

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C. 20554

<b>In the Matter of</b>	)	
	)	
<b>INTERFERENCE IMMUNITY</b>	)	<b>ET Docket No. 03-65</b>
<b>PERFORMANCE SPECIFICATIONS FOR</b>	)	
<b>RADIO RECEIVERS</b>	)	
	)	
<b>REVIEW OF THE COMMISSION'S RULES</b>	)	<b>MM Docket No. 00-39</b>
<b>AND POLICIES AFFECTING THE</b>	)	
<b>CONVERSION TO DIGITAL TELEVISION</b>	)	

**To: The Commission**

**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), by counsel, hereby respectfully submits its comments in response to the *Notice of Inquiry* (the Notice), FCC 03-54, released March 24, 2003, 68 Fed. Reg. 23677. The Notice requests comment from the public on the possibility of incorporation of receiver performance specifications into the Commission's spectrum policy on a broader basis. These comments are timely filed. For its comments, ARRL states as follows.

**I. Introduction**

1. In this proceeding, the Commission notes an intention to depart from the traditional process by which it seeks to ensure spectrum efficiency: the regulation of transmitted or radiated emissions from radio frequency devices. It has tentatively determined that incorporation of receiver performance (interference immunity) specifications could serve to promote more efficient utilization of the spectrum. ARRL congratulates the Commission on this determination and suggests that this finding is

absolutely correct. In fact, it is suggested that the Commission is long overdue in establishing mandatory performance specifications for receivers and RF devices in certain services.

2. This is not to say, however, that the establishment of minimum performance specifications for receiver interference immunity is suitable (or necessary) for all radio services. The establishment of such standards should not be done in such a way as to reduce the communications effectiveness of licensed radio services. Nor should it be done as a pretext to justify the overlay of incompatible sharing partners in bands substantially occupied by incumbent services. There are some services, such as the Amateur Radio Service (which is fundamentally an experimental service), in which receiver immunity standards are inapplicable and would preclude or largely frustrate one of the essential purposes of the service and a substantial portion of its operations. *See*, 47 C.F.R. §97.1.

3. The most important reason for incorporating receiver interference immunity standards in service rules is for the purpose of interference prevention between and among licensed services, and between licensed services and unlicensed RF devices. The latter, especially, has been at epidemic levels for many years. The Commission has had the authority to implement interference immunity standards for home electronic equipment for more than twenty years.

4. In sum, ARRL applauds the effort in this Notice, but it is urged that the Commission is approaching this matter from an incomplete perspective. The Notice indicates that the Commission is of the view that certain radio services are “dogs in the manger” because there is a preemptive effect of minimally performing receivers on the

ability to overlay “new” (i.e. additional) services on the bands used by the inefficient incumbents, or in adjacent bands. That is correct in some instances. The television broadcast service is perhaps the best example. However, the more compelling reason for implementing receiver immunity specifications is so that there are fewer instances of adverse interaction between the incumbent services and other co-channel or adjacent-channel incumbent services, or between incumbent services and unlicensed devices. Among unlicensed devices, home electronic equipment is the most troublesome in terms of interference immunity.

## **II. Background**

5. The issue of receiver immunity standards has been debated for many years. Radio frequency interference (RFI) legislation, including receiver interference susceptibility, was regularly proposed between 1972 and 1982. In 1973, H.R. 3516, a Bill to require that television receivers manufactured or sold in the United States be equipped with filters, was introduced by Representative Teague. In that year, the Commission received 42,000 RFI complaints, up 20 percent from the number of complaints received just three years earlier. In 1975, Representative Charles Vanik of Ohio introduced H.R. 7052, which proposed amendment of Section 302 of the Communications Act of 1934 to provide the Commission authority to regulate the manufacture of home electronic equipment to reduce the RF interference susceptibility of those devices. In 1977, during the peak popularity of the 27 MHz Citizen’s Radio Service, Senator Barry Goldwater introduced legislation, S. 864, to grant the Commission authority to ensure that consumer electronics devices manufactured or sold in the United States have adequate protection

against RF interception. In the March 2, 1977 Congressional Record, Senator Goldwater stated:

...The Federal Communications Commission informs me that it is now receiving complaints about radio frequency interference to home entertainment equipment at a rate of about 200,000 a year. Now, understand that this only the tip of an iceberg. The FCC has made studies which prove that there are at least 14 other people in the same neighborhood as a person who files a complaint who are annoyed by the same problem. This factor alone would bring the total number of persons adversely affected by radio frequency interference up to about 2.5 million. Thus, the true dimension of this problem is gigantic. There are many, many millions of citizens who are troubled in their daily lives by annoying and disruptive interference to the proper operation of electronic equipment in their homes as a result of the susceptibility of such equipment to radio frequency emissions....

What is not commonly understood is that the great majority of these complaints results from defects in home electronic equipment that pick up signals they should not be receiving. In fact, FCC has found in past years that 90 percent of all television-interference problems can be cured only at the television receiver. Interference has not been caused by the CB or amateur transmitter; it has resulted from basic design defects in the TV set itself....

It is my intention that the bill cover television receivers, AM and FM radio receivers, tape recorders, high-fidelity audio systems, phonographs, intercom systems and electronic organs. Public address systems would also be reached by the Bill. The legislation is not, however, limited to the above products. In a change from the Bill which I introduced last year, the new Bill drops the restrictive term "audio and visual electronic equipment" and substitutes for it the term "consumer electronic equipment." My purpose in making this drafting change is to reach electronic control devices and warning devices, as well as the above kind of equipment.

This legislation did not pass. However, there were hearings on S.864, held June 14, 1978, during which then-FCC Chairman Ferris was pointedly asked by the Senate Subcommittee on Communications why the Commission had not requested authority to regulate the interference-rejection capabilities of receiving devices, when its own

bulletins on the subject of RFI place much of the blame on their inadequate design. The chairman replied that a Notice of Inquiry was necessary on the subject.

6. Largely in response to the urging of the Senate Communications Subcommittee at the S. 864 hearing, the Commission did initiate an Inquiry in November of 1978 in Docket 78-369, which asked a series of questions concerning interference susceptibility of consumer devices. The Commission was interested at the time in ascertaining the scope of the problem from the perspectives of both the consumers and the manufacturers, and whether consumers would prefer aftermarket remedies for consumer electronic interference susceptibility, with attendant higher costs, or to have equipment made less susceptible to interference at the manufacturing stage. Viewing the matter properly as one of consumer protection, the Inquiry also asked what the proper level of government intervention in this matter should be. It asked other government agencies what comparable consumer protection programs existed, and whether they were premised on mandatory standards, incentive standards, or self-regulatory programs at the manufacturer level.

7. Finally, the Commission asked a series of questions on engineering issues, including whether there should be, as had been implemented in Canada, an “immunity grading” program; what type of equipment should be included in a receiver immunity program; whether the RF environment should be characterized differently for different types of electronic equipment; what measurement methods would be needed; whether there were, using these methods, reliability and repeatability problems; and what the aggregate effects might be of multiple transmitters affecting a single victim receiver.

More generally, the Commission asked what technical methods now existed to protect electronic equipment from interference.

8. In 1979, Senator Goldwater pursued the matter personally, calling a meeting to determine the progress of the Commission's inquiry and manufacturers' responsibility toward increasing RFI immunity of consumer electronic devices. Manufacturers were concerned about the costs of necessary modifications, and the Commission was asked why it had stopped accepting complaints about RFI to consumer electronic devices by telephone. Because of perceived progress in the dialog on this issue, Senator Goldwater decided to withhold his re-introduction of S. 864, and noted that he would continue to monitor progress.

9. In response to the Notice of Inquiry in Docket 78-369, the Commission issued a staff report and Further Notice of Inquiry. The staff report noted that the interference environment included on-channel and off-channel interference. The former occurs where the receiver reacts to unwanted signals on a desired channel from an assigned on-channel user. The latter occurs when a licensed or unlicensed spectrum user not assigned to a channel nonetheless radiates some RF energy on the victim receiver's channel. The staff report concluded that the only way to resolve on-channel interference is to reassign the transmitting source to another frequency, which is not generally practical, or by increasing the ratio of the desired-to-undesired signal power. Off-channel interference occurs even when a transmitting device is operating in accordance with Commission technical specifications. For example, with respect to television receivers, the RF environment is such that much stronger signals than were assumed in receiver design are actually present. The staff also concluded (prophetically) that interference from

unlicensed spectrum users was a “sleeping giant”, with the number of complaints of interference to victim receivers from those sources on the increase. The largest number of complaints, however, was attributed to receiver brute-force overload. The Commission staff claimed not to have a sufficient regulatory “handle” for those incidents. Another problem was receiver selectivity, such as the interaction between television receivers tuned to Channel 2 and Amateur 50-54 MHz operation, or military shipboard radars that interfere with Channel 13 in port cities.

10. The staff report discussed policy options, including a program of receiver grading and labeling with respect to the immunity to interference of home electronic equipment, either mandatory or voluntary. It also discussed minimum performance standards, and possible allocation of liability for interference resolution. One option even included placing the obligation for interference resolution on the transmitter operator, regardless of the extent of receiver interference susceptibility. This was opposed by ARRL in comments filed in response to the Further NOI. ARRL indicated that it could support receiver susceptibility grading and labeling, but that mandatory standards for interference rejection would be preferable, as they were more objective.

11. The interference environment at the time was not encouraging. In 1979, the number of interference complaints to the Commission regarding consumer electronics was 55,000. The next year that number had increased to 63,000, and by 1981, more than 64,000 complaints were lodged. As Senator Goldwater had earlier noted, only a small percentage (the Commission’s estimate was 12 percent)<sup>1</sup> of all citizens actually experiencing interference, actually lodged complaints. Senator Goldwater, noting little

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<sup>1</sup> *Hearings Before House Subcommittee on Telecommunications, Consumer Protection, and Finance of the Committee on Energy and Commerce. 96<sup>th</sup> Cong., 2d Sess. At 124 (1981).*

progress in resolving these incidents, introduced S.929, which would authorize the Commission to mandate the use of technology to address radio interference susceptibility in home electronic equipment. He indicated that he was “reluctant” to take that step to extend FCC jurisdiction over a matter which had been “left to the marketplace.” But, he noted, after “repeated unsuccessful efforts to obtain the electronics industries’ voluntary cooperation”, he believed it necessary to “rely on the FCC for guidance on a resolution of this issue.”<sup>2</sup> In November of 1981, hearings were held in the House Telecommunications Subcommittee on H.R. 5008, which would authorize the Commission to contract out testing of RF devices capable of causing interference. ARRL testified at that hearing concerning the need for legislation such as S.929, so as to clarify the Commission’s jurisdiction to promulgate minimum interference rejection standards. ARRL’s testimony<sup>3</sup> included the following:

(e)ducational FM broadcast stations...(are) not being issued licenses by the FCC...because television receivers cannot reject the FM station’s signal...(depriving) entire communities and cities...of educational radio programming. Hospitals and other safety of life services are denied authorizations for ...paging systems because of potential interference to television receivers. Police, fire, ambulance and other services are continually plagued and hampered by interference problems with individual consumers’ home electronic equipment. These problems need not occur and millions of consumers need not suffer because of a marketplace failure to address a growing problem.

In May of 1982, an amended H.R. 5008, which included Commission authority to promulgate minimum performance standards for receivers, was introduced. The House Telecommunications Subcommittee noted in Report No. 97-751 that the lack of voluntary

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<sup>2</sup> 127 Cong. Rec. S.3702.

action necessitated the legislation, but that the Commission had flexibility in exercising it. It was enacted to explicitly clarify the Commission's jurisdiction to regulate interference susceptibility of home electronic equipment and systems. A new Bill, H.R. 3239, was reintroduced, which contained both the provisions of S.929 and H.R. 5008. A joint conference committee reported the Bill out on August 19, 1982. The conference report stated that the Commission clearly had authority to prescribe minimum performance standards for home electronic devices, and that it expected "significant reduction of interference susceptibility" to radio frequency energy. Public Law 97-259 was enacted September 13, 1982.

### **III. The Commission Should Exercise its Heretofore Dormant Jurisdiction**

12. In response to the enactment of P.L. 97-259, the Commission in 1982 anomalously terminated a proceeding considering grading and labeling of television receivers, commenced four years previously, in Docket 78-307. However, industry efforts to address interference immunity in consumer electronic equipment commenced at the same time. The Commission staff requested the assistance of the Accredited Standards Committee C63-EMC of the American National Standards Institute (ANSI) to ensure that the voluntary standards community produced recommendations to decrease television receiver and VCR susceptibility, so as to obviate the need for regulations. The Consumer Electronics Group of the Electronic Industries Association undertook the major voluntary activity. In particular, EIA interim Standard No. 10 (Immunity of TV tuners to Internally-generated Harmonic Interference in the Band 535 kHz to 30 MHz) dated May, 1984 and

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<sup>3</sup> *Hearings Before House Subcommittee on Telecommunications, Consumer Protection, and Finance of the Committee on Energy and Commerce*. 96<sup>th</sup> Cong., 2d Sess. at 120 (1981).

Interim Standard No. 15 (Immunity of TV Receivers and VCRs to Direct Radiation from Radio Transmissions, 0.5 to 30 MHz) dated October 1985 were developed to provide measurement techniques and an immunity level guideline of a nominal value of 1 Volt/meter.

13. Beginning in 1983, ARRL participated in the ANSI C63 Committee work, and ARRL's participation continues to the present. ARRL did not concur in the above-referenced immunity standard No. 10, because of ARRL's view that receiver rejection guidelines should reflect real-world transmitted power levels, and thus should provide adequate protection to consumers. The 1 V/m standard is probably 20 to 30 dB lower than that needed to protect consumers against geographically proximate Amateur Radio transmissions. EIA believed, however, that protection levels beyond Standard 10 are best dealt with by on-site, post-market remedies, such as the addition of high-pass filters.

14. In April of 1986, ARRL filed a Petition for Rule Making, which would have required interference susceptibility labeling for home electronic devices. The label would indicate whether or not the device incorporated shielding, filtering or circuitry designed to reduce the susceptibility of the device to RFI. The argument was that such labeling would serve as a non-burdensome regulatory incentive to manufacturers both to adopt industry-generated RF rejection standards and to incorporate such design in their receivers or electronic devices that are otherwise RF-susceptible. It would be the least restrictive means of implementing the P.L. 97-259 authority, and it would also serve an educational function for the consumer. It would have been an immediate response to an immediate problem, and provide a source of relief at the manufacturer level for the consumer regarding interference resolution. Finally, it would be ancillary to establishing

voluntary industry standards, and it would not burden FCC enforcement resources. The proposal did not presuppose mandatory RF susceptibility standards, nor would it have required an evaluation of the sufficiency of the means by which immunity is incorporated into a particular device.

15. The Petition did not receive a file number. It was, rather, summarily dismissed by letter from the Chief Engineer only a month after it was filed. It was alleged to be “premature” since the susceptibility of home electronic equipment was then being addressed by ANSI. In June of 1986, ARRL Petitioned for Reconsideration of the unceremonious and arbitrary dismissal of the Petition, but this too was denied in October of 1986. The Memorandum Opinion and Order dismissing the Reconsideration Petition argued that any labeling was inextricably tied to establishment of a standard, which in this case did not exist. That argument was certainly not consistent with the instructions to the Commission from Congress, which had contrasted the establishment of standards (as the most substantial means of implementing P.L. 97-259) to merely requiring labeling of RF-susceptible devices (as the least restrictive means of implementing the authority conveyed by the legislation).

16. Because labeling was the least restrictive means of exercising its jurisdiction to regulate RF susceptibility of receivers and electronic devices, ARRL did not pursue the matter further, but instead continued to work with industry groups to arrive at reasonable industry standards for interference immunity for receivers. ARRL continues to believe that receiver immunity should be on the order of 3 V/m for receivers that might be in the near field of an Amateur Radio station. At this distance, a receiver would be immune to an Amateur Radio transmission at approximately 100 watts of transmitter power and an

antenna of 0 dBd (free space) gain, at approximately 100 feet separation. Such a standard for receivers, however, would not address the interference immunity of telephones, computers, alarm systems, audio systems, and other consumer electronic devices which constitute the bulk of the instances of interference involving Amateur radio operators.

The Commission has derived great comfort in the past from the regulatory requirement of Part 15 that unlicensed RF devices must accept any interference received from authorized radio services -- even that which might cause malfunction of the Part 15 device.

However, that regulatory provision is virtually useless to the consumer, who has purchased the device or system without advance notice of that fact, as a practical matter, and without notice that its interference susceptibility makes its proper operation conditioned on the happenstance of its operating environment (which is outside the capacity of the consumer in most cases to control). The result, since the cause and effect of RFI to consumer electronics is not intuitively obvious to non-technical consumers, is that the transmitter operator is blamed in every case.

17. The real need for receiver immunity specifications is in the area of consumer electronics. This has been the case for more than 20 years, as the foregoing history clearly establishes. With the current explosion of consumer electronics and unlicensed devices, the Commission must, concurrently with consideration of receiver immunity standards in licensed radio services, establish interference rejection standards for unlicensed home electronic equipment and systems as well.

## **V. Factors to Consider in Developing Receiver Immunity Performance Guidelines**

18. The Notice, at paragraph 14, asks a series of questions concerning factors that should be considered in establishing receiver interference immunity standards. ARRL offers the following views, subject to the caveat that the Amateur Service should not be subject to receiver immunity standards. The Amateur Service utilizes a wide variety of propagation types, emissions, bandwidths, power levels, receivers and antennas. Any performance standards for Amateur receivers would be purely arbitrary, and would compromise the experimental nature of the Service. Since Amateur Radio is often used in emergency and disaster communications, any regulation of receiver sensitivity or design would be counterproductive. Any interference suffered by Amateur Radio operators from other Amateur Radio operators is normally cooperatively resolved, and is essentially not a problem. Brute-force overload is occasionally encountered, but those instances are solved by radio amateurs without Commission intervention. Receiver immunity is not an intra-service issue.

19. With respect to radio services, the Commission asks whether receiver performance factors are related to frequency and operating power, and influenced by the nature of the RF environment. These factors are critically important, if not determinative. As a case in point, the ability of a high-frequency, narrowband receiver to reject unwanted signals is affected by the fact that the desired signal levels are quite weak, and there is required a commensurately high degree of receiver sensitivity. That sensitivity makes the receiver subject to interference from high ambient noise levels, and from noise due to power line leakage, conducted emissions, individual point-source radiators such as RF lighting devices, and adjacent-band or adjacent-channel transmitted signals. This

cannot reliably be offset by higher transmitted power from the desired signal source, since the path lengths in the high-frequency bands are long and influenced by highly variable, ionospheric propagation factors independent of transmitted power and receiver sensitivity. Filters and variable bandwidth tuning can offset these factors somewhat, but are not a complete solution.

20. The Notice asks whether there are factors that are less important or more important across receivers used with different services or with devices used to receive signals transmitted using different modulation methods. In general, certain modulation schemes and emissions produce radically different interference susceptibility. Data modes with error-correction protocols are of course most reliable in the presence of high noise environments or in the presence of interfering narrowband signals, as are wideband and spread spectrum emission modes generally. Modulation methods such as spread spectrum that facilitate immunity of receivers to unwanted signals should most definitely be considered germane to the process of establishing performance guidelines, especially for unlicensed devices.

21. The Notice asks whether, and how to rank immunity parameters in accordance with their level of importance to performance. Specifically, it asks about procedures for determining how to “trade off” the level of receiver performance with the practical issues of cost and implementation. The answer to this largely depends on the level of degradation expected in the service, and the amount of degradation from co-channel or adjacent-channel interference sources. For public safety receivers at 800 MHz, for example, where very little interference can be tolerated, a higher degree of interference rejection might be mandated. This may well substantially increase the cost of the

receivers, but the extra cost could be justified by the importance of interference immunity. There should be very little flexibility in this area, due to the need to protect public safety communications and maximize reliability. With respect to unlicensed consumer electronic devices, a highly competitive industry, cost becomes more of an issue, and performance is not quite as critical from the perspective of the manufacturer (though it may be from the perspective of the consumer, as discussed above). The Commission should either mandate a standard for all consumer electronic devices, or adopt a labeling or grading system which allows the consumer to make his or her own choice about the importance of interference immunity and the value of such relative to increased cost.

22. The Notice is very much concerned with the differing RF environments for gauging receiver immunity performance. This is well-taken. Receiver performance is dependent not only on the radio service and the functions thereof, but also (1) whether the receiver is deployed in mobile, fixed or aeronautical mobile use; (2) the frequency range at issue; (3) bandwidth, (4) the normal desired-to-undesired signal ratios, and (5) the antenna to which it is connected. A generic environment is not realistic for receiver immunity standards, as it would lead to substantial inequities in various radio services.

23. Nevertheless, some generalities can be assumed. Digital, software controlled or defined radios with dynamic frequency control offer the most effective interference control opportunities. The benefits of dynamic frequency selection, dynamic transmitter power control, and dynamic selectivity and receiver sensitivity cannot be overemphasized. Clearly, the best opportunity to deal with receiver immunity is through Software Defined Radio (SDR) technology. Existing trunked radio technology is also a

relatively efficient means of offsetting the effects of interference or narrowband noise in certain bands.

24. It is not believed that manufacturers should be relied upon exclusively to agree on performance categories or to define quantifiable ranges. As discussed above, the threshold for acceptable performance differs from the relative perspectives of consumers, manufacturers, and licensees in other radio services. Looking at the history of voluntary standards for RF interference rejection, the track record of manufacturers is not exemplary. It is believed that the Commission should establish a wide variety of standards, perhaps with the assistance of ANSI or other standards-setting organizations, for receivers in most licensed radio services and for unlicensed devices, taking into account the variety of RF environments in which the devices are expected to be deployed. At the very least, the Commission should publish<sup>4</sup> recommended guidelines for receiver immunity, and if those guidelines are not met in an individual interference case (after an appropriate implementation period to phase in new receivers in a given radio service), the presumption should be that the victim receiver is a contributor to the interference and therefore either not entitled to regulatory relief, or the user should be required to contribute to an interference solution. Of course, this would not apply to unlicensed devices, which are entitled to no interference protection in the first place. Nor should the

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<sup>4</sup> The Commission's Office of Engineering and Technology publishes "bulletins" from time to time, such as the Bulletin 65, which explains the methods of testing for compliance relative to human exposure to RF energy. This format would work well for receiver immunity guidelines. It would offer flexibility to manufacturers and would be informative for consumers, and those who are confronted with an interference problem.

presumption apply to services such as the Amateur Service, for reasons specified above.

## **VI. Receiver Immunity Standards in Spectrum Policy**

25. The Notice asks what approaches the Commission should use for implementing receiver immunity performance in its spectrum policies, other than voluntary industry standards, guidelines promulgated by the Commission (either in technical publications or as advisories in the rules) or mandatory standards adopted in the rules. ARRL suggests that the Commission should approach immunity standards from a cooperative, refereed approach. As suggested above, standards organizations such as ANSI should be consulted, and an industry advisory committee appointed. Because receiver standards will differ from service to service, and from frequency band to frequency band, the development of receiver immunity guidelines or mandatory standards should be done through cooperative industry participation, and if necessary, negotiated rulemaking, but with Commission oversight sufficient to insure that the standards are sufficient to protect licensees and consumers of RF products.

26. The Commission asks about the relationship between receiver standards and models used to manage the spectrum, including transmitter in-band and out-of-band emission limitations and definition of assigned frequency bands and areas. Given these, the Commission wants to know whether the costs and benefits of improved receiver interference performance would be internal to licensees, and whether they should be expected to design their own systems, and make efficient decisions regarding those systems. In general, licensees rely on manufacturers to design the appropriate receivers for their radio services, and do not themselves make decisions that affect receiver

immunity. This is especially true, for example, with respect to public safety and other land mobile radio service entities. The licensee (other than, as discussed above, the Amateur Service) is not in a reasonable position to negotiate the interference susceptibility of systems with manufacturers of equipment used in those systems. Licensees would therefore not make efficient decisions regarding receiver interference performance. Other criteria might overshadow interference potential in equipment purchasing decisions. Under a fully developed property rights model for spectrum allocations, it might be reasonable to rely on a licensee to serve as architect of the systems used in that licensee's spectrum, since the maximization of use of the spectrum depends on the efficient performance of both transmitters and receivers. A Guard Band Manager, for example, might be more interested in specifying minimum performance standards for receivers used in the guard band in a particular market, such that maximum frequency re-use is guaranteed.

27. As a general principle, receiver interference immunity can be considered together with other factors in spectrum allocations decision making. However, it should not be used as a means of justifying the overlay of otherwise fundamentally incompatible spectrum sharing partners. Specifically, receiver immunity standards should not be mandated for a particular service to the extent that the communications throughput, capacity or reliability in that service is materially reduced, or the cost of equipment substantially increased, merely to allow the addition of a new service to a band that otherwise would be incompatible. Requiring better performance from receivers or RF-susceptible devices is a valid, reasonable, and long overdue requirement, but the major

goal of doing so should be to prevent instances of interference, not solely to allow the overlay of otherwise incompatible sharing partners in deployed spectrum.

28. ARRL would specifically urge that the Commission not make interference susceptibility of unlicensed devices a criterion in determining whether a licensed radio service should be afforded an allocation in bands in which unlicensed (and hence unprotected) devices are deployed. The Commission recently refused to allocate an extremely small, 2 kHz band in the Low-frequency portion of the spectrum to the Amateur Service because of the ill-conceived prior deployment of unlicensed power line carrier systems in that band. Despite showings indicating that, in all but the most unusual circumstances, there would be no interaction between the unlicensed power line carrier facilities and Amateur stations, the Commission stated that it would not make an allocation without taking into account the current uses of the band. Therefore, it has in effect refused to make an allocation based on interference susceptibility of unlicensed and unprotected RF devices and systems. This is improper spectrum management and the policy should be revisited.

29. ARRL would not urge the Commission to require involuntary replacement of receivers in order to implement improved receiver interference immunity, even if the immunity standards ultimately adopted are mandatory. As the Notice, at paragraph 38, aptly puts it, “existing receivers are, for the most part, built to provide levels of interference immunity as determined to be necessary by their designer/manufacturer to provide satisfactory service.” Therefore, once new standards are in place, there should be a reasonable transition period in all services to phase in equipment with greater immunity as older equipment becomes obsolete.

## **VII. Conclusion**

30. The Commission should implement either mandatory receiver immunity standards, or at least guidelines, in most services. From service to service, and even intra-service, different receivers used for different functions in different environments will require unique standards. These standards should be established cooperatively among the Commission and industry, licensees and standards setting organizations and consumer groups. The most pressing need, however, is for improved immunity of consumer electronic devices and systems. The Commission has had the authority to require this for many years, and has failed repeatedly to exercise it. The explosive growth of unlicensed devices which are RF-susceptible has stymied allocations otherwise proper and reasonable in certain frequency bands, and it has resulted in many thousands of instances of complaints against Amateur Radio operators and in some cases, civil and criminal actions being filed. At the same time, no receiver immunity standards are necessary or practical in an essentially experimental radio service such as the Amateur Service.

Therefore, the foregoing considered, ARRL, the National Association for

Amateur Radio, requests that the Commission take further action regarding receiver immunity performance specifications as recommended herein.

Respectfully submitted,

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