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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

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

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

To: The Commission

DOCKET FILE COPY ORIGINAL

REPLY COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

The American Radio Relay
League, Incorporated

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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 reply 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 comments in this proceeding demonstrate no need for the Commission to make available both the 5.15-5.35 GHz and the 5.725-5.875 GHz bands for NII/SUPERNet devices. Allocation of 350 MHz is excessive and premature. Second, for longer-range community networks, licensed point-to-point paths in the 18, 23, 28, and 38 GHz bands, or other facilities, such as licensed and unlicensed PCS, and the millimeter wave bands, can be used for necessary community links. Finally, the record is inadequate to justify any use of the upper portion of the 5 GHz band, as interference protection for incumbent users in the 5 GHz band requires some preliminary sharing studies by the proponents of NII/SUPERNet devices.

Therefore, the League requests that the Commission limit the deployment of NII/SUPERNet devices to the 5.15-5.35 GHz band, and to limit any use of those devices to short-range operation, as per the technical rules in the Appendix to the Notice in this proceeding.

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REPLY COMMENTS OF
THE AMERICAN RADIO RELAY LEAGUE, INCORPORATED

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(c) of the Commission's Rules [47 C.F.R. §1.415(c)], hereby respectfully submits its reply 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 response to the comments filed to date in this proceeding, the League states as follows:

I. Introduction

1. The comments in this proceeding, though significantly divided, address two main issues: (1) whether the Commission's proposed availability of 350 MHz for NII/SUPERNet devices is excessive; and (2) whether the power and field strength limitations set forth in the Commission's proposed appendix are sufficient to permit short-range operation of these devices, while at the same time preventing interference to licensed services in the same bands. The League, and a significant number of other commenters suggest that the availability of 350 MHz is at the present time excessive, in view of other opportunities for high-speed data communications; that the Commission's proposal for short-range Part 15 facilities is as far as the Commission can or should go with unlicensed devices; and that longer-range devices should be operated only on a licensed basis.

II. The Commission Should Initially Limit NII/SUPERNet Devices to Operation in the 5.15-5.35 GHz Band

2. In its comments on the Notice, Apple Computer, Inc. (Apple) acknowledges that the Commission must satisfy the concerns of other users of the frequencies proposed for NII/SUPERNet applications. However, it dismisses any need for technical specifications and sharing studies relative to those same incumbent users. Apple states:

> Now that the Commission has identified the frequencies for the NII/SUPERNet Band and suggested some technical characteristics of the technologies that will be permitted to use the Band, the Commission can weigh sharing and interference potentials generally, without waiting for exhaustive evidence proving compatibility or incompatibility among types of old and new users. A simple over-arching "band plan" based on these conclusions can go a long way towards allaying the fears of existing users of the 5 GHz frequencies, while setting the stage for orderly development and deployment of compatible NII/SUPERNet devices.[1]

3. There are several problems with Apple's argument. First, Apple offers no statistics demonstrating how much spectrum is actually necessary to begin developing NII devices, or that 350 MHz is necessary for the purpose. Therefore, it is not established that it is necessary to share with users at 5.725-5.875 GHz at all. Second, Apple's proposed "simple" band plan does not address the compatibility problem. Finally, Apple's admission that the Commission must satisfy the concerns of other users is subsequently contradicted by its recommendation to the Commission to not wait for "exhaustive evidence proving compatibility or incompatibility," since the concern of other users is specifically the absence of *any* such evidence.

4. The League submits that there is no objective basis for making available for Part 15 use 350 MHz of spectrum for the development of NII/SUPERNet devices. After reviewing the petitions of both WINForum and Apple, the Commission concluded that "dramatic developments in digital technology have stimulated a need for the availability of spectrum to be used for wireless interconnection

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[1] Apple Comments at 10.

within and among these networks."[2] However, the Commission does not rely on any evidence of market demand to support the proposed allocation of 350 MHz. Instead, it acquiesces to the estimates of equipment providers and those seeking to create a market that might or might not justify the use of that volume of spectrum. It is unclear from the comments how much spectrum is actually necessary to support the initial deployment of NII/SUPERNet devices. There is significant evidence in the record, however, that allocation of 350 MHz is currently not supportable.

5. The comments of the Pacific Telesis Group, state, in part, as follows:

> That amount of spectrum (350 MHz) should not be committed to a service with unproven technology and untested market acceptance. Such a large allocation is unwarranted when compared with the amount allocated for unlicensed PCS services and for other unlicensed services. . . . A smaller initial allotment (for example, 100 MHz) would be sufficient to permit the development of the technology and market. When proven, additional spectrum could be allocated as needed.[3]

Others echo the same concern. The comments of Altstatt Associates note that, given current Commission requirements for spectral efficiency, even given assumptions of high volume of traffic, the occupancy by these devices should not exceed 120 MHz; that 350 MHz is unnecessary; and that all NII/SUPERNet operation would easily fit within the 5.15-5.35 GHz segment, leaving the current users at 5.725-5.875 GHz unaffected.

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[2] See, the Notice, at paragraph 32.

[3] Pacific Telesis Group at 3.

6. Western Multiplex Corporation notes that, since long distance links can be accomplished using spread spectrum technology under Part 15[4], only a portion of the requested spectrum is actually required for the remaining applications.[5] Western Multiplex states:

> WMC agrees with Andrew Corporation's point of view regarding spectrum requirements as stated in the NPRM paragraph 25 "Andrew contends that 150 megahertz of spectrum at 5.15-5.30 GHz should be sufficient initially for NII/SUPERNet services, adding that the benefits of making available 300 megahertz of spectrum are too speculative at this time to warrant disruption of existing services at 5.8 GHz". In fact, since the Commission's proposal is to grant 5.15 to 5.35 GHz, this would allow 200 MHz of bandwidth. WMC is in support of the granting of this portion of the spectrum (only) for NII/SUPERNet devices. However, we recommend that long

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[4] Specifically, Western Multiplex refers to Section 15.247 of the current Part 15 rules, which permits spread spectrum devices operating at, *inter alia,* 5.725-5.850 GHz, to use up to one watt of transmitter power while employing up to 6 dBi gain antennas.

[5] There are other options for short-range NII/SUPERNet communications at high data rates as well. Some of these are discussed *infra;* the comments of Cylink Corporation, however, include the following:

> In addition, as an alternative or progressive complimentary addition to the 5.8 GHz band for low power, short range communications, through ET Docket 94-124, a large contiguous block of contiguous bandwidth has been proposed for unlicensed high speed communications in the oxygen absorption band (59-64 GHz). Millimeter wave bands can provide both the exclusivity and protection from interference that would normally be secured by licensing. The millimeter wave bands provide exactly the characteristics for wireless LAN short range educational and industrial campus area applications that require very high bandwidth or data transfer rates, such as the videoconferencing and very high rate local area applications identified for the NII/SUPERNet users, without any penalization of existing spread spectrum users.
>
> Comments of Cylink, at 3.

> distance applications should be enabled in the 5.15 to 5.35 GHz band with appropriate standards.[6]

7. The League objects to the Commission's acceptance of Apple's claims that the upper 150 MHz at 5.725-5.875 GHz is a necessary and appropriate additional segment for use by NII/SUPERNet devices when there is no demonstrated reason to make more than the 200 MHz at 5.15-5.35 GHz available for that use. It is urged that the upper 150 MHz proposed for the NII/SUPERNet devices not be made available at the outset, but rather only after a determination has been reached as to the success of such devices at 5.15-5.35 GHz, and the need for additional spectrum, has been evaluated. The utility of these devices for the intended purpose has not been established; the existing alternatives have not been explored; and the interference potential to other users of the spectrum has not been determined. Indeed, in the comments of the Benton Foundation and Computer Professionals for Social Responsibility, the technical difficulties not yet explored may preclude successful deployment of NII/SUPERNet devices as proposed:

> Indoor wireless networks are often mentioned as alternatives to wired networks. This is in part based on the reduction of expense of installing a wireless network (footnote omitted). Those supporting this proposition should be required to produce a study or other evidence in support of this claim. The savings are supposed to come from not wiring a building (for example a school) and avoiding breaking through asbestos laden walls. But 1/10th (watt) power transmissions in the 5 GHz range has limited range and propagation. A transmission may have trouble making across a room. It does not appear that it would make it to a second room. Therefore, some method of carrying the signal throughout the building is required, such as bleeder lines (footnote omitted). In the end, a

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[6] Western Multiplex Corporation comments, at 3.

> SUPERNet network will require a server capable of managing all of the radio transmissions, an ability to carry the signal throughout the building (possibly repeaters or bleeder lines), units on each computer capable of connecting to the network, and installation. The price tag could be substantial. Proponents should be required to establish that this is a viable replacement to wired systems.
>
> *****
>
> Apple, Winforum, and others have presented NII/SUPERNet as a powerful solution to problems of universal service. Yet the technical difficulties of this proposal may indicate that NII/SUPERNet may not in fact meet those goals. The Commission should be provided with proof that this proposal can work and that it can work for the purpose presented. The zeal of American industry to profit from the wireless market should not blind the Commission to the possible technical deficiencies of NII/SUPERNet and its possible inability to deliver on its promises.
>
> The comments of the Connectivity for Learning Coalition...in this proceeding cast even more doubt on the usefulness of this proposal, as it stands, for schools and libraries. The comments of the coalition detail how the Commission's proposal will fall short of meeting the needs of the education and libraries communities. [7]

Therefore, because of the unproven nature of the NII/SUPERNet devices, the unestablished demand, and the unknown interference potential, there is no need for the Commission to make available the entirety of a 350 MHz segment for these devices at the present time.

III. The 5.725-5.875 GHz Band Should Not Be Made Available For Long-Range NII/SUPERNet Devices

8. Apple attempts to convince the Commission that the Notice overemphasized the risk of harmful interference from the deployment of longer reach "community networks" in the 5.725-5.875 GHz band:

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[7] See, Comments of the Benton Foundation and Computer Professionals for Social Responsibility, at 5, 7.

> Community networks, . . . have been tarred with the false label of "high power" and somehow differentiated from other applications allowed the same power. This has caused the Commission and some other parties to overestimate the possibility that community network links could threaten the reliable operation of other services . . . Nonetheless, although one watt ordinarily would not be described as "high power," Apple believes the community network technologies would not be adversely affected if they were restricted to transmitter power of 0.1 watt (+20 dBm) for personal/portable and fixed equipment, respectively which Apple recommends for all NII/SUPERNet devices, with, of course, the proviso that antenna gain not be restricted for point-to-point, fixed outdoor links.[8]

This does not address the entirety of the problem with higher power, non-spread-spectrum, unlicensed devices in shared bands. The real difficulty, aside from the non-spread-spectrum character of the devices, is the ubiquitous nature of the NII/SUPERNet services, their mobility and the potential aggregate interference potential to licensed services. There is no assurance, for example, that the "listen before talk" circuitry in such devices, or other spectrum etiquettes, will avoid interference to licensed services, especially mobile services. The Apple high power proposal stretches the regulatory concept of Part 15 unlicensed devices beyond the breaking point, and there are adequate alternatives.

9. Significant alternatives to NII/SUPERNet devices, for wideband, high-speed data over long range paths, exist on a licensed basis. The comments of the Fixed Point-to Point Communications Section, Network Equipment Division of the Telecommunications Industry Association (TIA), state, in part:

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[8] Apple at 8.

> TIA opposes authorizing unlicensed 5 GHz band point-to-point paths exceeding 1-2 kilometers. A basic Commission policy, that short haul "hops" should be in bands at 18 GHz and above, thereby reserving spectrum below 11 GHz for longer-range hops, would be compromised. "Hops" of up to 10 or 15 kilometers, as is being considered for the newly proposed unlicensed NII/SUPERNet operations, would be inefficient use of valuable spectrum. For example, the licensed 18 GHz band is perfectly adapted to the 10 kilometer high-speed, high-reliability point-to-point links that might be required for inter-community communications.
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> * * * *
>
> Affordable technology already exists for longer-range FS paths, which could provide intercommunity links for NII/SUPERNet. Domestic manufacturers are producing equipment for use in the 18 GHz, 23 GHz, and 38 GHz bands pursuant to Commission policy on using such higher bands for these "hops."
>
> * * * *
>
> In fact, the cost of supplying a millimetric radio link is comparable to the cost of the corresponding unlicensed equipment alternative. Estimates range from less than $20,000-$25,000 per 18 GHz hop to less than $15,000 per hop in the higher bands. . . . Further, vital short/medium-range inter-community links, using 18 or 23 GHz FS bands, would benefit from complete interference protection.[9]

10. The duplication of presently existing links would be inefficient, and inconsistent with FCC's prior spectrum allocations decisions. TIA filed reply comments in ET Docket 96-8, on the subject of amendment of the Parts 2 and 15 regulation of Spread Spectrum Transmitters, which addressed the same issue. There, TIA noted that existing service, equivalent to that proposed in the abstract by Apple, is sufficient for community links:

> TIA submits that the Commission already has provided for "longer reach" NII links by establishing the short to medium range licensed bands at 18, 23 and 38 GHz. As TIA

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[9] TIA Comments at 6-7. See also WMC Comments at 2-3 (proposing that since long distance links can be accomplished using Part 15.247 spread spectrum technology, only a portion of the requested spectrum is actually required for the remaining applications).

demonstrates in the current NII/SUPERNet rule making proceeding, high speed and high reliability transmission links are available for less than $15,000 per hop in existing microwave bands above 17.7 GHz (footnote omitted). Actually, "community networking" and many other NII applications already are very well covered by licensed microwave bands:

> Several 38 GHz operators, such as Advanced Radio Telecom Corp. and WinStar Communications, Inc. have been marketing affordable Internet access services for more than a year and already have entered into agreements with Internet service providers.
>
> The ITU-R recently has contributed to the ITU Joint Rapporteur Group on the Global Information Infrastructure ("GII") by describing the role of radio in the GII implementation. In its input document, the ITU-R clearly establishes the key role that licensed point-to-point and point-to-multipoint digital radio relay systems will play in the GII.

Thus, the Commission first should look to the licensed bands for longer range links to support NII needs.[10] The comments of Harris Corporation-Farinon Division echo those of TIA:

> Harris emphasizes that the 5 GHz band is a valuable natural resource to be used in a highly efficient manner. Use of part of this band for NII/SUPERNet devices for short-range high-speed digital communications on an unlicensed basis is considered to be an efficient use. However, utilizing the 5 GHz band spectrum for "hops" of 2 to 10 (or 15) kilometers in length is considered highly inefficient. The Commission correctly made this determination when it allocated the 18 GHz, 23 GHz, and 38 GHz bands for use on short paths and reserving spectrum below 10 GHz for long "hop" microwave links in the aforementioned higher bands.
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> Harris urges the Commission to adhere to its policy on spectrum usage for fixed microwave links. Accommodation of NII/SUPERNet devices at 5 GHz for short transmissions of up to 1 kilometer is fine, as a multitude of such

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[10] See, the Reply Comments of TIA in ET Docket No. 96-8, filed on or about July 18, 1996, at 3,4.

> operations can then be provided within the spectrum available. However, the point-to-point services needed to support those very local networks should be in separate higher bands where spectrum usage would be coordinated, licensed, and where power authorizations would be sufficient to provide a quality, reliable service...As a final point, the licensed bands at 18 GHz, 23 GHz, and 38 GHz all have the capability to transport up to 155 Mb/s.[11]

11. That Part 15 long-distance NII/SUPERNet devices should not be authorized as proposed by Apple is heard almost unanimously in the comments in this proceeding. AT&T, for example, states that as a matter of policy, regardless of what spectrum is considered for these devices, higher-power, longer-range NII/SUPERNet devices should be operated only on a licensed basis:

> While AT&T recognizes the potential benefits of providing spectrum for NII/SUPERNet uses, the Commission should allow high-power, long-range community network operations only on a licensed basis pursuant to spectrum auctions. If the Commission determines that previously allocated spectrum is insufficient to support such services, it should dedicate a portion of the proposed 350 MHz for these licensed operations.[12]

AT&T argues that any dedication of spectrum for unlicensed long-range, high-power devices would be unfair to the holders of existing licenses, and would undermine the Congressional objective of promotion of regulatory parity among wireless services.[13] This would dictate equivalent treatment to all categories of wireless

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[11] See the Comments of Harris Corporation, at 2,3.

[12] AT&T Comments, at 3,4.

[13] The *Omnibus Budget Reconciliation Act of 1993*, Pub. L. 103-66, Title VI, §6002(b) (1993); H.R. Report 103-213, 103rd Cong., 1st Sess. 494 (1993) (intent of Congress is that, consistent with the public interest, similar services are accorded similar regulatory treatment).

services that have the potential to compete with one another in the marketplace; it includes auctions, and eligibility rules and obligations imposed on other license holders.

IV. Apple's Plan Does Not Address Interference Potential to Amateur and Other Licensed Operations in the 5 GHz Band

12. The risk of interference from NII/SUPERNet devices to amateur stations and other licensees has not been adequately addressed in comments in this proceeding[14]. Some evidence of compatibility between NII/SUPERNet devices and licensed amateur radio uses (not "exhaustive studies" as Apple fears) would seem a normal prerequisite for proposed shared use of any spectrum in which there is anticipated geographic proximity of both uses. The League, as noted in its comments, is concerned that a more scientific approach has not been taken in this proceeding. Other commenters have expressed this same concern.[15] As an example, the

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[14] The comments of the Pacific Telesis Group share the Commission's view that:

> An unlicensed longer-range community network concept, however, raises significant concerns about both interference and regulatory parity. As the Commission notes, concerns have been raised that links longer than one kilometer in length would have the potential to cause harmful interference. We share this concern and strongly support the Commission's proposal not to accommodate higher power longer range communications sought by WINForum and Apple.

Pacific Telesis Group, at 3,4.

[15] See Comments of Federal Highway Administration, Western Multiplex Corporation, NARCC, Inc., L/Q Licensee, Inc., Benton Foundation, ReSound Corporation, ICO, Larus Corporation, Cylink

comments of the Intelligent Transportation Society of America ("ITS America") included a study commissioned by the Federal Highway Administration indicating that NII/SUPERNet devices operating in the 5.850-5.875 GHz range may adversely affect Dedicated Short Range Communication ("DSRC") operation when the devices function within 60 meters of each other.[16] The League believes that this type of study is called for by the proponents, and that the ITS study in particular, although preliminary, emphasizes the need for additional tests of NII/SUPERNet compatibility with incumbent users before any decision is reached concerning the availability of the 5.725-5.875 GHz band for NII/SUPERNet devices. For example, the comments of The Bell Atlantic Telephone Companies (Bell) state as follows:

> If the Commission were to consider the use of higher power devices on an unlicensed basis, it would have to develop methods to control harmful interference that would ordinarily be controlled through coordination and licensing procedures. The only method for controlling interference mentioned in the NPRM is spectrum etiquette -- i.e. a basic "listen before talk" protocol standard. This system has not yet been proven in wide area applications. Moreover, it will work only where the transceivers are within the range of each other. If two transceivers are out of each other's range, they will not hear anything when they "listen before talking"...The situation is further complicated by the presence of many different transceivers operating with two different systems.
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> Bell Comments, at 2.

13. The League shares Western Multiplex Corporation's (WMC) recommendation that NII/SUPERNet devices not be permitted to use

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Corporation, and European Telecommunications Standards Institute.

[16] ITS America at 2 (footnote omitted).

any portion of the 5.725-5.875 GHz band, nor should any equipment be authorized for use, unless the devices are demonstrated to not cause interference to, or impose additional restrictions on existing users.[17] Cylink, in its comments, suggests the need for detailed technical analysis before deployment of NII/SUPERNet devices in this band in order to prevent harmful interference with Part 15 spread spectrum operations.[18] ReSound Corporation believes that proposed sharing of the ISM band, in particular in the 5.850-5.875 GHz segment, threatens publicly beneficial healthcare advancements.[19] ETSI also expresses concern that the upper 150 MHz will be shared with ISM band users, and proposes making available instead more spectrum in the lower 5 GHz range.[20]

14. The League submits that industry comments reflect consensus on one of the major flaws inherent in this notice-and-comment proceeding: it was not premised on a preliminary technical investigation of compatibility with existing uses, which is the usual burden placed on a potential new user of allocated spectrum. The League emphasized this flaw in its prior comments. Though the Commission has cobbled together technical rules for NII/SUPERNet devices, a more scientific approach is called for in this, and in future allocation proceedings. The League remains willing and able to conduct the appropriate sharing studies with Apple or others as

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[17] WMC comments at 3-4.

[18] Cylink comments, at 1.

[19] ReSound at 3.

[20] ETSI at 2.

to the compatibility with amateurs at 5.725-5.875 GHz, but none is presently in the record.

V. Conclusions

15. The comments in this proceeding demonstrate no need for the Commission to make available both the 5.15-5.35 GHz and the 5.725-5.875 GHz bands for NII/SUPERNet devices. Allocation of 350 MHz is excessive and premature. Second, for longer-range community networks, licensed point-to-point paths in the 18, 23, 28, and 38 GHz bands, or other facilities, such as licensed and unlicensed PCS, and the millimeter wave bands, can be used for necessary community links. Finally, the record is inadequate to justify any use of the upper portion of the 5 GHz band, as interference protection for incumbent users in the 5 GHz band requires some preliminary sharing studies by the proponents of NII/SUPERNet devices.

Therefore, the foregoing considered, the American Radio Relay League, Incorporated, requests that the Commission limit the deployment of NII/SUPERNet devices to the 5.15-5.35 GHz band, and

to limit any use of those devices to short-range operation, as per the technical rules in the Appendix to the Notice in this proceeding.

Respectfully submitted,

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