Appendix I

Experimental License Section of

Report of the Unlicensed Devices and Experimental Licenses Working Group

Spectrum Policy Task Force

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(http://www.fcc.gov/sptf/files/E&UWGFinalReport.pdf)

I. EXPERIMENTAL LICENSES

A. Background

Section 303(g) of the Communications Act of 1934, as amended, (the Act) authorizes the Commission to provide for experimental use of frequencies and charges the Commission with encouraging the larger and more effective use of radio in the public interest.[1] The rules for the Experimental Radio Service (ERS) are contained in Part 5 of the Commission's rules.[2] The primary purpose of the ERS is to provide for experimental uses of radio frequencies and for development of techniques and systems that are not otherwise permitted under existing service rules. The ERS provides opportunity for manufacturers, inventors, entrepreneurs, and students to experiment with new radio technologies, new equipment designs, characteristics of radio wave propagation, or new service concepts related to the use of the radio spectrum. Some of the uses permitted under Part 5 are: 1) experimentation for purely scientific purposes; 2) development of equipment under Federal Government contract, foreign contract, or for export; 3) technical demonstration of equipment or techniques; 4) testing of equipment in connection with production or type acceptance, approval or certification; 5) field strength surveys or demonstration of equipment to prospective purchasers; 6) development of radio techniques, equipment, and operational or engineering data related to an existing or proposed radio service; and 7) provision of communications essential to research projects where other means of communications are not available.[3] While

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[1] *See* Section 303(g) of the Communications Act of 1934, as amended, 47 U.S.C. § 303(g). This discussion is based in part on the NPRM in Docket 96-256, 11 FCC Rcd 20130 (1996).

[2] *See* 47 CFR Part 5.

[3] *See* §5.3, Scope of service.

some experimentation and development is also allowed within existing services, such activities are restricted to applicants that are eligible to apply for a license in a particular service and on frequencies that are allocated to that service.[4]

In order to encourage innovation, the ERS rules provide great flexibility with regard to allowable frequency range, power, and emission. However, in order to protect allocated services, ERS licenses are issued on the condition that experimental operations do not cause interference to authorized stations of such services, and experimental operations are not protected from interference from allocated services. Additionally, ERS stations can be required immediately to cease operations at the Commission's request, and ERS licenses are subject to revocation without notice.

The FCC receives about 600 to 1000 ERS applications per year. Applications for experiments that use frequencies with only non-Federal Government primary users are solely within the FCC's jurisdiction. However, about 40% of the applications received deal with frequencies either shared with Federal Government users or that are assigned only to such users. In these cases information from the applications must be sent to the Department of Commerce's National Telecommunications and Information Administration (NTIA) for coordination, since NTIA is responsible for frequency management of government users. Experimental applications that are solely within the FCC's jurisdiction are usually approved in less than a month.

B. Issues and Findings

Only a few of the commenting parties to the Public Notice addressed the topic of experimental licenses. The principal concern of these parties appeared to be the delays involved in obtaining an experimental authorization due to NTIA coordination and difficulties associated with testing systems being developed for overseas markets with different allocation plans. This theme was repeated to some degree in the comments received at the Public Workshop.

1. Interference Definition

Experimental licenses are secondary operations and are conditioned on not causing interference to licensed users.[5] The UEWG believes that uncertainty over the definition of interference and its application to specific cases may result in doubts about whether a given experiment is practical on an interference-free basis and may act as an impediment to experimentation. Similarly, incumbent users of spectrum may have uncertainty about the risk of interference to their operations

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[4] *See*, for example, developmental rules for broadcast stations under Subpart A of Part 74.

[5] As secondary services, experimental licenses must also accept interference from licensed users.

from experiments and might raise objections to experiments that pose little or no risk.[6] The UEWG finds that reducing uncertainties as to what constitutes interference will remove a disincentive for experimentation as well as increase the certainty of conventional licensees who may have lingering doubts about how much experiments might disrupt their operations.

2. NTIA Coordination

Nortel Networks, in its comments to the Public Notice, stated that in order to promote the competitiveness of U.S. manufacturers in international markets the Commission needs to adopt a more relaxed policy towards experimental licensing or developmental authorizations for product experimentation, verification and testing. Nortel indicates that these authorizations would enable development of equipment for overseas sales, where the regulations may not correspond with those in the U.S. It argues if manufacturers are unable to perform the necessary live-air experimentation required to develop or improve products for markets outside of the U.S., manufacturers may be limited in product development and thereby inhibited in their ability to compete in the international marketplace.[7] Further discussions with Nortel staff revealed difficulty in obtaining experimental licenses for two systems that were being developed in their U.S. laboratory for overseas sales and whose operating frequency was in a band used by the Federal Government in the U.S. Nortel indicated that in both cases it was unable to meet with the NTIA's managers who had concerns and try to develop a modification to their application to limit power, frequency range, operating hours, operating location, or other parameters in order to conduct the proposed test without interference to Federal Government systems.

Motorola indicated similar concerns stating that in some instances, experimental licenses are necessary to develop and test equipment in the U.S. that is destined for export sales. According to Motorola, this requires short-term use of spectrum allocated for Government services and therefore under the control of the NTIA. Motorola asserts that the NTIA, under the auspices of the Department of Commerce, should welcome such use of the spectrum on a coordinated basis, especially when the outcome is sales of product into foreign countries, which helps the balance of trade. Motorola further states that it has at times experienced delays of 12 months or more in obtaining NTIA approval and delays longer than a few

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[6] In an unrelated rulemaking, one party has requested that the Commission "clarify that if any experiment causes *any* interference, the experimental licensee must eliminate the interference or cease operations" and that the Commission require 30 day advance notification of any radio experiment so that incumbent licensees can "independently" review proposal. Reply Comments of BellSouth Corporation, CC Docket 98-094, August 5, 1998 at p.6

[7] Comments of Nortel Networks, ET Docket 02-135, at p. 2.

months can be the difference between successfully deploying product into a foreign marketplace or being denied critical sales.[8]

Motorola has also suggested parallel review by FCC of potential interference of experiments to Federal Government systems, a procedure for allowing applicants to discuss with NTIA directly any concerns about applications and to negotiate possible modifications to eliminate interference threat to Federal systems.[9] Finally, Motorola suggested that the Commission set aside at least 50 MHz of spectrum between 2 and 4 GHz "for the development of advanced mobile communications systems."[10]

At the public workshop on August 1, 2002, concerns were also raised about the apparent lack of transparency of the NTIA coordination process from the point of view of private entities seeking to experiment with new technology.[11]

As indicated above, experimental applications that request use of spectrum that is used exclusively by the Federal Government or shared with the Federal Government are required to be coordinated with NTIA. In practice, NTIA refers such applications to the Interdepartmental Radio Advisory Committee (IRAC), which is composed of all federal agencies that are major spectrum users.[12] While many coordination requests are handled promptly by NTIA, it does appear some

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[8] "A White Paper on Future Federal Communications Commission Spectrum Policy," Motorola, ET Docket 02-135, August 30, 2002 at p. 26.

[9] Motorola, *op. cit.* at p. 26.

[10] *Ibid.* p. 25

[11] See Transcript of August 1, 2002 Workshop on Unlicensed Spectrum and Experimental Licenses, Remarks of David Reed at p. 201 and DeWayne Hendricks at p. 207. Hendricks stated the following at the workshop:

> "It seems to me that without transparency, and whether the government owning so much of the spectrum, we're going to continue to have that problem, and it's going to hurt -- you know, it's going to basically mean that anybody who either competes with the government, or might have a better use for the spectrum than the government, or might even be developing technology that would ultimately benefit the government, has an extremely high burden to bear of many years of delay, if nothing else, while they try to work through a non-transparent system."

[12] NTIA coordination is actually carried out by the IRAC Frequency Assignment Subcommittee (FAS).

applications remain in the coordination process for a considerable period of time and in some instances are not resolved after periods in excess of one year.[13]

The UEWG recognizes that NTIA coordination is necessary to ensure that experimental operations do not adversely impact important Federal Government use of the spectrum. It does appear, however, that based on the public comments and the FCC's experimental licensing data that certain changes may be warranted.

While experimental licenses in bands with Federal Government assignments pose a possible interference risk to those systems, such experiments also have potential benefits for all radio users through facilitating the development of new technology and also have potential economic benefit such as increased export sales. The Task Forces suggests that in considering the coordination of such licenses that NTIA should consider the benefits of experimentation and the public interest balancing of them with possible interference risks to Federal Government systems.

Parties have also indicated an interest in being able to communicate directly with the Federal Government entities concerned about their pending experimental applications on a more regular basis. They note that there is no general requirement for Federal Government users to try to seek a compromise solution to a possible conflict resulting from a proposed experiment. These parties suggest such contacts would allow them to explore possible modifications that might lead to mutually acceptable outcomes such as restricting location, operating power, and operating hours.[14] The UEWG recognizes that classification issues related to certain Federal Government systems may make direct communication impractical in all cases. Nevertheless, in most instances it believes that communications between the parties is possible[15] and that new procedural and organizational mechanisms should be considered to improve communications between commercial parties desiring to implement experiments and Federal users of the spectrum.

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[13] OET's Experimental Branch has recently instituted a procedure in which new applications that not successfully coordinated in one year are dismissed without prejudice.

[14] Another tool for resolving conflicts in extreme case might be real time coordination of experimental operations with the Federal Government user of the spectrum and immediate cessation in case of interference or unexpected increases in the Federal Government user's need for spectrum due to local emergencies. This approach appears to have been used in some past cases.

[15] In some cases where direct communications between an applicant and the affected Federal Government user is not possible due to classified information, NTIA might wish to act as or appoint a third party to act as a go between.

3. Transparency of Spectrum Available for Experiments

FCC permits experimental license applicants to propose any frequency and location for their experiment. The FCC license database is publicly available and can be accessed over the Internet. However, frequency assignment information for Federal Government users can contain classified information and this information is not generally available to potential applicants. This necessity to classify certain Federal Government frequency assignments complicates the issue of using such spectrum for experiments. Further, even though the FCC information is available, the dynamic nature of frequency allocations in recent years with reallocations between services means potential experimenters who are not experts in U.S. spectrum use may not be able to identify readily non-Federal Government spectrum that may be available for experiments on a non-interfering basis.

The UEWG believes that it would be beneficial to be able to identify certain frequency bands, locations and times where and when experiments generally may be conducted. With regard to Federal Government spectrum, the UEWG believes that one potential approach to this problem deals with the several bands now in transition from Federal Government use to non-Federal Government use. Non-government long term commercial operations cannot be licensed and operated in such bands until the transitions are completed and government systems are re-located. However, *all* such bands are not in use *everywhere* in the country *at all times*. There are likely opportunities for experiments in these bands on a non-interfering basis today if only one could determine the appropriate locations, frequencies, and times. The classification of NTIA assignments makes this difficult, if not nearly impossible, for private sector entities.

While it would be impractical, and probably a classification problem in itself, for NTIA to identify all location, frequency, and time combinations within the transfer bands that are practical for radio technology experiments, it would be possible with a modest amount of effort to identify a few areas of the country, preferably urban areas, where specific transfer bands are not presently in use and are not expected to be used prior to the final transfer to FCC control. NTIA could identify a small number of frequency and location pairs that it could announce and FCC could indicate that experimental license requests for those bands would not be delayed for lengthy NTIA coordination purposes, as they had initial pre-approval.

Similarly, FCC could identify locations and blocks of spectrum in bands with pending reallocations, for example, in TV channels 52-69, in which interference to ongoing operations is of negligible risk and for which experimental licenses could likely expect timely approval. While the basic information on TV channel use is publicly available, small high tech firms may not be familiar with the structure of the FCC license databases and the generally accepted propagation models that would be used to consider the interference risk of a specific experiment. "Pre-clearing" frequency and location pairs would reduce the risk and delays associated with applying for an experimental license and might stimulate radio technology

experimentation in entrepreneurial firms. Alternatively, FCC could publicize what quantitative criteria it will use for approving experimental licenses in these bands.

C. Experimental License Recommendations

The UEWG makes the following recommendations with regard to the experimental authorization process:

- Interference and its definition are a key issue in the approval and operation of experimental licenses. All Task Force Recommendations for narrowing the ambiguities of today's definition will facilitate experimentation in the future and lead to a better understanding of the rights of both experimenters and other incumbent licenses.

- The UEWG recommends that NTIA consider a new interface for the non-federal Government spectrum users with IRAC members to help search for workable compromises for experimental applications and suggest that NTIA or DOC to appoint an advocate/ombudsman for the private sector.

Most coordination of experimental licenses with NTIA goes smoothly, but there are a few recurring cases that have problems – often involving testing of equipment intended for foreign markets. Yet in order to compete in world markets, US manufacturers must develop equipment that is designed for foreign environments. Recognizing that security classified information about Federal Government spectrum use must continue to be protected, there is an important need to improve the transparency of the NTIA coordination process and try harder to search for solutions to spectrum problems associated with experiments. The UEWG recommends that NTIA consider a new interface for the non-federal Government spectrum users with IRAC members to help search for workable compromises for experimental applications and suggest that NTIA or DOC to appoint an advocate/ombudsman for the private sector.

- Identify spectrum from government transfer bands and non-government spectrum with pending reallocations where experiments could be permitted under certain specified and publicized conditions.

With the ongoing transfer of bands from Federal Government use to FCC control, it is natural to expect that private entities may be interested in experimenting with new possible uses for such spectrum. Experimental licenses in such bands are possible today, but the lack of publicly available information on present government use of the bands creates an implicit entry barrier for such experiments. Extensive monitoring by potential applicants might reveal (location, frequency, time) combinations that would permit experimentation but the requirement for such monitoring raises significant entry costs and there is always the possibility of some contingent use that monitoring would not reveal.

Information from NTIA frequency assignment records would make it easier to identify such opportunities for experimentation. For example, they might show that in a specific band scheduled for transfer there are no Federal Government assignments in Northern California and no contingencies expected to use that spectrum in that area. However, such information on Federal Government assignments is not available to the public due to security classification and security concerns, it is available to FCC and NTIA; and the UEWG recommends that NTIA and FCC review Federal Government assignment data in the transfer bands, identify and announce the availability of combinations of location, frequency and time that would be available now for experimental licensing under existing rules. The SPTF believes that such announcements would lower barriers to experimentation and protect sensitive information.

Similarly, there is spectrum now under FCC control, *e.g.* TV channels 52-69 that will be reallocated in the near future and can be expected to be of interest to firms interested in developing new technology. While information about licenses in these bands is in publicly available databases, there is little easily available information about how to find this information and what criteria the FCC would use for considering an experimental license in such bands. The SPTF recommends that the Commission compile and make publicly available background information for potential experimenters in these bands concerning reallocation schedules, current licensees, and technical criteria for avoiding interference such as required D/U ratios with existing licensees and acceptable propagation models.