

Before the
U.S. DEPARTMENT OF COMMERCE
National Telecommunications Information Administration

In the Matter of

**United States Spectrum
Management Policy
For the 21st Century**

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Docket No. 040127027-4027-01

Comments by Nickolaus E. Leggett
N3NL Amateur Radio Operator

The following is a set of formal Comments from Nickolaus E. Leggett, an amateur extra class radio operator, inventor (U.S. Patents 3,280,929 and 3,280,930 and a computer patent application pending), and a certified electronics technician (ISCET and NARTE). I also have a Master of Arts degree in Political Science from the Johns Hopkins University (May 1970).

My comments are directed at the social impacts of spectrum reform. Each comment is associated with a specific quoted item from the Notice of Inquiry (NOI).

“1. Does the bifurcated spectrum management system currently used by the United States present obstacles to the most efficient and beneficial use of the spectrum? Should the Federal government consider establishing a centralized organization to perform these functions?”

A centralized organization would shift the center of gravity in spectrum management decisions away from the Federal Communications Commission to the executive branch of the Federal government. This would have serious social and political consequences.

The Federal Communications Commission was set up by Congress to accommodate the numerous and diverse parties that want to have access to the electromagnetic spectrum. Despite some problems, the FCC has managed so far to adequately balance these competing interests in a quasi-judicial process that is highlighted by an unusual degree of openness and opportunities for public access.

Shifting this process to an executive branch agency would reduce the level of public access and would make spectrum allocations more subject to the influence of politically powerful interests. Inevitably, the spectrum allocation process would become an instrument of administration policy and the judicial-style detachment would be lost.

The small users of the radio spectrum would have less input and impact on spectrum management than they currently have at the Federal Communications Commission. These small users include the following:

- Amateur radio operators
- Citizens band radio operators
- Radio astronomers (including both amateur and professional observers)
- Part 15 radio experimenters on 190 kHz
- Radio control (RC) model operators
- Short wave broadcast listeners
- Low Power FM (LPFM) community radio broadcasters
- Low Power Television (LPTV) community TV broadcasters
- Future Low Power AM (LPAM) community radio broadcasters
- Future Citizens Broadcasting Band neighborhood radio broadcasters operating on millimeter wave allocations and terahertz (infrared light) bands

All of these small radio spectrum users provide useful services to the nation and to their specific communities. They provide a diversity of views and participants, communications during emergency situations, and a source of both content and technical innovations.

With the spectrum management process increasingly focused on large interests, these small users would be pushed aside over time. This future trend will deprive the Nation of the contributions of these individuals and small organizations.

In addition, such a trend towards representing large interests will cause a decline in the legitimacy of the spectrum allocation process. Early examples of this can be seen in the media ownership issues and in the emerging battle on the interference from Broadband over Power Line (BPL) technology. It is not in the public interest of the United States of America to have a declining legitimacy in this basic function of government.

“8. Should the U.S. spectrum management system include long-range planning activities by NTIA, the FCC, and other Federal agencies?

a. What should be the nature, scope, and objective of these planning activities?

b. What should be the nature and scope of the public involvement in these planning activities? “

Any long-range planning activity by the United States government should provide ample opportunity for public comment in both written and spoken form. The Federal Communications Commission has been quite effective in this regard. Other Federal agencies have not been nearly as good.

Public participation by all segments of society is required for a system of regulation to be legitimate. Participation is necessary but not sufficient for a system of regulation to be legitimate. In addition, the results of the regulatory process must be fair to all parties for the regulations to be legitimate.

If spectrum allocation is moved from the Federal Communications Commission to some other agency, this burden of legitimacy will be very heavy. This will be due to the need for the new agency to prove that it is fair to all segments of society. The burden of proof will be on the new agency, since it will be an unknown without an existing track record of fairness. The possible close connection of the new agency to the executive branch and its political agenda would also increase the burden to prove fairness and generate legitimacy.

17. Should NTIA establish a pilot secondary lease program whereby the Federal government can lease temporary and/or preemptable access to Federal government spectrum to non-government users?

This question raises the issue of the constitutionality of the auctioning or leasing of radio spectrum. Attorney Donald J. Schellhardt has raised this question in relation to equal protection of the law (14th Amendment of the United States Constitution) considerations. His central point is that a lease or auction program that inherently favors large and wealthy organizations denies equal protection of the law to the numerous organizations and individuals who are not wealthy enough to lease spectrum.

I am formally requesting that the NTIA engage its legal staff to research Mr. Schellhardt's question and report to the public on its findings.

“24. Discussions on efficient use of the spectrum may focus on receiver performance standards. Most spectrum uses involve at least one electromagnetic emission and at least one receiver/detector to recover the information contained in the emission. In activities such as radio astronomy and a variety of "electromagnetic" sensing activities (such as those of the National Aeronautics and Space Administration and Department of Commerce), only the receivers can be controlled because the emissions come from nature or space. In most other spectrum uses, the opportunity exists for controlling, through design, the operational performance of both the receiver and the emitter. NTIA seeks comments on how receiver performance standards can be employed to increase spectrum efficiency and minimize harmful interference.”

This issue has already been discussed in a docket at the Federal Communications Commission (Interference Immunity Performance Specifications for Radio Receivers - ET Docket No. 03-65). The NTIA should include all of the comments from that docket in this proceeding.

My two sets of comments in this FCC docket are in the Appendix A of this document. As I pointed out in my comments to the FCC, performance standards can greatly increase the cost of radio receivers and reduce the access of poor people to radio broadcasts. In addition, receiver performance standards can greatly inhibit experimental and educational work with receiver circuitry.

30. Since the implementation of some new and expanded radiocommunication services and technologies may require the reallocation of spectrum, discuss whether and the extent to which auctions for spectrum licenses in given frequencies or bands of frequencies could constrain future reallocations of those frequency bands.

As discussed above, the auctions themselves appear to be quite dubious from a political science and legal perspective. This proceeding needs to address the constitutionality of spectrum auctions and leases.

34. The terrorists' attacks against the United States on September 11, 2001, raised serious national concerns regarding the ability of Federal, State, local, and tribal entities to maintain continuity of their critical governmental activities during future attacks as well as during unexpected natural disasters.

If the terrorists or rogue nations are sufficiently advanced, they can use high power microwave (HPM) or electromagnetic pulse (EMP) weapons to disable communications infrastructure over significant geographic areas. The NTIA should examine the prospect of setting aside some spectrum for communications systems that are protected from this threat by appropriate shielding and bypassing components.

In this regard, the NTIA is invited to examine the FCC docket RM-10330, Amendment of the Commission's Rules to Shield Electronics Equipment Against Acts of War Or Terrorism Involving Hostile Use of Electromagnetic Pulse (EMP). In this docket take a look at the comments from Dr. William A. Radasky filed on 12/19/2001.

Other Suggested Actions

The NTIA should clearly and publicly evaluate the impact of any proposed modifications to the spectrum allocation process on the small users of the radio spectrum.

In view of the complexity of the issues raised in this NOI, it is clear that the closing date for comments of March 18, 2004 is not adequate. I am formally requesting that at least 60 days be added to the comment period. This extension of time would allow more members of the public to become aware of this NOI and to comment substantively on it.

Respectfully submitted,

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February 5, 2004

APPENDIX A – COMMENTS TO THE FCC ON RECEIVER PERFORMANCE STANDARDS

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

In the Matter of)
)
Interference Immunity) **ET Docket No. 03-65**
Performance Specifications)
for Radio Receivers)
)
Review of the Commission’s) **MM Docket No. 00-39**
Rules and Policies Affecting the)
Conversion to Digital Television)
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)

To: The Commission

**COMMENTS of Nickolaus E. Leggett
N3NL Amateur Radio Operator**

The following is a set of comments from Nickolaus E. Leggett, an amateur radio operator (Extra Class licensee – call sign N3NL), inventor (U.S. Patents # 3,280,929 and 3,280,930 and one electronics invention patent application pending), and a certified electronics technician (ISCET and NARTE). My comments are directed at the impact of receiver standards on simple radio kits and projects used by beginning students of electronics.

Needs of Beginning Students of Electronics

Electronics technology is a mysterious subject to people who are first encountering it. These beginning students need to work with very simple electronic

circuits and radios in order to develop mental models of electron and signal flows. As they work with these simple circuits they learn the functions of the discrete radio components (such as resistors, capacitors, coils, diodes, and transistors) and they see how these parts work together to provide the functions of signal detection, amplification, and output.

The current marketplace offers simple radio receiver kits and electronics project sets that allow the beginner to build and operate very simple radio receivers. These kits are offered by vendors ranging in size from very large firms such as Radio Shack to small organizations such as the Crystal Set Society. Typically these receivers use two or three transistors and a small set of passive components. Some of these receivers are even simpler, such as single-diode crystal sets and one-tube receivers. These receivers generally operate in the AM, FM, and short wave broadcast bands.

All of these very simple receivers allow people to teach themselves the basics of radio electronics. I used such radios myself in learning electronics and moving ahead to more advanced capabilities (and certifications) in the field of electronics.

America needs people who want to learn radio electronics for the following reasons:

1. Novice radio builders will often advance on to careers in electronics technology and engineering. Thus the little radios serve as a recruiting process into engineering and technology. Many children are introduced to electronics this way.

2. Learning the functions and operation of discrete components encourages a sophisticated view of electronics that is useful for high-quality engineering analysis.
3. Some of the builders of these radios will proceed to invent new electronics technology that is useful to the Nation's economy. They will create these inventions either as employees of technology firms or as independent inventors.
4. People with a detailed hands-on knowledge of electronics can improvise communications in emergency situations that can arise during widespread natural disasters or terrorist events.

Impact of Receiver Performance Standards on Simple Radio Kits

If receiver performance standards are applied to these simple radios, their educational function can be defeated. The radios would have to be redesigned with much more complicated circuits to meet the standards. The parts count and circuit complexity would be greatly increased. Integrated circuits probably would be added to the circuit. The simplicity that allowed the beginner to grasp the functioning of electronic circuits would be lost.

As a result of this increased complexity, electronics would remain as a mysterious "black box" for many people. These people would never have the opportunity to grasp the basic simplicity and elegance of electronics theory. This is a very real concern in the educational area. Indeed, I remember the great difficulty that I originally had in learning the operation of components, such as transformers, that now seem obvious to me.

Suggested Actions

My recommendation is that such educational radios and project kits not be subject to receiver performance standards of any sort. These radios and project kits should be explicitly excluded from any such standards.

Respectfully submitted,

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March 31, 2003

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC. 20554

In the Matter of)	
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Interference Immunity)	ET Docket No. 03-65
Performance Specifications)	
for Radio Receivers)	
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Review of the Commission's)	MM Docket No. 00-39
Rules and Policies Affecting the)	
Conversion to Digital Television)	
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To: The Commission

ADDITIONAL COMMENTS of Nickolaus E. Leggett
N3NL Amateur Radio Operator

The following is a set of comments from Nickolaus E. Leggett, an amateur radio operator (Extra Class licensee – call sign N3NL), inventor (U.S. Patents # 3,280,929 and 3,280,930 and one electronics invention patent application pending), and a certified electronics technician (ISCET and NARTE). This is my second set of comments in this proceeding. My first set of comments was filed on March 31, 2003.

This set of additional comments is focused primarily on the impact of receiver performance specifications on low-income and experimenter users of radio receivers in various radio services. The comments include broadcast radio receivers and receivers used in amateur radio and radio astronomy.

AM and FM Broadcast Band Radios

Low-income listeners have had access to the AM and FM broadcast bands for years. This access is provided by very inexpensive “transistor radios” providing satisfactory reception of local AM and FM broadcast stations. Standards that improve the performance of these broadcast band receivers could easily increase their parts count, complexity, and cost. Such a development would have a negative social effect of closing the poor out of the broadcast connection to their communities and the Nation.

Any new broadcast radio receiver standards should be flexible enough that the future production of inexpensive radios is protected. A retail price target or cap of ten dollars per radio should be included in the standards for a basic AM or FM receiver. Manufacturers should be allowed to ignore the standards when a basic radio’s cost to the consumer would be pushed above the cap by the impact of the standards.

This issue of broadcast radio affordability becomes even more important as the broadcast world moves towards digital technology. At the current time, digital technology is more expensive than the simpler traditional analog radio technology. Poor people cannot afford this digital technology. The Commission should address this problem by either requiring broadcast stations to continue transmitting analog signals along with digital signals for a decade or more. Or the Commission can work with the standards setting bodies to make sure that a cheap digital receiver is accommodated by the receiver performance standards.

Short Wave Radios

The issue of affordability applies to radios that receive short wave broadcasts. The current high-power international short wave broadcasts can be received by very

simple radios such as regenerative receivers or even crystal sets. A crystal set is a non-powered radio consisting of a diode rectifier component and a tuned circuit (coil and capacitor).

This ease of reception is very important in that it allows people in third-world nations to receive international broadcasts from outside the borders of their nations. This is a useful capability for people who are in authoritarian nations or who are too poor to purchase more advanced radios. Many people in the World are too poor to purchase advanced radios.

The Commission should encourage the manufacture of simple short wave radios that can be an export product from the United States to other nations. Any receiver performance standards, directed at international short wave broadcast receivers, should be structured so that very simple and inexpensive radios can be manufactured here in the United States. In addition, the Commission should examine the role of analog AM technology in international broadcasting. Converting short wave broadcasting to digital modes would probably price the radio receivers out of the reach of the majority of third-world residents. Thus the Commission should work internationally to retain some AM short wave broadcasting and with the standards organizations to permit the manufacture and marketing of very inexpensive digital short wave radios.

Amateur Radio Receivers

The amateur radio service is oriented towards experimental and self-training operation by licensed radio amateurs (refer to Part 97.1 of the Commission's rules listed in Appendix A of this document). Much of the experimental work in amateur radio is focused on low power (QRP) stations that are built from kits or are homemade. Imposing

receiver performance standards on these low power stations would reduce the design choices available in their production. In addition, the resultant increased complexity would reduce the field-repairability of these otherwise simple radios. As I have already pointed out in docket RM-10412, field repairability is an important factor in the self-training, electronic experimenting, inventing, and extended emergency communications aspects of amateur radio.

In addition, many amateur radio stations are frequency agile using variable frequency oscillators (VFOs). This enables a constantly changing frequency spacing between amateur stations that would defeat the purpose of many specific receiver standards.

The Commission should avoid establishing any receiver performance standards in the amateur radio service. The amateur operators themselves can act through the American Radio Relay League (ARRL) to set up receiver performance guidelines if they feel such a step is necessary.

Radio Astronomy Service

Radio astronomy operation requires very specialized high-sensitivity broadband receiver design. Many radio astronomy installations are one-of-a-kind installations that are assembled for specific scientific purposes.

This activity requires unusual radio receiver assemblies that are best left to the design of the experimenter in this important field of science.

Homemade Radios

The Commission should not attempt to impose any receiver performance standards on radios that are made by the user. Such standards would be basically

impractical and would also conflict with the significant educational value of making one's own receiver. A person learns a lot from building his own radio because he must plan the layout and connectivity of the components and then he must implement this layout to create a working radio receiver. In doing this, the person learns to read published schematic diagrams showing the components' connectivity. Eventually he progresses to an even more advanced state of knowledge where he designs his or her own radio receiver from basic electronic principles. This is the art of radio frequency electronic engineering. Some of these experimenters produce new innovations and inventions such as the recent invention of a variable capacitor formed using a conducting liquid.

If the Commission attempts to impose receiver design standards on the person building his own receiver, the educational and inventive process will be inhibited by the introduction of additional complexity and filtering/bandwidth aspects that deflect the builder from his own personal goals in building his receiver. Radio experimenters are a precious aspect of the electronics discipline and they should be allowed to learn and grow undisturbed by regulatory intrusions.

Private Standard-setting Organizations

Private standard-setting organizations have a useful role to play in receiver design. However, it is important to remember that the output of such organizations does not necessarily equal the public interest. This is because the private organizations have a definite view that is not necessarily representative of society as a whole. This requires that the Commission, as a representative of the Nation as a whole, should provide some guidance and limits to the activities of the private standards-setting organizations.

Suggested Actions

The Commission should carefully consider that receiver performance standards can have a negative impact on the access by the poor to radio broadcasts. In addition, receiver performance standards are not appropriate in experimental radio services such as amateur radio and radio astronomy.

Respectfully submitted,

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May 2, 2003

APPENDIX A – Basis and Purpose of the Amateur Radio Service

97.1 Basis and purpose.

The rules and regulations in this Part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles:

- (a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.**
- (b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.
- (c) Encouragement and improvement of the amateur service through rules which provide for advancing skills in both the communications and technical phases of the art.
- (d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.
- (e) Continuation and extension of the amateur's unique ability to enhance international goodwill.