

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

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

**COMMENTS OF ARRL, THE NATIONAL ASSOCIATION FOR
AMATEUR RADIO**

ARRL, The National Association for Amateur Radio, also known as the American Radio Relay League, Incorporated (ARRL) submits these comments in response to the Commission’s Notice of Inquiry (NOI)¹ examining the role of receiver performance in achieving more efficient spectrum use in the ever-changing and intensive spectrum environment.

Receiver Standards Would be Inappropriate for the Amateur Service

The Commission seeks comment on whether there are services in which promotion or regulation of receiver improvements is unnecessary.² The Amateur Service is strictly a non-commercial service and experimental in nature under both the Commission’s rules³ and ITU Radio Regulations.⁴ Unlike the commercial services, in the Amateur Service many of the

¹ ET Docket No. 22-137, 87 Fed.Reg. 29248 (publ. May 13, 2022).

² *Id.* at ¶ 69.

³ The Commission at Section 97.113(a), 47 C.F.R. § 97.113(a), expressly prohibits licensed amateur radio operators from providing “[c]ommunications for hire or for material compensation, direct or indirect, paid or promised...” or “[c]ommunications in which the station licensee or control operator has a pecuniary interest.” At Section 97.1, 47 C.F.R. § 97.1, the Commission provides that a fundamental purpose of the Amateur Radio Service is “[c]ontinuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.”

⁴ The ITU Radio Regulations at Art. 1.56 define the Amateur Service as “[a] radiocommunication service for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, by duly authorized persons interested in radio technique **solely** with a personal aim and **without pecuniary interest.**” (Emphasis added.)

amateur bands are used in a relatively free-form manner without channelization and with signals of different bandwidths, modulation types, and signal strengths adjacent to each other simultaneously in an ever-changing *ad hoc* arrangement. Coexisting with different and unexpected signals, as well as widely varying and continually changing signal propagation in bands such as those at high frequencies (HF) are a continual part of operations and experimentation. In addition, many amateurs build or modify their own receivers. Given the inherent characteristics of the Service, regulatory performance standards for receivers used in the Amateur Service would be counterproductive to the amateurs' continued experimentation and operations.

Lessons From the Amateur Experience

We do, however, offer two aspects of the amateur experience that may contribute to the Commission's consideration of how to approach the impact of receiver characteristics on spectrum use and whether and how receiver considerations might be treated within the regulatory context. (1) Receivers used by radio amateurs have remarkably improved in recent years in their handling of adjacent signals of different strengths and technical characteristics. Much of the improvement has derived from better testing of relevant receiver parameters and effective communication of the test results to users who have the technical knowledge to understand their meaning. This has been accomplished without regulatory mandate. (2) Another aspect worth consideration is that when reallocations will change the spectrum environment today's software-defined radios may provide a more flexible and timely upgrade path to accommodate future requirements and improvements in those services in which they are employed.

More specifically, the ARRL Laboratory conducts thorough testing of major new amateur transmitters and receivers (most commonly combined in transceivers) and publishes the results in

its widely-distributed magazine, QST.⁵ Other amateurs independently conduct and publish similar tests focused on their particular areas of interest.⁶ In turn, many amateurs view the published material and are guided by the results when making equipment purchases.

Many amateurs focus on receiver test results because receiver capabilities directly affect whether a relatively weak signal adjacent to a much stronger signal can be heard. In the amateur bands, strong and weak signals often are randomly mixed. The different modulation schemes and bandwidths of signals operating adjacent to each other, and even partially overlapping, often create multiple scenarios similar to or even more complex than those present in typical adjacent band scenarios between commercial services.

The difficulty of receiving some of the signals in complex situations and the public receiver testing has resulted in substantial improvements to amateur receiver dynamic range (the ratio of the smallest usable signal to the largest tolerable signal) and to both hardware and software filters. Amateur receiver capabilities today excel in the crowded and complex RF environment of the amateur bands because amateur receiver manufacturers responded to the test data by making improvements to their receivers. The result is that amateur receivers today are exceptionally robust in crowded signal environments compared to those of a generation ago.

Another consideration worth highlighting is the potential for increased flexibility with software defined receivers. If designed with future upgrades in mind, a range of improvements and changes are possible without requiring new hardware. While the hardware necessarily has limits, many amateurs today take advantage of improvements and new functions by downloading

⁵ See the ARRL's Test Procedures Manual at pages 35-89 (receiver testing) at:

[http://www.arrl.org/files/file/Technology/Procedure Manual 2011 with page breaks.pdf](http://www.arrl.org/files/file/Technology/Procedure%20Manual%202011%20with%20page%20breaks.pdf).

⁶ See, e.g., Rob Sherwood's amateur receiver comparison chart and related explanations at:

<http://www.sherweng.com/table.html> and Adam Farson's test reports and explanations at: <https://www.qsl.net/ab4oj/test/reports.html>.

software upgrades rather than making hardware changes. This and related advances in software receiver technologies not generally employed by amateurs, such as dynamic frequency selection, could be useful to explore in the context of improving spectrum use through receiver improvements.

Conclusion

Given the inherent characteristics of the Amateur Service, regulatory performance standards for receivers used by amateurs would be counterproductive to the amateurs' continued experimentation and operations and should not be considered.

In the context of how to approach receiver issues, however, there are worthwhile lessons to be learned from amateur experience and experimentation in situations that duplicate some of the problematic adjacent signal and other scenarios called out in the NOI as problematic. The ARRL stands ready to provide additional information and contribute to the Commission's work in this area.

Respectfully submitted,

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ARRL, THE NATIONAL ASSOCIATION
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By:

A handwritten signature in blue ink that reads "DR Siddall". The initials "DR" are written in a stylized, cursive font, followed by the name "Siddall" in a similar cursive script.

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