

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

**In the Matter of** )  
 )  
**Amendment of the Amateur Service Rules to** ) **RM-\_\_\_\_\_**  
**Facilitate Use of Spread Spectrum** )  
**Communications Technologies** )

**To: The Chief, Wireless Telecommunications Bureau**  
**Via: Office of the Secretary**

**PETITION FOR RULE MAKING**

ARRL, the National Association for Amateur Radio, also known as The American Radio Relay League, Incorporated (ARRL), by counsel, hereby respectfully requests that the Commission issue a Notice of Proposed Rule Making at an early date, proposing the deletion of Section 97.311(d) of the Commission’s rules, save for the first sentence thereof. The effect of the rule change would be to eliminate an automatic power control provision that has proven over time to be impractical of compliance; is unnecessary in order to protect other Amateur Radio operations or the operation of any licensed radio service sharing certain Amateur Radio allocations; and which has unfortunately served as an unintended, but effective deterrent to Spread Spectrum experimentation in the Amateur Service. In support of its Petition, ARRL states as follows:

1. Use of Spread Spectrum (SS) communications in the Amateur Service was first authorized by the Commission in 1985.<sup>1</sup> The Commission authorized SS in the Amateur

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<sup>1</sup> *Report and Order*, 99 FCC 2d 1432; 58 RR 2d 328 (1985) in Gen. Docket 81-414. However, as early as 1981, Amateur SS experiments were authorized by Special Temporary Authority granted by the

Service in order to permit Amateurs to develop, test and operate low cost SS systems, thus to stimulate advances in radio technology, consistent with the basis and purpose of the Amateur Service.<sup>2</sup> The specific benefits to the public to be gained from Amateur use of SS as determined by the Commission included the following: (1) reduced power density and concomitant reduction of interference to narrow band communication systems; (2) realizable improvements in communications under conditions with poor signal-to-interference ratios; (3) improved communication performance in selective fading and multipath environments; and (4) the ability to accommodate more communication channels functioning simultaneously in the same spectrum than is possible using frequency division multiple access exclusively.

2. Since the time SS was first authorized in 1985, there have been experimental operations using SS techniques, but they have not been widespread. ARRL's experience with SS operation in the Amateur Service suggests that a principal reason for this is limitations in the rules regarding SS communications. The Commission has revisited the rules governing Amateur SS communications several times, and has been responsive to the concern of overregulation of SS in the Amateur Service. In December of 1995, ARRL filed a Petition for Rule Making, RM-8737 proposing several modifications to the Commission's rules, in general seeking to eliminate restrictions which inhibited Amateur SS experimentation. In that Petition, ARRL noted that there had not, in the intervening ten years since the first authorization of SS in the Amateur Service, been reported to ARRL a single instance of interference from Amateur SS operation to either other

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Commission to members of the Amateur Radio Research and Development Corporation (AMRAD) in 1981. See, *FCC Encourages Amateur Radio Experimentation*, *FCC News Release*, March 9, 1981.

<sup>2</sup> 47 C.F.R. § 97.1

Amateur stations or stations in other services which share certain Amateur allocations where SS is permitted. That same situation exists today. Interference concerns that resulted in certain regulatory restrictions applied to SS in 1985, specifically inter-service and intra-service interference, have not proven to be an issue at all.

3. Among the changes to the SS rules proposed in 1995 by ARRL was a suggestion to incorporate automatic transmitter power control (APC) for SS communications. Previously, the SS rules [then Section 97.311(g)] simply limited stations using SS emissions to 100 watts. ARRL proposed that, when more than one watt of power was used by an Amateur station transmitting SS emissions, output power would be limited to that which is required for the communication. It was believed at the time that this provision would implement technically the existing, overarching requirement in the Amateur Rules that at all times, an Amateur Station must use the minimum transmitter power necessary to carry out the desired communication.<sup>3</sup> ARRL also believed at the time that APC for SS could be accomplished technically.

4. The Commission agreed with the ARRL proposal, and on March 3, 1997 released a *Notice of Proposed Rule Making*, FCC 97-10, in WT Docket 97-12, which incorporated the APC proposal in RM-8737. The Commission stated therein, in part, that:

We believe that the amendments requested would increase spectrum efficiency and allow amateur operators to contribute to technological advances in communication systems and equipment. Experiments conducted by amateur operators have shown that stations transmitting SS emissions can co-exist with other amateur stations, and in many cases these spread spectrum emissions are undetectable by other amateur

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<sup>3</sup> 47 C.F.R. § 97.313(a)

stations....As requested by ARRL and Part 15 equipment providers, we propose to require that automatic power control circuitry which reduces the radiated power of an amateur station transmitting an SS emission to the minimum level necessary to conduct communications, be included in SS equipment.

*Id. at ¶ 8.*

5. There were comments filed by amateurs in Docket 97-12, however, which opposed the APC requirement. Some comments claimed that this requirement would be burdensome to implement, and did not work well in Amateur station and network configurations, such as point-to-multipoint operation (including roundtable-type on-air discussions) and spacecraft downlink telemetry. Other accomplished Amateur experimenters, including Mr. Philip R. Karn, Jr. KA9Q; Robert A. Buaas, K6KGS and the members of Tucson Amateur Packet Radio (TAPR) opposed APC, claiming that it would be difficult to implement; it was unnecessary to protect narrowband modes, even given the proposed deregulation of spreading codes; and it would discourage SS experimentation in the Amateur Service.

6. The Commission, in its *Report and Order* in that Docket proceeding,<sup>4</sup> noted that the comments were divided over the need and ability to implement APC. The Commission, noting that ARRL had supported APC, ultimately held as follows:

After review of the record, we conclude that the automatic power control requirement proposed in the *Notice* should be adopted. We conclude that such a requirement is reasonable in mixed-mode frequency bands until sharing protocols are sufficiently developed to satisfy users that stations can avoid inter-mode interference. Further, we believe that power limits are a reasonable tradeoff between the wideband characteristics of SS emissions and the ability and flexibility to use various spreading codes.

*Id., at ¶ 14.*

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<sup>4</sup> FCC 99-234, 17 CR 130, released September 3, 1999

Now, seven years later, it is apparent to ARRL that the rules requiring APC indeed have proven to be difficult to implement, unnecessary, and something of a barrier to SS experimentation. Section 97.311(d) can be greatly simplified without increasing the risk of intra-service or inter-service harmful interference.

7. Section 97.311(d) currently reads as follows:

(d) The transmitter power must not exceed 100 W under any circumstances. If more than 1 W is used, automatic transmitter control shall limit output power to that which is required for the communication. This shall be determined by the use of the ratio, measured at the receiver, of the received energy per user data bit ( $E_b$ ) to the sum of the received power spectral densities of noise ( $N_0$ ) and co-channel interference ( $I_0$ ). Average transmitter power over 1 W shall be automatically adjusted to maintain an  $E_b/(N_0 + I_0)$  ratio of no more than 23 dB at the intended receiver.

While ARRL does not object to the continuation of the 100 watt power limitation, because there is no evidence that that limit contributes to the current regulatory disincentive to experiment with SS (and because it limits the power spectral density of an SS emission in the Amateur Service, thus contributing to the apparent compatibility between Amateur SS and Amateur narrowband modes in the same allocations) the APC requirement has not worked well at all. First of all, it is virtually impossible of compliance: the power of the transmitter is determined, according to the current rule, by the ratio of the received energy per user data bit to the sum of the received power spectral densities of noise and co-channel interference *measured at a distant receiver, or potentially many distant receivers*. Because of this, the APC at the transmitter is, in a given application, impossible to implement. Furthermore, the formula would be difficult to apply in any case.

8. Elimination of the APC portion of this rule subsection would not have any effect on the obligation of an Amateur station transmitting SS emissions to utilize the minimum power necessary to conduct communications. The station licensee or control operator would still have that absolute obligation, according to Section 97.313(a) of the Commission's Rules.<sup>5</sup> Furthermore, the SS rules already make SS essentially secondary to any Amateur narrowband emission modes.<sup>6</sup> Given these existing rules, which are not proposed to be modified or deleted, the APC requirement is not necessary to avoid interference to any other user of the same spectrum as the Amateur SS emission. The only change would be that Amateur SS equipment would not have to be configured to calculate the lowest transmitter power necessary by reference to a remote receiver or to multiple receivers (which has proven an impossible task in many applications). The minimum transmitter power can be determined more flexibly, and practically, by the Amateur station transmitting the SS emissions, using whatever techniques are necessary to comply with the minimum power rule. This provides greater flexibility and removes a substantial obstacle to SS experimentation, which is clearly the Commission's goal.

Therefore, the foregoing considered, ARRL respectfully requests that the Commission issue a Notice of Proposed Rule Making to implement the modification to

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<sup>5</sup> "At all times, an amateur station must use the minimum transmitter power necessary to carry out the desired communications."

<sup>6</sup> See, Section 97.311(b): "A station transmitting SS emissions must not cause harmful interference to stations employing other authorized emissions, and must accept all interference caused by stations employing other authorized emissions."

Section 97.311(d) of the Commission's rules contained in the attached Appendix, and adopt the same after an opportunity for notice and public comment.

Respectfully submitted,

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## **APPENDIX**

Part 97 of Chapter I of Title 47 of the Code of Federal is amended as follows:

Part 97 - Amateur Radio Service

1. Subsection 97.311(d) is revised to read as follows:

(d) The transmitter power must not exceed 100 W under any circumstances.