interference immunity performance associated with incumbent services operating in spectral proximity to new users and services.[12] For example, the FCC adopted operating conditions and rules to enable the introduction of new operations into frequency bands, with various incumbent users operating under different service allocations in the same band, adjacent band, or other spectrally proximate frequency bands.[13] These recent proceedings demonstrate the FCC's developing interest in having accurate and timely information about receiver characteristics to address potential harmful interference concerns, and also highlight several other spectrum management issues that can arise with respect to receiver interference immunity performance.[14]

In recent years, the FCC's TAC has also examined the technical issues concerning receiver performance in several white papers.[15] In its white papers, the TAC recognized a close relationship between spectrum efficiency and receiver standards/guidelines for performance, recommended an interference limits policy that set harm claim thresholds for spectrum interference, and recommended other policies regarding receivers and spectrum efficiency.[16] Several other agencies and entities have also conducted relevant studies and concluded that receivers are crucial to spectrum efficiency, including the International Telecommunication Union, the European Union, and the United Kingdom's Office of Communications.[17]

III. Discussion

In its NOI, the FCC stresses the critical role of receiver performance in spectrum management as innovative spectrum uses that drive economic growth, competition, security, and innovation increase spectrum congestion, and increasingly situate transmitters and receivers in closer spectral and geographic proximity.[18] These new congestion pressures, likely driven by the surge in 5G and Internet of Things activity, appear to have convinced the FCC that the time for increasing focus on receivers has finally come. To that end, the FCC asks commenters to discuss various approaches and develop the record on receiver performance across the RF spectrum and how the FCC might consider options that promote more efficient spectrum use.[19] The topics of interest to the FCC are further described below.

A. Receiver Performance Parameters and the RF Environment

In the NOI, the FCC seeks information on receiver performance parameters that it should consider to promote receiver performance.[20] The FCC also asks commenters to consider approaches to advance receiver performance in ways that take receiver performance parameters into greater consideration, and what specific parameters (e.g., selectivity, sensitivity, dynamic range, automatic RF gain control, shielding, modulation method,

signal processing) should be considered.[21] The FCC invites commenters to address a host of issues regarding receiver performance parameters, including: whether specific receiver performance parameters are more critical for allowing introduction of new services in the adjacent or neighboring bands without causing unacceptable interference; whether the FCC should consider recent technical advancements in receiver design; how receiver performance factors are related to frequency and operating power, and how these factors are influenced by the nature of the RF environment (e.g., how does anticipated in-band and out-of-band power affect receiver performance and influence design choices); and how can the FCC measure, validate, and rate receiver performance parameters.[22]

Similar to the 2003 NOI, the FCC seeks comment on the current RF environment with respect to particular services—including various mobile services (terrestrial, aeronautical, satellite, maritime), fixed services (point-to-point microwave, point-to-multipoint, satellite), public safety services, broadcast services (fixed and mobile), and other services such as radionavigation, radiolocation, and sensing services used for scientific applications.[23] Specifically, the FCC is interested in obtaining information on whether the RF environment and receiver interference immunity performance may have changed because of technological advancements, evolved spectrum management challenges, or changing spectrum use requirements.[24] Additionally, the FCC seeks comment on the changing RF environment, including what kinds of changes are anticipated that the FCC might better prepare for, and how it might establish approaches that can effectively help ensure that receiver interference immunity performance concerns are addressed as the FCC takes future actions affecting the current RF environment to enable greater access to spectrum for new services and more efficient spectrum use.[25]

Regarding receivers, the FCC invites comment on whether it should require more information regarding receiver characteristics be made available.[26] The FCC also requests that commenters discuss particular contexts in which having more information on receiver characteristics would be helpful, and what factors the Commission might consider if it were to require more information on receiver characteristics, while addressing concerns around proprietary information.[27] The FCC also seeks comment on the merits of an integrated systems analysis approach that takes into account every component of a radio-based communication system involved with either the transmission and/or reception of a signal, and how the FCC should go about developing such an approach.[28]

B. Promoting Improved Receiver Interference Immunity Performance

The FCC states that as it moves forward, it is important to provide an overall framework for considering how the FCC might incorporate receiver performance considerations into its spectrum management decision-making.[29] The FCC asks whether to factor receiver interference immunity performance into spectrum policy in the form of incentives, guidelines, or regulatory requirements.[30] These could include additional FCC guidance, such as clarifying FCC policy, issuing a policy statement, or considering approaches such as an interference limits policy, and/or a harm claim threshold approach where that might be helpful.[31]

The FCC seeks comment on how a voluntary industry-led approach may be effective, and how the FCC can encourage or enhance such an approach.[32] Alternatively, the FCC also seeks comment on how it can implement policy and guidance to incorporate receiver performance more directly in spectrum management decisions without hindering development.[33] For general policy guidance, the FCC seeks comment on how it can: (1) establish clear expectations about the extent to which incumbent receivers will receive interference protection as new services are introduced; (2) clarify the importance of assigned frequency bands and allocations with respect to

receiver performance; (3) develop performance criteria or ratings; (4) inform relevant stakeholders of any forthcoming policy guidance; and (5) provide other policy guidance commenters may suggest.[34]

The FCC also asks whether issuing a policy statement to establish a clear and transparent FCC policy can help bring receiver interference immunity performance into fuller consideration in spectrum management decisions.[35] For example, the FCC considers the "basic principles" identified by the TAC Working Group's *White Paper on Basic Principles for Assessing Compatibility of New Spectrum Allocations*.[36] With the nine "basic principles," the TAC sought to promote "good neighbor policies" among spectrum users that better enable adjacent and nearby spectrum users to "get along" with each other.[37] The nine principles are organized in three function groups: "Interference Realities" (realities of interference everyone must accept); "Responsibilities of Services" (responsibilities that services have to mitigate their interaction with other services); and "Regulatory Requirements and Actions" (requirements for, and actions that should be taken by, regulatory authorities with respect to spectrum allocations).[38] The FCC invites comments on these principles and their application to certain types of receivers.[39]

The FCC directs commenters to review and address the TAC's white papers on interference limits policy and harm claim thresholds, and address whether and how these policies should be approached and considered by the FCC.[40] In these white papers, the TAC Working Groups noted that to meet the growing demand for wireless service, the number of wireless systems that operate in close proximity in frequency, space, and time need to increase, and that while many benefits are derived from packing wireless systems among these dimensions (i.e., higher system density), it also increases risk of service disruption due to inter-service interference.[41] The TAC concluded that implementing an interference limit policy would bring receivers into the spectrum management picture with minimal regulatory intervention.[42] In short, the FCC seeks to develop an up-to-date record on whether the FCC should explore implementing an interference limits policy, and in particular, a harm claim thresholds approach.[43] The FCC asks commenters to review the two TAC white papers, and offer their thoughts on the details discussed there, the issues and concerns raised, and how the FCC might proceed in consideration of interference limits policy and harm claim thresholds.[44]

On a final note concerning enforcement of receiver standards, the FCC seeks comment on: (1) whether it should consider expanding its receiver rules to encompass more radio services or to apply rules generally across all radio services; (2) whether in certain cases a regulatory approach should be considered because the receivers associated with a particular service are not sufficiently under the control of the licensee or may not be designed to meet particular industry specifications; (3) if the FCC should consider requiring certain disclosure to consumers and owners/operators of equipment and systems with embedded receivers or transceivers; and (4) if the FCC were to pursue consideration of mandatory requirements, the technical specifications or other requirements that would need to be considered.[45]

C. Innovation and the Marketplace; Legacy Receivers and Transition Pathways; Costs and Benefits; and Legal Authority

As part of the FCC's overall spectrum management goals, it requests that commenters address the various considerations and approaches that have been discussed in the NOI, and inform it about how best to promote innovation.[46] The FCC also requests comment on the range of issues and considerations that it should take into account as it considers the treatment of legacy receivers that may not comply with any new approaches or policies

adopted in the future (e.g., improved receiver minimum interference immunity performance where that might be appropriate).[47] The FCC recognizes that in many instances, receivers are replaced fairly often, and that improved receiver performance in those cases could be achieved relatively rapidly, while other approaches may be needed in other situations.[48] Commenters should help the FCC identify and consider the range of issues and concerns that should be taken into account when addressing legacy receivers and transitioning to systems with improved receiver interference immunity performance that would serve the public interest.[49]

The FCC also invites comment on ways to minimize the costs, optimize the benefits, and otherwise balance the costs and benefits, as steps are taken in the future to improve receiver interference immunity performance as part of the FCC's overall spectrum management goals.[50] The FCC requests input on whether sections 4(i), 301, 302(a), 303(e), (f), and (r) of the Communications Act, as amended, or other sources of authority give the FCC the necessary statutory authority to promulgate receiver immunity guidelines.[51]

Lastly, the FCC invites comment on other approaches for its consideration, including convening FCC-led workshops with experts or creating a pilot project with particular frequency bands.[52] Moreover, the FCC, as part of its continuing effort to advance digital equity for all, including people of color, persons with disabilities, persons who live in rural or Tribal areas, and others who are or have been historically underserved, marginalized, or adversely affected by persistent poverty or inequality, invites comment on any equity-related considerations and benefits (if any) that may be associated with the approaches and issues discussed in the NOI.[53]

IV. Conclusion

The FCC's latest NOI seeks to promote spectrum efficiency by taking a fresh look at the role of receiver performance in the FCC's spectrum management responsibilities, with the goal of facilitating new opportunities for the use of our nation's spectrum resources. If you have any questions regarding the FCC's latest NOI or would like assistance reviewing and commenting, contact Alan Poole with Troutman Pepper's Telecommunications Infrastructure Team. If you would like to receive more updates and key insights on telecom and infrastructure, please subscribe to our advisory updates by clicking here and selecting the "Telecom + Infrastructure" box.

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[1] Federal Communications Commission, *Notice of Inquiry: Promoting Efficient Use of Spectrum Through Improved Receiver Interference Immunity Performance* (the *NOI*), ET Docket No. 22-137, March 31, 2022.

[2] *Id.* at FCC Fact Sheet page.

[3] *Id.*

[4] *Id.*

[5] *Id.*

[6] *Id.* at ? 4.

[7] *Id.* at ? 5.

[8] *NOI*, at ? 6.

[9] *Id*.

[10] *Id.* at ? 7.

[11] *Id.* at ? 7–16.

[12] *Id.* at ? 17.

[13] *Id.* at ? 18; see also *In the Matter of LightSquared Technical Working Group Report*, *et al.*, IB Docket Nos. 11-109 and 12-340, Order and Authorization, 35 FCC Rcd 3772 (2020) (*Ligado Order*); *Expanding Flexible Use of the 3.7 to 4.2 GHz Band,* GN Docket No. 18-122, *Report and Order and Order of Proposed Modification*, 35 FCC Rcd 2343 (2020) (*3.7 GHz Report and Order*).

[14] *Id.* at ? 18.

[15] *Id.* at ? 19.

[16] *Id.* at ? 20–24.

[17] *Id.* at ? 25–34

[18] *NOI*, at ? 34-35.

[19] *Id.* at ? 36.

[20] *Id.* at ? 39.

[21] *Id.* at ? 41.

[22] *Id.* at ? 42–45.

[23] *Id.* at ? 53.

[24] *Id.*

[25] *Id.*

[26] *NOI*, at ? 67.

[27] *Id.* at ? 67–70.

[28] *Id.* at ? 71–73.

[29] *Id.* at ? 78.

[30] *Id.*

[31] *Id.*

[32] *Id.* at ? 80.

[33] *Id.* at ? 93.

[34] *Id.* at ? 98–108.

[35] *Id.* at ? 109.

[36] *Id.* at ? 114.

[37] *NOI*, at 114.

[38] *Id.* at ? 115.

[39] *Id.*

[40] *Id.* at ? 119–20.

[41] *Id.* at ? 120–21.

[42] *Id.* at ? 121.

[43] *Id.* at ? 127.

[44] *Id*. at ? 127.

[45] *Id.* at ? 138–142.

[46]*NOI*, at ? 147.

[47] *Id.* at ? 159.

[48] *Id.*

[49] *Id.* at ? 160.

[50] *Id.* at ? 161.

[51] *Id*. at ? 166, 170. (Per ? 166, it is clear the FCC believes it has such authority).

[52] *Id.* at ? 171.

[53] *Id.* at ? 172.

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