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

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

In the Matter of)

Amendment of the Commission's Rules to)
Provide for Unlicensed NII/SUPERNet)
Operations in the 5 GHz Frequency)
Range)

ET Docket No. 96-102

DOCKET FILE COPY ORIGINAL

To: The Commission

COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
IN RESPONSE TO NOTICE OF PROPOSED RULE MAKING

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League, Incorporated

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TABLE OF CONTENTS

	<u>Page</u>
Summary	i
I. Introduction	2
II. The Notice Proposal Should Limit NII/ SUPERNet Devices to the 5.15-5.35 GHz Band	3
III. The Commission has Pushed the Part 15 Concept As Far As It Can Go	5
IV. The Proposed Rules for NII/SUPERNet Devices Appear To Be Sufficient to Avoid Significant Interference to the Amateur Service, But Sharing Studies Are Necessary	9
V. Conclusions	12
Certificate of Service	

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SUMMARY

The American Radio Relay League, Incorporated (the League), the national association of amateur radio operators in the United States, submits its comments in response to the Notice of Proposed Rule Making (the Notice), FCC 96-193, released May 6, 1996. The Notice proposes to amend Part 15 of the Commission's rules to permit use of 350 MHz of spectrum at 5.15-5.35 GHz and 5.725-5.875 GHz by a new category of unlicensed equipment, called NII/SUPERNet devices. These would provide short-range, high-speed wireless digital communications on an unlicensed basis in support of the "National Information Infrastructure" (NII), a group of interlinked networks of all types of communications facilities to serve the people of the United States in the future.

The Notice proposal, including all of its interference avoidance elements, is in keeping with the regulatory scheme for unlicensed devices, though it pushes the regulatory premises for unlicensed operation as far as they will conceptually go. The long-range, high-powered devices and path distances of 15 km proposed by Apple Computer but not included in the Notice proposal do not provide a proper framework for Part 15 devices. Such should be licensed transmitters, operated as fixed, point-to-point microwave links on a licensed basis, or provided alternatively through PCS carriers or switched telephone services. An unlicensed radio service with the characteristics proposed by Apple Computer is ill-advised, and not in accordance with the licensing requirements of the Communications Act of 1934.

The League sees no need, given the Commission's proposal, for the availability of both the 5.15-5.35 GHz and the 5.725-5.875 GHz bands for NII/SUPERNet devices. The lower 200 MHz is ample for development of NII systems. Use of the upper segment would place a large number of these devices, with unknown aggregate interference potential, in close geographic proximity to co-channel amateur operations.

Should the Commission decide nonetheless to permit NII/SUPERNet devices in the upper segment as well as the lower, the League suggests that the Commission's proposed technical operational rules and interference avoidance criteria, only if taken together (and if strictly enforced), might be sufficient to avoid widespread interference to amateur communications in the 5.650-5.925 GHz band. This cannot be confirmed, however, since the proponents of the authorization have not conducted sharing studies in advance of their proposal, nor has there been sufficient time following the release of the Notice to do such.

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To: The Commission

**COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED
IN RESPONSE TO NOTICE OF PROPOSED RULE MAKING**

The American Radio Relay League, Incorporated (the League), the national association of amateur radio operators in the United States, 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 *Notice of Proposed Rule Making* (the Notice), FCC 96-193, released May 6, 1996. The Notice proposes to amend Part 15 of the Commission's rules to permit use of 350 MHz of spectrum at 5.15-5.35 GHz and 5.725-5.875 GHz by a new category of unlicensed equipment, called NII/SUPERNet devices. These would provide short-range, high-speed wireless digital communications on an unlicensed basis. The Commission's goal in the Notice proposal is to create new wireless local area networks (LANs) in furtherance of the so-called "National Information Infrastructure" (NII), a group of interlinked networks of all types of communications facilities to serve the people of the United States in the future.

With respect to the frequency bands proposed and the compatibility of the instant proposal with continued operation by incumbent users, including the Amateur Service, the League states as follows:

I. Introduction

1. The Commission's Notice in this proceeding is based on two petitions for rule making, RM-8648 and RM-8653. The latter, filed by Apple Computer, Inc., proposed the use of the 5.725-5.875 GHz band for so-called "NII" operation. What the Apple petition entailed, far different from the short-range, high-speed digital communications proposed by the WINForum petition, was a community network with path lengths up to 15 km, power levels for non-spread-spectrum devices at up to one watt, and unlimited antenna gain (and apparently unlimited antenna beamwidth). The WINForum and Apple concepts were radically different in scope and concept. The League objected, in comments filed July 10, 1995, to the expansion of the Part 15 regulatory concept for unlicensed devices, proposed by Apple, especially in an amateur allocation. The League did not object to the WINForum proposal for use of the lower portion of the 5 GHz band. Most importantly, and as noted by the Commission in the instant Notice, the Apple proposal sought a change in the table of allocations, which is not possible for Part 15 devices. (See, the Notice, at Footnote 34). Rather, those devices are merely permitted to operate in bands allocated to other services on a non-interference basis.

2. The Apple petition, when filed, was woefully incomplete in terms of technical specifications and sharing studies relative to incumbent users. As the League noted in its July 10, 1995 comments:

The Apple petition is amorphous, in that it does not propose any specific rules changes (other than amendment of the Table of Frequency Allocations, 47 C.F.R. §2.106, to make spectrum available for the proposed new service). It contains no technical showing to support the proposed allocation whatsoever; and there is no showing of compatibility between the so-called "NII" (National Information Infrastructure) band allocation proposed by Apple, and existing Government and non-government users (including Part 15, Part 18 and Part 97 users). The petition is rife with glowing predictions of universal access by the public for whatever communications purposes are desired, but it contains no real information about the possibility of coordination of use between and among unlicensed users in the bands, or coordination between and among inter-service users. It contains only the vaguest references to compatibility with existing services in the 5150-5300 and 5725-5875 MHz bands. One can only conclude from the absence of any proposed operational rules and the lack of any technical compatibility showing that there is in fact no possibility of coordination, and that the opportunities for compatible sharing are little more than hopeful, but baseless, predictions. Neither does the petition contain an adequate discussion of alternatives to the specific allocations proposed in the petition; Apple indicates that the proposed 5 GHz allocations would be used both for long and short distance communications, but does not establish that frequencies above 40 GHz would not be sufficient (or indeed preferable to the 5 GHz bands proposed) for short-range paths.

**II. The Notice Proposal Should Limit NII/SUPERNet Devices
To the 5.15-5.35 GHz Band**

3. The Commission has solved some, but not all, of these problems by virtue of the proposed technical rules contained in the Notice, including the proposed power limitation of -10dBW (0.1 watt) peak EIRP; the limitation on power spectral density to a maximum of 0.03 milliwatts in any 3 kHz segment; the limitation on height of outdoor antennas; and the "listen-before-talk" protocol

standard. There is no significant antenna gain characteristic proposed to be permitted, though the Commission seeks information on the appropriate regulation applied to antennas.

4. Thus, the Commission has essentially adopted the concept of short-range, high-speed networks proposed by WINForum in the lower portion of the 5 GHz band, and proposed a full 200 MHz of spectrum for use by Part 15 unlicensed NII/SUPERNet devices therein at 5.15-5.35 GHz¹. It has rejected in principle the proposal of Apple Computer for long-range, high power unlicensed devices. Notwithstanding the proper rejection of the concept of 15 km path lengths from Part 15 unlicensed devices in shared bands, the Commission nonetheless proposes to permit lower power devices to operate in an additional 150 MHz of spectrum at 5.725-5.875 GHz, to conduct the same types of communications that would be conducted in the 200 MHz of spectrum at 5.15-5.35 GHz.

5. The Notice is silent as to the Commission's rationale for the necessity of the additional frequency authorization for NII/SUPERNet Part 15 devices in the upper 150 MHz, except to say that "(w)e also believe that the 5.725-5.875 GHz band is appropriate spectrum for NII/SUPERNet operations and that with appropriate technical constraints, these devices can share with existing amateur, unlicensed and ISM operations, as well as with FSS uplinks in the 5.850-5.875 GHz band." It is not clear that the Commission substantively addressed the contention of commenters such as Andrew Corporation, which, in response to the two petitions

¹ See, the Notice, at Paragraph 34.

for rule making, supported the use of the lower portion of the 5 GHz band for NII/SUPERNet devices, but stated that the need to make available more than 150 MHz for such devices now is far too speculative to warrant the disruption of existing services at 5.8 GHz. The League agreed with that prudent warning then, and agrees with it now: unless and until the Commission determines the adequacy and sufficiency of the 5.15-5.35 GHz band for NII/SUPERNet devices, it should not make the 5.725-5.875 GHz segment available.

III. The Commission Has Pushed The Part 15 Concept As Far As It Can Go

6. The League, in its comments in RM-8653, suggested not only that the Apple proposal for NII use of 5.7 GHz was premature, it misunderstood the entire regulatory framework for Part 15 unlicensed devices:

The concept of "community networks" and local area networks as Apple proposes appears better facilitated by the use of existing services such as private, fixed point-to-point microwave facilities now licensed by the Commission under Part 94; by frequencies above 40 GHz; by licensed and unlicensed PCS facilities for which the Commission has just allocated a substantial amount of spectrum at and near 2 GHz; and by existing wireline facilities... Part 15 operation is itself questionable under the terms of the present Communications Act; an allocation for unlicensed communications devices as proposed by Apple would be plainly impermissible. Part 15 devices have no allocation status, and have had none, internationally or domestically... These devices are permitted on an "at-sufferance" basis: they must not cause interference to licensed radio services, and they must tolerate interference received from licensed radio services in the same bands. The Communications Act of 1934 is devoid of any authority to accord Part 15 ... devices any allocation status at all; the only authority to permit unlicensed devices under the Act is with respect to radio control and citizen's radio service facilities. 47 U.S.C. §307(e). The only provision for Part 15 devices in the Communications Act is for the

Commission to regulate the interference potential of such devices by "reasonable regulation". 47 U.S.C. §302. This the Commission has done by permitting operation of such devices in bands allocated, on a primary basis, to one or more licensed radio services, where the operation of the unlicensed devices has been determined to be unlikely to cause interference to the licensed radio services.²

7. The instant Notice proposal would permit wireless interconnection of computers into local area networks over short distances of several hundred yards, at power levels and bandwidths that are presumptively unlikely to cause significant interference to amateur or other communications, except in quite close geographic proximity. The main problem is the ubiquitous nature of the devices, their mobility, and the potential aggregate interference potential, which has not yet been determined. Thus, whether the NII/SUPERNet devices can operate in the same environment as amateur radio at 5.725-5.875 GHz is unclear. This is a significant additional basis for presently limiting the authorization of the devices to the 5.15-5.35 GHz band. The League would be willing and able to conduct sharing studies with manufacturers of the devices in the near term to determine whether NII/SUPERNet devices could conform to Part 15 concepts and still be useful consistent with interference susceptibility, and the overall

² The Telecommunications Act of 1996, Pub. L. 104-104, 110 Stat. 56, Feb. 8, 1996, amended Section 307(e) of the Communications Act of 1934 to add to those services which may by FCC rule operate without individual licenses the aviation radio service for aircraft stations operated on domestic flights when such aircraft are not otherwise required to carry a radio station; and the maritime radio service for ship stations navigated on domestic voyages when such ships are not otherwise required to carry a radio station.

compatibility of NII/SUPERNet devices with co-channel amateur operation.

8. Assuming, however, that the Commission decides to proceed with the 5.725-5.875 GHz authorization at present, the technical rules proposed would have to be strictly adhered to, in order to protect licensed radio services with allocations in the subject bands from interference. The proposed General Technical Requirements, Section 15.407 in the proposed Appendix to the Notice, sets forth reasonable criteria which could be assumed to permit minimal interaction with amateur communications. This proposal, however, is as far as the Commission could go with the Part 15 unlicensed device concept. To permit either greater transmitter power than one-tenth of a watt, or to permit high-gain antennas for non-spread-spectrum devices in the subject band would signal a significant departure from the conceptual framework for Part 15 unlicensed devices. Part 15 and Part 18 devices are permitted under present rules to operate at relatively limited field strengths and operate over very short range, thus to protect licensed services against interference;³ only spread-spectrum devices are permitted to operate at up to one watt of power, as the result of the reduced interference potential from true spread-spectrum systems to narrowband co-channel services. As to adherence to the technical rules proposed, the Commission can be assured of

³ The Notice, at Paragraph 47, states that the instant proposal would permit operation of NII/SUPERNet devices at approximately 21 dB EIRP higher than existing, non-spread-spectrum Part 15 intentional radiators in the 5.725-5.875 GHz band.

no voluntary rule compliance; the marketing of Part 15 devices is as a general matter not confidence inspiring, when one considers the marketing rules violations and the inability or unwillingness of the Commission to police these violations. It could be expected that the NII/SUPERNet devices would be marketed in configurations in excess of authorized parameters. Because of the interservice interference potential and the proliferation of the devices, and because control over unlicensed facilities is non-existent, higher-power devices must be licensed devices.

9. Notwithstanding the stated concern that "permitting higher power, longer range links would pose unacceptable interference risks to other services..." the Commission notes that it finds "merit in the concept of longer range community networks and seek(s) comment on whether to permit such higher power operation at up to 1 watt of transmitter output power within the 5.725-5.875 GHz band." Such is ill-advised and would go well beyond the Commission's authority, since non-spread-spectrum devices, with no bandwidth limitations, at significant power and antenna gain, operating over the 15 km paths that Apple envisions, are not compatible with co-channel amateur operation. Purely and simply, higher powered transmitters and high antenna gain have significant interference potential and must, under the regulatory requirements of the Communications Act, be operated on a licensed basis. Any interconnection of schools, for example, as Apple proposes, should be done through 2 GHz PCS facilities, millimeter-wave facilities, licensed, fixed point-to-point microwave facilities, or via cable

systems or the public switched telephone network. Furthermore, it would appear to the League incompatible to mix the lower power, unlicensed NII/SUPERNet devices with higher power unlicensed community networks in the same bands; the intermixture would frustrate the entire concept of short range localized communications.

10. Taking into account the virtual absence of any enforcement activity of the Commission, in recent years, in non-safety-of-life interference incidents, and the anticipated continuation of the problem in the near future, it would be entirely inappropriate (even assuming that unlicensed operation at higher power with high-gain antennas was possible as a matter of law), to authorize such. The interaction that would inevitably result from co-channel amateur operation would never be resolved as a matter of fact, and the absence of any regulatory priority of such devices relative to licensed services is not an adequate explanation in the minds of the consumers of such devices.

**IV. The Proposed Rules for NII/SUPERNet Devices
Appear To Be Sufficient to Avoid Significant Interference
To the Amateur Service, But Sharing Studies are Necessary**

11. While, as noted above, the ubiquitous nature of NII/SUPERNet devices makes it difficult to determine the aggregate interference potential of these devices relative to the Amateur Service, the operational limitations proposed in the Notice, and

only those, taken together,⁴ appear to be facially sufficient to avoid significant interference to present and future amateur service communications generally. These include the following:

- A) Limitation of peak EIRP to -10dBW (0.1 watt).
- B) Limitation of power spectral density of 0.03 mW in any 3 kHz bandwidth as measured with a spectrum analyzer.
- C) Typical communications distances of 50 to 100 meters.
- D) Attenuation of emissions outside the band of operation by 50 dB below the fundamental emission or as per existing Part 15 requirements.
- E) Compliance with ANSI/IEEE 1992 RF Exposure standard.
- F) Spectrum etiquette provisions of Proposed Section 15.411.
- G) Antenna limitations for presumption of non-interference to licensed services: either indoor antennas or outdoor antennas not higher than 15 meters above ground.
- H) Requirement of automatic discontinuation of transmission in absence of information to transmit or operational failure.

12. Thus, while the League does not agree at all with the Commission that there is any demonstrated need to permit NII/SUPERNet devices to operate in both the 5.15-5.35 GHz and the 5.725-5.875 GHz bands at the present time, and suggests that the lower segment is ample spectrum space to launch the concept in the United States, the League does not take significant issue with the Commission that, "with appropriate technical constraints these devices can share with existing amateur, unlicensed and ISM operations as well as with FSS uplinks...". It must be noted,

⁴ The League would emphasize that only these measures together appear sufficient to mitigate interference; none are sufficient alone, or in combination with less than all of the listed items.

however, that these technical constraints have not yet been developed and do not now exist.

13. NTIA has recommended, and the League heartily concurs, that additional studies of spectrum sharing should be (and should have been) conducted between the proposed unlicensed operations and existing and proposed operations in the subject bands (*Notice, at paragraph 35*). The League remains willing and able to conduct sharing studies with Apple Computer or others as to the feasibility of compatible sharing with amateurs at 5.725-5.875 GHz. Such studies should be conducted before any decision is made with respect to 5.725-5.875 GHz. The burden of conducting such studies should be on the proponents of the authorization, and at least preliminary studies by those proponents should have preceded the filing of their petitions, or at least prior to the issuance of the Commission's Notice in this proceeding. It is rather late on, procedurally, for the Commission to ask for sharing studies to be conducted in the time available between the issuance of the Notice and the comment dates.

14. This proceeding points up one of the flaws inherent in the notice-and-comment process presently utilized with respect to spectrum allocations issues; it does not mandate that the proponent of a new use or an allocation change make at least preliminary technical investigation of compatibility with existing users. What has resulted from the failure of the petitioners in this proceeding to do exactly that is that the Commission itself has had to cobble together technical rules for NII/SUPERNet devices based largely on

assumptions of interference potential. While it has done in this instance a creditable job, a more scientific approach is called for in this, and in future allocations proceedings.

V. Conclusions

15. In this proceeding, the Commission has proposed only to permit short-range, wideband Part 15, unlicensed wireless LAN devices to interconnect computer systems as part of the NII. It has specifically not proposed, but it did request comment on, long-range, higher power, non-spread-spectrum devices of the same type, also unlicensed, for community networks. The Notice proposal, including all of its interference avoidance elements, is in keeping with the regulatory scheme for unlicensed devices, though it pushes the regulatory premises for unlicensed operation as far as they will conceptually go. The long-range, high powered devices and path distances of 15 km do not provide a proper framework for Part 15 devices. Such should be licensed transmitters, operated as fixed, point-to-point microwave links on a licensed basis, or provided alternatively through PCS carriers or switched telephone services. An unlicensed radio service with the characteristics proposed by Apple Computer is ill-advised, and not in accordance with the licensing requirements of the Communications Act of 1934.

16. The League sees no need, given the Commission's proposal, for the availability of both the 5.15-5.35 GHz and the 5.725-5.875 GHz bands for NII/SUPERNet devices. The lower 200 MHz is ample for development of NII systems. Use of the upper segment would place a

large number of these devices, with unknown aggregate interference potential, in close geographic proximity to co-channel amateur operations.

17. Should the Commission decide nonetheless to permit NII/SUPERNet devices in the upper segment as well as the lower, the League suggests that the Commission's proposed technical operational rules and interference avoidance criteria, only if taken together (and if strictly enforced), might be sufficient to avoid widespread interference to amateur communications in the 5.650-5.925 GHz band. This cannot be confirmed, however, since the proponents of the authorization have not conducted sharing studies in advance of their proposal, nor has there been sufficient time following the release of the Notice to do such. As suggested by NTIA and others, such is desirable in advance of formal rule making in this proceeding and in other allocations proceedings.

Therefore, the foregoing considered, the American Radio Relay League, Incorporated, requests that the Commission take no further

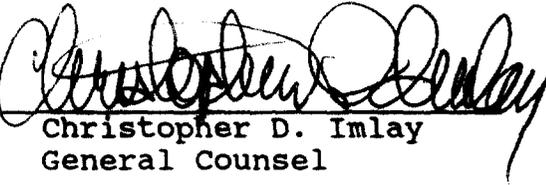
action toward Part 15 use of the 5.725-5.875 GHz band except in accordance with these comments.

Respectfully submitted,

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