

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

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<b>In the Matter of</b>	)	
	)	
<b>Amendment of Part 15 of the Commission's Rules Regarding Spread Spectrum Devices</b>	)	<b>ET Docket No. 99-231</b>
	)	
<b>Wi-LAN, Inc. -- Application for Certification of An Intentional Radiator Under Part 15 of the Commission's Rules</b>	)	<b>DA 00-2317</b>
	)	

**To: The Commission**

**COMMENTS OF ARRL, THE NATIONAL ASSOCIATION FOR  
AMATEUR RADIO, IN RESPONSE TO FURTHER  
NOTICE OF PROPOSED RULEMAKING**

ARRL, the National Association for Amateur Radio, also known as the American Radio Relay League, Incorporated, by counsel and pursuant to Section 1.415 of the Commission's Rules (47 C.F.R. §1.415), hereby respectfully submits its comments in response to the *Further Notice of Proposed Rule Making and Order*, FCC 01-158, released May 11, 2001 (the Notice). The Notice proposes to amend Part 15 of the Commission's rules to improve spectrum sharing by unlicensed devices operating in the 2400-2483.5 MHz band (the 2.4 GHz band); to provide for introduction of new spread spectrum (SS) technologies; and to eliminate unnecessary regulations for SS systems. Specifically, the Notice proposes to reduce the amount of spectrum required for frequency-hopping SS systems in certain cases, and to allow new digital transmission technologies to operate under the same rules as SS systems. The Notice also proposes to eliminate the processing gain requirement for direct sequence spread spectrum systems, ostensibly to permit increased flexibility to manufacturers of Part 15 devices. Because

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some Amateur Service allocations (including the 2400-2450 MHz band) are heavily utilized by Part 15 devices, ARRL is concerned about any relaxation of rules which, in their inception, were intended to reduce or eliminate incidents of unintended interaction between Part 15 devices and licensed radio services. For its comments, ARRL states as follows:

1. The only portion of this proceeding with which ARRL is specifically concerned at present is the Commission's proposal to eliminate the processing gain requirement for direct sequence SS systems. The Amateur Service has, in general, been able to make some use of the 902-928 MHz, 2400-2450 MHz, and 5725-5850 MHz bands, notwithstanding the substantial, and increasing, presence of Part 15 consumer devices in those bands, and the concurrent increase in the noise floor. The proliferation of unlicensed devices in recent years has significantly diminished the practicality of many types of amateur operations in those band segments. However, as a general matter, there is still a reasonable opportunity for Amateur operation in these bands. One of the reasons why this is the case is that many of the newer Part 15 devices deployed in those bands are SS devices, with which Amateur narrowband operation is relatively compatible.

2. Nevertheless, the Commission's claim that its SS rules have been a "tremendous success" is an overstatement from the perspective of the licensed services which must operate in an increasingly cacophonous noise environment. The Amateur Service, which operates in the subject bands at 900 MHz, 2.4 GHz and 5.7 GHz, has had to endure interference to its operations in a noise environment substantially elevated due to the presence of an abundance of unlicensed devices. Very recently, the former Chief of the Office of Engineering and Technology admitted that the Commission does not

currently know the nature of that noise environment, and that it has no good idea whether the noise levels due to Part 15 devices are increasing, decreasing, or stable. While the Commission's Technological Advisory Council, laudably, is in the process of developing a noise study to address this issue, ARRL has already initiated a program to measure actual noise levels in different environments in these same bands. ARRL's effort is intended to help determine the proper regulatory environment for unlicensed devices, looking ahead. In the meantime, ARRL urges the Commission not to be complacent about aggregate noise levels in the bands in which unlicensed devices operate, and not to relax rules just for the sake of deregulation. The Commission should not rely on assumptions when making decisions regarding deregulation of unlicensed devices. These devices, like the contents of Pandora's Box, cannot be recalled on an aftermarket basis, and assumptions regarding the aggregate noise and interference impacts of Part 15 deregulation, once made, right or wrong, have long-term effects on licensed radio services.

3. It is true, as the Commission notes at paragraph 8 of the Notice, that the data rates achievable by SS devices have increased substantially over time. It is certainly not ARRL's intention to restrict the development of high-speed digital devices. As a general principle, higher data rates for such devices translate to shorter duty cycles, which is good from the perspective of the authorized radio service using the same frequency band. As long as new digital devices have the same power spectral density as true SS devices, the interference potential of the devices to Amateur receivers should remain static. However, ARRL is concerned about increased interference to Amateur stations by the elimination of the processing gain requirement for 1-watt direct sequence SS devices, and about

increased incidents of interference to unlicensed devices from properly operating Amateur transmitters.<sup>1</sup> While ARRL agrees with the Commission's proposal to treat digital devices and SS devices similarly relative to the application of Section 15.247 of the Rules, this does not necessitate elimination of the processing gain requirement for direct-sequence SS devices. The processing gain gave amateurs some comfort that designers of Part 15 SS devices would distribute their power uniformly over the bandwidth utilized without spectral lines. ARRL realizes, of course, that new technologies may render the processing gain requirement meaningless in some cases, but certainly not all.

4. As noted at paragraph 19 of the Notice, the current rules require direct sequence SS systems to have a processing gain of at least 10 dB [47 C.F.R. §15.247(e)]. This requirement was adopted so as to ensure that manufacturers would not take advantage of the higher power levels afforded spread spectrum devices by designing systems with wide bandwidths where much of the energy transmitted is not needed for communication. The Notice, at paragraph 22, states that the current state of the industry makes the continuation of this requirement questionable, and that manufacturers have "an incentive" to design their systems to include processing gain so that the devices will operate properly when proximate to other RF devices. The Notice also indicates that precise measuring of processing gain is difficult. For these reasons, the Notice proposes to eliminate the processing gain requirement.

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<sup>1</sup> ARRL is of course aware that Part 15 devices must not cause harmful interference to, and must tolerate interference received from authorized services pursuant to §15.5 of the Commission's Rules. However, this regulatory condition is lost in practice on non-technical consumers who purchase Part 15 devices. Amateur stations are never given consideration where a Part 15 device causes interference, and Amateurs are typically blamed for causing interference to consumer Part 15 devices such as cordless phones and other residential Part 15 devices.

5. In *Spread Spectrum Systems*, 67 RR 2d 1543 (1990), the Commission deregulated the design and use of direct sequence SS systems. In that Order, it imposed the processing gain requirement of 10 dB, and required certification applications for direct sequence SS devices to be accompanied by an exhibit demonstrating how the system achieves the required 10 dB of processing gain. In that proceeding, the Commission held:

We agree with NCR and Omnipoint that a processing gain requirement is needed for sequence systems to ensure that such systems operating under Part 15 rules are, in fact, spread spectrum in nature. We also agree that, without a processing gain requirement, the concept of spread spectrum operation is not clearly defined and insufficient guidance is provided to industry as to what is actually acceptable to the Commission as a spread spectrum system. Further, in the absence of a processing gain requirement, there is a strong potential for abuse of the Part 15 spread spectrum provisions. Devices could be designed to take advantage of the 1 Watt power provision by generating spread bandwidths where much of the energy is completely unnecessary for communications. These unnecessary signals constitute an inefficient use of the radio spectrum. We are adopting the definition of processing gain recommended by Gambatte, that is, processing gain is the unprocessed signal to noise ratio of the receiver versus the post-processed signal to noise ratio...

It was our intent in establishing these regulations to provide for and encourage spread spectrum technology. The 1 Watt power provision was intended to be a strong incentive in this regard. We deemed it desirable to foster this technology because of its low propensity to cause interference and its relatively high tolerance of interference from other sources. We do not believe it is in the public interest to allow the intent of these regulations to be undercut by systems that generate broad bandwidths only to take advantage of the 1 Watt permitted power. We reject those comments suggesting that the Commission should only be interested in whether the transmitter signals have potential for causing interference. The interests of spectrum efficiency dictate that we take steps to ensure against the transmission of radio frequency energy that serves no useful purpose for communication, may result in interference, and can be avoided....

67 RR 2d at 1547.

As recently as April of 1997, when the Commission eliminated the directional antenna gain requirement for Part 15 SS transmitters operating in the 2.4 and 5.7 GHz bands, alternative means of measuring processing gain were discussed. See, *Spread Spectrum Transmitters*, 7 CR 534, at 548 (1997). Therein, the Commission stated that "(t)he standard for a minimum processing gain was established to ensure that a system is, in fact, spread spectrum in nature. Absent this standard, there is a strong potential for abuse of the Part 15 spread spectrum provisions." Nothing has occurred, apparently, between April of 1997 and the present time that would ameliorate this "strong potential" for abuse. The present Notice states, however, without any citation of authority, that manufacturers have some unspecified "incentive" to design their systems to include processing gain. ARRL is frankly unconvinced that manufacturers have any such incentive. Past experience with Part 15 device manufacturers indicates that, generally speaking, they are not sensitive to interference avoidance considerations, inasmuch as that factor does not significantly affect consumer demand, individually or in the aggregate.

6. ARRL therefore remains concerned that elimination of the processing gain requirement for direct sequence SS systems is unjustified at present. Nor does it appear that the requirement adversely affects manufacturers of Part 15 devices. The difficulty in measurement of processing gain was addressed previously and rejected as a basis for not adopting the requirement in the first place; it should not be considered an obstacle to maintaining the rules now.

7. Elimination of processing gain potentially substantially reduces immunity of receivers to interference from narrowband signals. Because Amateur stations operate in close proximity to residential SS consumer devices, this is cause for concern,

notwithstanding the regulatory status of Part 15 devices. ARRL is unconvinced that manufacturers have any significant non-regulatory incentive to incorporate interference immunity design characteristics in Part 15 products.

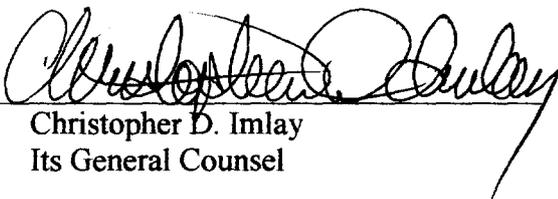
8. Overall, ARRL would caution the Commission not to delete the processing gain requirements without a more substantial premise than its speculative belief that manufacturers have an incentive to incorporate processing gain in their products. That assumption is directly contrary to the previous finding of the Commission that manufacturers have an incentive to design products that transmit up to one watt, and that the potential for abuse of that liberal operating parameter is high.

Therefore, the foregoing considered, ARRL, the National Association for Amateur Radio respectfully requests that the Commission carefully review the proposed change in the processing gain requirement for Part 15, direct sequence SS devices, and to make no change absent a better justification than is provided in the Notice in this proceeding.

Respectfully submitted,

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