

**Before the
UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Washington, D.C. 20230**

In the Matter of)
) **Docket No. 040127027-4027-01**
United States Spectrum Management)
Policy for the 21st Century)

To: Strategic Spectrum Planning and Reform Division, NTIA

**COMMENTS OF ARRL, THE NATIONAL ASSOCIATION FOR AMATEUR RADIO
IN RESPONSE TO NOTICE OF INQUIRY**

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) in the captioned proceeding. The Notice was published in the Federal Register on or about February 2, 2004, and therefore these comments are timely filed. In this proceeding, the United States Department of Commerce's National Telecommunications and Information Administration (NTIA) sought comments on policy reforms relative to the management of the radio frequency spectrum as a national resource. From the perspective of the Amateur Radio Service, which is itself a national public resource of volunteer communicators and technicians, ARRL respectfully submits the following comments in response to the Notice.

ARRL is the national Amateur Radio society in the United States. It has more than 155,000 members, and has been the principal advocate for the interests of the Amateur Radio Service, numbering more than 680,000 licensees of the Federal Communications Commission.

ARRL has served in this capacity for ninety years. It has a staff of more than one hundred persons at its headquarters in Newington, Connecticut. ARRL also employs a full time staff of four persons, who, with the assistance of others in the Washington, D.C. area, are devoted to interfacing with the Federal government on technical and other regulatory issues affecting Amateur Radio. Recently, ARRL submitted comments to the Federal Communications Commission's Spectrum Policy Task Force (SPTF) on July 8, 2002, and to the Commission in ET Docket No. 02-135 on the Spectrum Policy Task Force Report Recommendations for Spectrum Policy Reform on January 27, 2003. ARRL has been an active participant in forums of the SPTF, the Johns Hopkins University Capstone Project, and the Forum on Spectrum Management Policy Reform organized by the National Academies' Computer Science and Telecommunications Board. ARRL has extensive domestic and international spectrum management experience, and is a regular participant in United States delegations to meetings and conferences of the International Telecommunication Union, as well as a regular contributor in FCC proceedings dealing with the Table of Allocations, 47 C.F.R. §2.106.

In response to certain of the specific questions in the instant Notice, ARRL states as follows:

First Objective: Facilitate a modernized and improved spectrum management system.

Federal Government Organizational Issues

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?

The bifurcated spectrum management system has its benefits and disadvantages. A significant advantage of maintaining the present scheme of separate spectrum management functions is that the separate functions provide, as a practical matter, a system of checks and balances. A disadvantage of the separate functions is that the separation can delay needed action,

and promotes somewhat parochial and divergent priorities. On one hand, the FCC tends to advocate, sometimes without the apparent exercise of technical discretion, entrepreneurial uses of the spectrum. In an effort to achieve the overarching goal of competition in delivery of telecommunications services and products, FCC has acted as a self-described “cheerleader” for new, typically unlicensed, technologies without a firm grasp of technical compatibilities and incompatibilities. On the other hand, NTIA has a dual (and often potentially conflicting) role of the principal telecommunications advisor to the President of the United States and the spectrum manager for Federal agencies. It is somewhat ironic that the FCC is in this context a lead advocate of commerce, while NTIA has tended to focus on the portion of its role as the protector of non-commercial (Federal) spectrum. Yet, this arrangement tends to provide a reasonable balance between important, but conflicting, goals and policies. ARRL’s experience is that the FCC has been inconsistent at best in its spectrum protection efforts; more so in the past decade than previously. NTIA’s spectrum management office, on the other hand, regularly provides professional and impartial evaluations of new technologies and the interference potential of those technologies to government exclusive and shared government/non-government spectrum. A bifurcated system of spectrum management contributes to NTIA’s ability to temper the FCC’s “cheerleader” role toward spectrum use by new technologies by addressing directly the technical realities of interference prevention and electromagnetic compatibility.

It might, on the other hand, be more efficient to have a single spectrum management entity. There is only one Table of Allocations, however prioritized among government and non-government uses, international and domestic uses. There is increased sharing of bands between Federal and non-Federal users, and a single spectrum management entity could improve the efficiency of decisionmaking with respect to such issues. Such an entity could operate under

“negotiated rule making” procedures in which the stakeholders are invited to the same table as opposed to the present “command and control” approach. ARRL has for years advocated increased use of negotiated rulemaking in spectrum allocation matters, and continues to believe that advocates of new technologies are in a position to resolve formally, in advance of receiving regulatory authorizations, any compatibility issues.

Given the competing goals and interests, and recognizing that there is a need for expeditious resolution of spectrum management issues (which could be done through the negotiated rulemaking process by a centralized spectrum management organization), ARRL suggests, as a compromise, that the FCC and NTIA should adopt as a “best practices” guide a return to the standard operating procedures used in years past, when the spectrum management professionals of both FCC and NTIA worked closely and cooperatively, and when there was regular communication between the two entities at the staff level. It is apparently not sufficient that FCC should participate as a member of the IRAC. Instead, FCC spectrum management officials in the Office of Engineering and Technology should regularly meet with the NTIA Spectrum Management Office.

2. What are the benefits and risks of combining the common administrative processing functions performed by the NTIA and the FCC?

In its broadest sense, the term “administrative processing functions” could be applied to everything below the spectrum policy level having to do with allocation and assignment of frequencies. Combining the deliberative part of the process could be more efficient and expeditious than separate consideration by FCC and NTIA especially if negotiated rule making were applied. There could be efficiencies in having a single entity process assignments and maintenance of a common database available to all stakeholders.

Spectrum Allocation Issues

3. *Published versions of the United States Table of Frequency Allocations compiled by NTIA¹ and FCC² differ in several ways (e.g., different priorities, different document printing schedules, etc.). NTIA seeks comments on the feasibility, benefits, and risks of replacing the existing tables with a single national policy document.*

A single Table would be preferable from the viewpoint of the Government in doing a function once and thereafter having it timely maintained, and from the perspective of the user who would like to be able to rely on a single official document or database.

4. *The table of allocations divides the spectrum into various categories: government exclusive, non-government exclusive, and shared. Are the current exclusive allocations justified?*

Looking at the matter purely from an administrative viewpoint, at present, it is necessary to look at two columns in the Table to determine government and non-government allocations and applicable footnotes. While it is appealing to find the needed information in one place, it would seem that an editorial review of G, NG and US footnotes would first be required.

Any evaluation of the wisdom of considering elimination of exclusive allocations must be prefaced by an exhaustive analysis of the RF noise environment in various allocations. The FCC has considered the use of receiver immunity, interference temperature metrics, and cognitive radio technologies as various alternatives to compartmentalized exclusive allocations for various incumbent services. These are reasonable techniques and may in the longer term, in the aggregate, provide a more flexible means of spectrum management than do exclusive allocations. However, neither the FCC nor NTIA has conducted a reliable evaluation of ambient noise in the radio spectrum, and is not adequately cognizant of trends, upward or downward, in terms of man-made noise. No new paradigm can be adopted for allocations unless and until these trends

¹ *See id.*

² 47 C.F.R. § 2.106 (2002).

are known. Allowing certain spectrum overlays in formerly exclusively allocated bands may appear reasonable now, but in the future, increases in ambient noise in the subject bands may make those same overlays incompatible with incumbent services.

Frequency Coordination

5. The FCC has delegated specific portions of its spectrum management authority to certified frequency advisory committees that are authorized to receive applications for spectrum uses from a selected group of users, coordinate the applications among the affected incumbent spectrum users, and submit the coordinated applications to the FCC for approval. NTIA seeks your comments on improving this process or expanding this management concept to other bands.

This delegation of FCC spectrum management authority presently does not apply to the Amateur Radio Service. Generally, the Amateur services are allocated bands for use on a real-time self-assigned basis. That is, an individual amateur station can select an operating frequency within an allocated band without a frequency assignment from the government or a committee.

More in detail, Part 97 of the FCC rules divides some of the amateur allocations into segments for different types of emission, such as telegraphy and telephony, and wideband and narrowband data emissions. ARRL is preparing a petition asking the FCC to consider band segmentation by bandwidth rather than by mode of emission. Essentially, there is a preference among U.S. radio amateurs that there be some segmentation by regulation, particularly in the crowded HF bands.

Within the Amateur Radio Service there are a number of frequency coordinating bodies which operate on a volunteer, cooperative basis. Most of them coordinate frequencies for repeaters in the VHF and UHF bands to promote efficient operation while maintaining desired frequency and distance separations. Overall, this practice has been successful and will continue for the foreseeable future. Coordinators have no enforcement power except for cooperation between users and through peer pressure. In a few cases, it is necessary for the FCC Enforcement

Bureau to help resolve problems and generally a station not having gone through the coordination process has a principal obligation to resolve interference, but cooperation with a coordinated user is expected and urged.

For Amateur-Satellite Service frequencies, the International Amateur Radio Union has a Satellite Adviser who appoints an advisory panel of experts to assist in coordinating frequencies and maintaining a database of existing and proposed Amateur satellites. Satellites, such as developed as university projects operating in Amateur-Satellite bands, are also considered even though they may be experimental stations not licensed as Amateur Satellites.

The experience with volunteer, non-mandatory frequency coordination in the Amateur Service is, overall, a positive one. The view of other radio services, exposed to mandatory private sector frequency coordination, is not as positive. The land mobile frequency coordination procedures are expensive and slow, and they have led to inequities due to lack of consistent coordination procedures among various private sector entities. They work well from FCC's perspective, since FCC administrative application review procedures are obviated. The private sector fixed microwave procedures are similarly expensive and time consuming, but they do tend to result in an accurate database of fixed licensees. FCC has recently taken a large step backward in frequency coordination for the fixed broadcast auxiliary services, which were, until recently, coordinated using a volunteer, market-based coordination procedure similar to, and modeled after, the private, volunteer coordination system for fixed facilities developed by the Amateur Service. It worked well. FCC substituted a prior written notification procedure using commercial frequency coordinators identical to that used in the fixed microwave service. This added cost and delay for licensees, but no benefit whatsoever over the earlier volunteer system.

State, Local, and Tribal Government Issues

6. Currently the responsibility for managing the spectrum used by State, local, and tribal governments rests with the FCC. Because of the need for Federal government agencies to work closely with State, local and tribal governments located near Federal installations throughout the States, and because of the need for close coordination among the homeland security activities of Federal, State, local, and tribal governments, the interoperability of the radiocommunication facilities used by all of these agencies is essential.

a. What are the barriers to achieving interoperability among the different levels of government entities?

b. What would be necessary to achieve improved standardization of the radiocommunication facilities used by State, local, and tribal governments to enhance interoperability among the assets used by these entities?

c. What, if any, technical assistance is most needed by State, local, and tribal governments for radiocommunication facilities planning for effective and efficient use of the spectrum?

Particularly from a spectrum management viewpoint, the recent focus on homeland security has already blurred the line between Federal, state, tribal and local government public safety agencies. The elusive interoperability objective could be better addressed by a single entity to deal with spectrum management and standards. ARRL has no magic answer to facilitation of interoperability among public safety entities at the various levels of government. Radio amateurs routinely provide communications to fill the gap at disaster recovery and relief sites during and after all types of emergencies, such as hurricanes, forest fires, earthquakes, and other events where infrastructure failures contribute to the inherent lack of interoperability among public safety entities. This will continue. Radio amateurs have the capacity and ubiquitous deployment of stations and decentralized systems so as to virtually guarantee the availability at a given venue of communications to interface various agencies at all levels. However, the longer term solution to interoperability issues on an interagency basis appears to be increased deployment of cognitive radio technologies and common allocations. The 700 MHz band in particular has potential to be used for interagency communications, when it becomes available for public safety use.

International Issues

7. The Department of State serves as the lead negotiator of the United States in making arrangements relative to spectrum use: (1) with neighboring foreign administrations regarding operations of radio systems near borders; and (2) with other countries globally or regionally in regards to such areas as regulations, accommodations of new technologies, standards, and revised and new allocations via meetings with international telecommunications bodies such as the International Telecommunication Union (ITU) and the Inter-American Telecommunications Commission (CITEL). The FCC, NTIA, and the International Telecommunication Advisory Committee-Radiocommunication Activity (ITAC-R) have roles in these preparations and negotiations. NTIA seeks comment on methods to improve the effectiveness and efficiency of the U.S. national process (preparation through implementation) that results in these arrangements.

A single spectrum management entity encompassing those functions presently in the FCC and NTIA could simplify the international spectrum management process. Although the international procedures are often lengthy, the United States itself has a long, cumbersome, and multi-tiered internal process in developing the positions concerning controversial telecommunications issues. One problem is that the United States cannot effectively contribute to electronic correspondence groups because issues must be debated in U.S. ad hoc working groups and then cleared through the National Committee process. On the other hand, some foreign countries appear to have either looser controls or faster approval processes and are able to dominate the debate. Likewise, U.S. Sector Members can contribute to a correspondence group without government release.

There has been a continuing consideration of so-called “guidelines” for U.S. delegations. While in general, ARRL’s views are consistent with those of the United States ITU Association, ARRL wishes to emphasize the need to continue allowing individual representatives of regulated industries to take leadership of some U.S. delegations. Conveners of U.S. ad hoc working groups and task groups should be selected on the basis of the best individual for the job, not simply premised on the candidate being a government employee. Industry persons have served responsibly in such leadership positions for many decades.

Finally, the international preparation process is a significant commitment for those most affected by the outcome of the process. For the Amateur Service, participation in the process is of critical importance, and ARRL is well represented at all meetings and conferences, and will continue to be so represented. However, consistent participation in working group and advisory committee meetings, which is essential to effective participation in the process, requires a dedication of resources that are not available to all sectors of the telecommunications industry. The process therefore is not fully representative of all stakeholders, particularly the general public. It is not a process that is either transparent or available to all who are deeply affected by the outcome of the process.

Planning

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?*
- c. What approaches can be used to identify and project the future spectrum requirements of the Federal agencies?*
- d. What approaches can be used to identify and project the future spectrum requirements of non-Federal entities?*
- e. What approaches, including legislative provisions, are recommended for ensuring the availability of adequate resources in the Federal agencies for performing such planning activities?*

There have been a number of long-range spectrum planning activities by NTIA and other agencies, and these activities should be continued. It should be a transparent process in which the agencies and the public work collaboratively. The process should be initiated by notices of inquiry requesting inputs from Federal and non-Federal entities as to their spectrum requirements. History suggests that there be sufficient flexibility to take into account both predetermined requirements and allowance for the unpredictable. After a first round of inputs, the stakeholders should be invited to participate in small groups to explore ways of satisfying the needs of different entities. This process was used essentially in preparing an excellent report,

U.S. National Spectrum Requirements: Projections and Trends, NTIA Special Publication 94-31, released in March of 1995. Though now somewhat outdated, this was a thorough and extremely useful document which should be updated periodically, and which should serve as a premise for FCC regulatory planning.

9. NTIA seeks comment on whether the current long-range spectrum-planning mechanisms in place at the NTIA, the FCC, and the ITU provide appropriate assurances to consumers, service providers, and government institutions that sufficient spectrum will be available to satisfy projected requirements.

The current mechanisms at NTIA are reasonably adequate as far as they go. The process, however, is not as transparent as it should be. Simply inviting public input without providing a window into the deliberative process is not sufficient. It is necessary to involve non-Federal entities in the deliberation of alternatives. Many bands are shared resources. Having the participation of the affected parties should lessen the chances of unintended consequences. The FCC's processes of long-range spectrum planning provide essentially no assurance to consumers, service providers, or government institutions that sufficient spectrum will be available to satisfy projected requirements, or even any assurance that FCC knows how realistic those projected requirements really are. The FCC's allocation decisionmaking falls into an all-too-familiar pattern: An advocate of a new service appears on the scene with a petition for rule making announcing that it has a new technical concept, device or system that is not configured to operate in the allocations available, or according to operating parameters permitted in the various radio services. The promoter of the technology touts the alleged public benefits of the service, but typically provides no technical compatibility study showing that its proposed allocation or operating parameters are consistent with incumbent users' deployed uses of the spectrum. The FCC, looking uncritically only at the claimed public interest benefits of the technology, or its contribution to competition in the delivery of telecommunications services, proposes to proceed

with the allocation, and routinely ignores the effect on incumbent radio services. This is repeated in recurring cycles of piecemeal allocation planning. FCC does not appear to have any long range plan for spectrum management, and development of one should be a cooperative, open, and negotiated process.

Second Objective: Facilitate policy changes to create incentives for achieving more efficient and beneficial use of the spectrum, and provide a higher degree of predictability and certainty in the spectrum management process as it applies to incumbent users.

10. Efficiency has been defined in a number of ways, e.g., technical efficiency (bandwidth, frequency reuse, geographical coverage, etc.), economic efficiency (revenue, profit, added value, etc.), and functional efficiency (reliability, quality, ease of use, etc). Depending on the balance of these types of efficiency metrics, there could be different benefits to users, taxpayers, various stakeholders, the economy, and society. NTIA seeks comment on the definitions of these terms and how they may be used in developing spectrum policy.

Technical efficiency (bandwidth, frequency reuse, geographical coverage, etc.)

ITU-R Study Group 1 considered a definition of spectrum efficiency and published a comprehensive Recommendation.³ Study Group 1 has an open question on the same subject.⁴

Further study is needed to take into account spectrum efficiency of software defined radio, spread spectrum and ultra-wideband (UWB) systems as well as their compatibility with traditional narrow band technologies sharing spectrum. Modern mitigation techniques, such as digital signal processing (DSP), waveform orthogonality, antenna-directivity and diversity techniques, are now being used to improve spectrum efficiency, and should be factored in any new studies of spectrum efficiency. It is recommended that the NTIA consider a contribution to ITU-R Study Group 1 to update this Recommendation taking the above into account. Technical efficiency is the only universally applicable definition of spectrum efficiency. Looking at the

³ International Telecommunication Union, *Definition of Spectrum Use and Efficiency of a Radio System*, Recommendation ITU-R SM.1046-1, 1997.

⁴ International Telecommunication Union, *Parameters of radio systems and equipment required for spectrum management and the efficient use of the radio spectrum*, ITU-R Document 1/9, November 5, 2003.

Amateur Service for example, which uses the radio spectrum just as the public uses a public park, there is no relevance of any concept of economic efficiency. One might determine through economic analysis whether portions of the radio spectrum should be dedicated to public access and public use for the betterment of emergency communications, international goodwill, technical self-training and improvement in technology, as opposed to other applications. However, in a radio service which has no pecuniary nexus whatsoever, the economic efficiency of allocations for Amateur Radio has no direct relevance. The same could be said of radioastronomy or public safety services, as other examples. Functional efficiency is really an element of technical efficiency. The extent to which an allocation contributes to or detracts from reliability or quality of communications is related to the compatibility and other technical efficiency issues typically considered in the allocations process.

Economic efficiency (revenue, profit, added value, etc.)

Functional efficiency (reliability, quality, ease of use, etc.)

Once the technical efficiency is maximized for a specific use, there is still the murkier question of whether there is a place for this use in the radio spectrum. The Communications Act states:

NEW TECHNOLOGIES AND SERVICES⁵

(a) It shall be the policy of the United States to encourage the provision of new technologies and services to the public. Any person or party (other than the Commission) who opposes a new technology or service proposed to be permitted under this Act shall have the burden to demonstrate that such proposal is inconsistent with the public interest.

(b) The Commission shall determine whether any new technology or service proposed in a petition or application is in the public interest within one year after such a petition or application is filed. If the Commission initiates its own proceeding for a new technology or service, such proceeding shall be completed with 12 months after it is initiated.

On the face of this statute, unless the FCC can find that a new technology or service is not in the public interest, other persons or parties first must be aware of the new use and make a

⁵ 47 U.S.C. § 157.

determination whether there is a basis for opposition. Even if the new use ultimately does not interfere with the interests of, or spectrum used by, others, the process to arrive at that conclusion is often arduous. Until now, the effort has been to fit new uses in the spectrum without a determination of their viability or value relative to existing uses of the spectrum. While the practical limits of spectrum utilization are far from having been reached, it has become considerably more difficult to shoehorn in new applications without material adverse effect on incumbent users. It would be useful to apply an objective standard to evaluate new uses, but the “public interest” criterion in the statute, and a determination of the relative public interest of the proposed new use versus that of incumbent technologies or services is difficult.

Unless the concept of “value” is general enough to encompass the concept of public interest, convenience and necessity, it tends to devalue or ignore uses of the spectrum that do not have economic components. Non-profit uses of the spectrum, such as Amateur Radio, serve the public interest by providing a voluntary service that could not be duplicated by a commercial or government service. In addition, Amateur Radio fulfills its basis and purpose as stated in the FCC rules.⁶

11. Considering these economic, technical, and functional metrics, how should the term "spectrum efficiency" be defined to provide useful tools in managing the spectrum resource? What metrics can be used to apply the definition?

ARRL believes that spectrum efficiency should be determined by its most universally applicable test, which is technical efficiency. The measure of technical spectrum efficiency is the ratio of resources required divided by resources consumed. Thus, a spectrum use that is greater than the need is less efficient than a use that matches the need. While spectrum efficiency is of course not equivalent to the “public interest”, it is the technical efficiency of a proposed use that

6 47 CFR § 97.1.

is the appropriate consideration, reserving for separate analysis the relative merits of a proposed use to the public.

12. What incentives or changes in policy should be imposed on the Federal and private sector spectrum users or potential users to use the spectrum more effectively and efficiently?

Before any request for a new allocation of radio spectrum should be considered, the entity making the request should be required to explain why the requirement cannot be accommodated without impacting the radio spectrum, or within the existing allocations to an appropriate radiocommunication service.

13. What mechanisms could be established for promoting improved spectrum sharing between Federal agencies and the private sector?

A single spectrum management entity would improve spectrum management by having the mandate and tools to consider Federal and private sector uses at the same time, as part of a single allocation transaction. It should operate according to negotiated rule making procedures wherein the stakeholders are allowed to participate. The process for considering new Federal and non-Federal sharing plans should be more open than it currently is. A recent example involving the Amateur Service provides an illustration. A small allocation in the 5 MHz band for the Amateur Service was proposed and found by FCC to be a reasonable request. A Notice of Proposed Rule Making was released by FCC, and NTIA objected very late in the process to the allocation. There was no procedure for ARRL, FCC and NTIA (or the individual agencies concerned about this allocation) to meet and address the concerns. Instead, without any public procedure, NTIA and FCC agreed to a compromise that was inadequate for the purpose. A negotiated rulemaking procedure could address these issues more quickly, and likely more effectively, than under current procedures.

14. How could the general spectrum management oversight of Federal users be improved?

There should be an emphasis on greater transparency in the Federal use of spectrum, excepting of course truly sensitive, confidential matters related to national defense and homeland security.

15. Should the fee structure and budget processes for Federal users be reformed to reflect opportunity cost of the spectrum resource?

ARRL has no view on this subject. The determination of opportunity cost of a spectrum resource not used for commercial services is by definition somewhat speculative. Congress and the FCC have, to date, exempted non-commercial radio services such as the Amateur Service from license and regulatory fees, save for those which apply to services voluntarily sought from the FCC, such as specialized call signs. ARRL would suggest that most Federal spectrum uses are analogous to non-commercial radio.

16. What should NTIA and the Federal agencies do with temporarily unused Federal spectrum?

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?

18. What would be the commercial demand for temporary and/or preemptable usage rights or spectrum commons? What would be the demand by state and local government users of such a resource?

19. Are there commercial applications for short term spectrum rights, such as overnight data caching, special event, or seasonal use?

20. Are there liability or technological issues that arise if spectrum leases are to be preemptable in an emergency by a governmental agency?

These questions are closely interrelated. Temporarily unused spectrum could be managed by a single entity having the function of making temporary, preemptable authorizations for specific frequencies, locations and times with appropriate mitigation provisions. The FCC's experimental licensing program should be part of this single entity so that both Federal and non-Federal frequencies could be used for the temporary application. There is a good opportunity

here for exclusive Federal spectrum secondary market deployment. A good model for this exists in the use of Aeronautical Flight Test Telemetry. The Aerospace and Flight Test Telemetry Coordinating Council (AFTRCC) performs temporary frequency coordination for other uses of Flight Test Telemetry allocations, which are not used all the time, and where substantial capacity exists for other uses. Broadcasters and video production entities apply for use of these frequencies for wideband video at short term venues, and pay the AFTRCC coordination fees for that use. The FCC grants experimental licenses or STAs based on AFTRCC coordination. It is a good example of short term secondary markets in spectrum that is good for all involved.

In a broadened version of this concept, the burden of showing no harm to incumbent users would be that of the applicant, at least to the extent of publicly available information. The single entity would have the burden of checking against classified uses by Federal agencies. For maximum efficiency, the process of determining the impact of the proposed operation on stakeholders should be conducted by electronic means, and the authorization also should be conveyed electronically such as on a Web site. Fees could be imposed to recover administrative costs and additional user fees could be applied in special circumstances where there is measurable economic impact on incumbent services.

21. What issues arise for appropriators and Federal budget managers if user fees or leases are implemented?

User fees or leases are not applicable to the Amateur Radio Service. As noted above, however, a secondary market plan involving temporary non-Federal uses of Federal spectrum should provide revenues which would offset the appropriations needed to operate the agency at issue.

22. What improvements are recommended to the Office of Management and Budget's budget

development process and what guidance should be provided to the Federal agencies in performing cost-benefit analyses of planned spectrum use to increase spectrum sharing among Federal agencies?

ARRL has no view on this issue.

23. *How could NTIA best facilitate spectrum sharing among Federal agencies?*

ARRL has no view on the proper role of NTIA as facilitator of spectrum sharing between or among Federal agencies. However, NTIA should act as a facilitator between Federal agencies and non-Federal entities seeking (or opposing) new uses of Federal spectrum, and should evaluate technical impediments to proposed shared uses. NTIA should also independently evaluate FCC proposals for new technologies to determine what technical issues should be resolved before FCC takes any final action involving shared Federal allocations.

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.*

ARRL participated in panel discussions of the FCC Spectrum Policy Task Force and was among those urging the adoption of receiver immunity standards, particularly for unlicensed devices used in homes. Further, ARRL submitted comments to the FCC in ET Docket No. 03-65 concerning interference immunity performance specifications for radio receivers. In its comments, ARRL stated:

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 Commission has had the authority to implement interference standards for home electronic equipment for more than twenty years.

* * *

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 as 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

ARRL concluded its comments by urging the Commission to implement either mandatory receiver immunity standards, or at least guidelines, in most services. In its conclusions, ARRL added:

The explosive growth of unlicensed devices which are RF-susceptible has stymied allocations otherwise proper and reasonable in certain 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.

The most pressing need is for RFI-immunity standards for unlicensed devices, which by their very nature are used by individuals not trained in electronics or even aware of Federal regulations governing them. Standards should be the cornerstone. Labeling can be helpful and the concept could be extended to include an on-screen notice on devices having such a display.

The White Paper produced by the Capstone Project⁷ stated:

The challenge of managing interference is to balance the protection of existing licensees with the enabling of new spectrum uses. Existing licensees often have to design their systems to be tolerant of worst-case interference levels that they cannot easily project. This can result in the use of guard bands or costly filters that protect against the worst case but reduce efficiency both economically and spectrally. It can result in demands that new service providers operate at lower

⁷ Johns Hopkins University Graduate Capstone Project, *Spectrum Issues of Concern to Non-Federal Users*, White Paper, prepared for U.S. Department of Agriculture, December 11, 2003.

power, with fewer transmitters, or use guard bands to protect the more established operation of existing users, especially if they are public safety entities.

While some filters in systems used in some licensed services may fit the above description, lamentably the filtering in unlicensed devices often is only minimal, even though the cost and size of additional filtering can be relatively modest.

Third Objective: Develop policy tools to streamline the deployment of new and expanded services and technologies, while preserving national and homeland security and public safety, and encouraging scientific research.

25. What objective principles, standards, or processes are appropriate to timely evaluate proposed spectrum uses for new technologies and services to determine whether the limited spectrum resource should be used for implementing a proposed spectrum use?

The Communications Act states, in relevant part, as follows:

GENERAL POWERS OF THE COMMISSION⁸

Except as otherwise provided in this Act, the Commission from time to time, as public convenience, interest, or necessity requires shall—

* * *

(g) Study new uses for radio, provide for experimental uses of frequencies, and generally encourage the larger and more effective use of radio in the public interest.

DEVICES WHICH INTERFERE WITH RADIO RECEPTION⁹

(a) The Commission may, consistent with the public interest, convenience and necessity, make reasonable regulations (1) government the interference potential of devices which in their operation are capable of emitting radio frequency energy by radiation, conduction, or other means in sufficient degree to cause harmful interference to radio communications; and (2) establishing minimum performance standards for home electronic equipment and systems to reduce their susceptibility to interference from radio frequency energy. Such regulations shall be applicable to the manufacture, import, sale, offer for sale, or shipment of such devices and home electronic equipment and systems, and to the use of such systems.

ARRL appreciates the care taken by the FCC and NTIA in the introduction of new licensed uses of the spectrum. The study of potential new licensed services and their compatibility with existing services is well understood. However, ARRL continues to urge that unlicensed low power and unintentional radiators should not be permitted without due regard to

⁸ 47 U.S.C. § 303.

⁹ 47 U.S.C. § 302.

their impact on existing radio services. Conversely, ARRL believes that new home electronic equipment and systems are sold without sufficient regard to their unintended susceptibility to radio frequency energy from licensed radio transmitters.

Low power devices and unintentional radiators are increasing small and readily transported between other countries and the United States. A short-range device purchased in Europe and designed to operate under European standards may not be appropriate for the United States. An example is that short-range devices built to operate in the ISM band at 433 MHz in some European countries may not comply with U.S. rules because, for very good reason, there is no such ISM band here. Another is that European visitors to the United States often bring their PMR446 Personal Mobile Radio transceivers in their baggage and expect to use them in the United States to keep in touch with others traveling with them. In both of these cases, such units could interfere with the government radiolocation and amateur services. Conversely, devices designed to operate in the band 902-928 MHz in Region 2 would not be permitted in Regions 1 or 3 because allocations are not aligned.

The foregoing would suggest that there should be a study of frequency ranges and other characteristics of low-power devices and unintentional radiators with a view to harmonizing frequency bands, standards and testing.

26. What are the benefits and risks of establishing an organizational mechanism for designating, funding, and operating test platforms to be used in performing reasonably large-scale operational testing of proposed new and expanded radiocommunication services and technologies?

a. Discuss whether the establishment of such an organizational mechanism may expedite the implementation of new services and technology.

b. Would such a mechanism reduce the risk of causing unacceptable interference to incumbents? Are there other approaches to determine the potential impact that new and expanded radiocommunication services and technologies may have on incumbent users?

27. Should one, or more, Federal laboratories be designated and certified to perform this testing?

28. Should a mechanism be established for certifying both Federal and non-Federal laboratories to perform this testing?

ARRL would suggest that there might be an independent laboratory, or network of laboratories, which could conduct necessary evaluations of proposed technologies prior to any FCC or NTIA proposal for a frequency allocation for such technologies. A good application for such a laboratory would be to evaluate the interference potential of Broadband Over Powerline (BPL) systems, where the stakeholders are in rather substantial disagreement about the interference potential from radiated emissions from overhead lines to licensed radio services in the High Frequency or Very High Frequency ranges.

29. Should a mechanism be established to authenticate or certify the interference protection required by incumbent spectrum users? If so, provide recommendations for an approach that would establish appropriate interference protection criteria.

The United States should have a network consisting of Federal and non-Federal laboratories for testing potential large-scale spectrum applications. This network should operate in conjunction with those in other countries and should include mutual recognition arrangements where appropriate.

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.

There are still open questions concerning the rights and obligations of those users of auctioned bands. Because the process of obtaining future allocations historically takes years, the period of the grants following auctions should be kept equal to, or shorter than, the estimated time necessary to reallocate the bands, domestically and/or internationally. It is generally understood that an auction winner has obtained a license, not an allocation, and that the license, while it may carry with it the expectation of renewal in the normal course, premised upon

regulatory compliance during the license term, is not permanent. The more difficult concept is that of “band managers” where, in essence, an auction winner does obtain rights to a block of spectrum to deploy in a more flexible manner than geographic licenses of individual channels. However, it is only consistent with the table of allocations to consider the auction of blocks of spectrum as a license and not an allocation that is acquired. ARRL would suggest that the “property rights” model for spectrum planning is not the philosophical underpinning for auctions of licenses. That model should not be applied to auctions of licenses for blocks of spectrum. To do otherwise is inconsistent with the international and domestic tables of allocations.

Fourth Objective: Develop means to address the critical spectrum needs of national security and homeland security, public safety, Federal transportation infrastructure, and science.

31. Are the current U.S. requirements for spectrum use (domestic or international) being satisfied?

- a. If not, identify those requirements that are not satisfied.*
- b. Discuss whether actions consistent with existing policies by the spectrum managers could be taken to satisfy the unmet requirements.*
- c. Are there policies that contribute to or cause these requirements to remain unsatisfied?*
- d. NTIA seeks comment on policy reforms that may facilitate satisfying these requirements.*

The traditional U.S. process for satisfying spectrum requirements has received more criticism than actually deserved. This process has been associated with the pejorative term “command and control,” but has in fact served our nation for many decades. It takes foresight to identify new spectrum requirements, to select preferred frequency bands, to perform the due diligence of determining the impact of this new use on incumbent users, and to face the difficulty of mitigation or reaccommodation.

One problem worthy of consideration is how to improve transparency in sensitive Federal Government usage for those performing studies. To its credit, NTIA has provided numbers of Government assignments in certain bands and characteristics of some Federal Government systems such as those in the radiolocation service. In some cases where the actual characteristics

of a system are sensitive, NTIA has provided hypothetical data that simulates the technical characteristics to the degree needed by other users of the spectrum. There should be a clearer line between what data actually needs to be protected and what will be known anyway. Basically, if the Government wants a system to receive protection, the Government must give at least manifest technical characteristics. Otherwise, no one knows what it is that needs protection. ARRL and the International Amateur Radio Union have provided hypothetical reference circuits for typical amateur stations to the ITU when needed for sharing studies. This information is being continuously updated and reference antenna patterns are being added.

The main source of criticism that the system is not working appears to come from newcomers knocking on the door for new spectrum, usually in allocations that are already being used by incumbents. Rather than getting educated on how the system actually works best, there is a tendency to denigrate the process and call for drastic reform. In ARRL's opinion, there is greater need for education on how spectrum management really must work than for sweeping reform. NTIA holds spectrum management courses for students of foreign administrations under United States Telecommunications Training Institute (USTTI) auspices. Perhaps it is time for spectrum management courses to be made available in Washington to those seeking spectrum or otherwise entering the spectrum management process. ARRL is willing to do its share in orienting new spectrum managers, and believes other stakeholders would appreciate such an opportunity to pass along their experience.

32. Some requirements for spectrum use by Federal government agencies and non-Federal entities are critical only during emergencies or while specific mission operations are performed. These communications channels remain unused during non-emergency periods. NTIA seeks comment on the feasibility and advisability of establishing a spectrum-sharing arrangement in which both Federal users and non-Federal users could be assured "priority access" to satisfy their critical spectrum requirements during emergencies or specific mission operations.

ARRL believes that finding compatible sharing partners is the key to solving this problem. Some of the Amateur Radio allocations work this way, namely that the Federal Government has a primary domestic allocation and the Amateur Service has a secondary allocation. Within the Amateur Service, particularly at HF and VHF, the bands are normally used for routine operations but can be limited to emergency use either by voluntary agreement or FCC declaration of emergency. Real time frequency coordination is a means of implementing this plan, and there are successful models for this.

It would appear that a beginning point would be to identify the spectrum requirements and preferred bands of the emergency services and to consider complementary uses.

33. What policy reforms are needed to satisfy spectrum access, interoperability, and interference protection requirements?

Negotiated rule making among the stakeholders and potential users of a band should be the preferred process over the existing adversarial process for considering spectrum matters. Stakeholders should not be summarily dismissed after stating their cases, but should remain part of the negotiated rule making process through to the decision. To do otherwise invites “end runs” on what should be a logical process.

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.

a. What identifiable problems or deficiencies exist in accessing adequate spectrum resources for governmental or municipal continuity of operations plans under current spectrum policies?

b. What is the proper Federal role in developing and coordinating (between the Federal, State, local, and tribal entities) the spectrum management elements relative to government continuity of operation plans?

c. What approaches could be used to improve planning at the State, local, and tribal level to ensure that adequate access to spectrum is available to first responders to an emergency situation?

At every opportunity, those representing public safety services state the need for more spectrum. Some have commented that it is not the lack of frequencies but how they are managed, and there are jurisdictional and operational reasons why there is an interoperability problem. Software defined radio may help. While the problem involves numerous state, tribal and local entities, the Federal Government is in a position to help with standards, funding and expertise.

35. The FCC has granted waivers authorizing certain non-public safety and public safety entities to jointly build and operate systems that operate on both private land mobile and public safety frequency allocations. In combining physical resources and spectrum, both the public safety and non-public safety entities realize economic and spectrum efficiencies. NTIA seeks comment on whether Federal government and non-Federal government systems could be similarly combined as a way to conserve physical and spectrum resources.

There appears to be some possible improvement in spectrum efficiency by sharing Federal Government frequencies with state, tribal and local government, particularly for public safety and emergency use.

In summary, ARRL welcomes the opportunity to comment in this proceeding. Many of the concepts that were considered in the FCC Spectrum Policy Task Force Report are worthy of consideration but are not sufficiently mature as to form a basis for replacement of the existing spectrum management process, which has served the nation well for decades and continues to provide a reasonable and prudent paradigm for the near term.

The foregoing considered, ARRL, the National Association for Amateur Radio, respectfully requests that the NTIA take these comments in to consideration in any processes or proceedings looking toward reforming spectrum management in the United States.

Respectfully submitted,

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