APPENDIX B: FINAL REGULATORY FLEXIBILITY ANALYSIS

As required by Section 603 of the Regulatory Flexibility Act, 5 U.S.C. § 603 ("RFA"), an Initial Regulatory Flexibility Analysis ("IRFA") was incorporated in the *Notice of Proposed Rule Making* ("*NPRM*"), ET Docket No. 96-102.[157] The Commission sought written public comment on the proposals in the *NPRM*, including the IRFA. The Commission's Final Regulatory Flexibility Analysis ("FRFA") in this Report and Order conforms to the RFA, as amended by the Contract With America Advancement Act of 1996 ("CWAAA"), Pub. L. No. 104-121, 110 Stat. 847 (1996).[158]

I. ***Need for and Objectives of the Rule***: By this action, the Commission provides 300 megahertz of spectrum for a new category of unlicensed equipment called "Unlicensed National Information Infrastructure" ("U-NII") devices. These devices are needed to provide high speed wireless digital communications on an unlicensed basis. The Commission anticipates that these U-NII devices will support the creation of new wireless LANs, campus networks, community networks, and will facilitate wireless access to the National Information Infrastructure. Additionally, the rules set forth herein will foster the development of a broad range of new devices and services that will stimulate economic development and the growth of new industries. Finally, this action will promote the ability of U.S. manufacturers to compete globally by enabling them to develop unlicensed digital communications products for the world market.

II. ***Summary of Significant Issues Raised by the Public Comments in Response to the IRFA***: Five parties directly address the *IRFA*. In general, comments support the provision of U-NII devices and argue that these operations will benefit small entities. Several comments addressing the *IRFA* argue that longer range U-NII devices will be needed to permit schools and libraries to access information on the NII without having to pay expensive monthly charges, such as long distance fees, to telecommunications service providers. Further, these parties state that longer range U-NII devices will not only benefit equipment manufacturers, but also will benefit Internet service providers, small entities in rural communities, and the up to 5 million small businesses that offer products and services over the Internet.[159] However, regarding the manufacturers of U-NII devices, the Northern Amateur Relay Council of California, Inc. ("NARCC") argues that only established major players in the microwave radio community will have the talent and resources to bring U-NII devices to the market in a timely manner. Therefore, NARCC contends that affording small companies preferential treatment will not produce anything significant in the way of a lower cost, more innovative product.[160]

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[157] *See Notice of Proposed Rule Making*, ET Docket No. 96-102, 11 FCC Rcd 7205 (1996).

[158] *See* Subtitle II of the CWAAA is "The Small Business Regulatory Enforcement Fairness Act of 1996" ("SBREFA"), codified at 5 U.S.C. § 603.

[159] *See* Wireless Field Test for Education Project; Fundamental Research Corporation; Crystal Wind Communications, Inc.; and Jean Armour Polly.

[160] *See* Northern Amateur Relay Council of California, Inc. Comments at 7.

Finally, Cylink, Inc. opposes the adoption of an interim spectrum etiquette because small entities would not have the resources to develop interim equipment and to later redesign that equipment to comply with any formally adopted spectrum etiquette.[161]

III. ***Description and Estimate of the Number of Small Entities to Which the Rules Will Apply***: The RFA generally defines the term "small business" as having the same meaning as the term "small business concern" under the Small Business Act, 15 U.S.C. §632. Based on that statutory provision, we will consider a small business concern one which: (1) is independently owned and operated; (2) is not dominant in its field of operation; and (3) satisfies any additional criteria established by the Small Business Administration (SBA). The RFA SBREFA provisions also apply to nonprofit organizations and to governmental organizations. Since the Regulatory Flexibility Act amendments were not in effect until the record in this proceeding was closed, the Commission was unable to request information regarding the number of small business that might use this service and is unable at this time to determine the number of small businesses that would be affected by this action. The rules adopted in this Report and Order will apply to any entities manufacturing U-NII devices to operate in the 5 GHz range which could include computer manufacturers and unlicensed RF equipment manufacturers. Although the rules do not directly affect entities that purchase this equipment, comments contend that several million entities, including consumers, schools, libraries, and small businesses, could benefit from the use of these devices.

The rules adopted in this Report and Order will apply to entities engaged in the manufacturing of U-NII devices. The Commission has not developed a definition of small entities applicable to unlicensed device manufacturers. Therefore, the applicable definition of small entity is the definition under the Small Business Administration ("SBA") rules applicable to manufacturers of "Radio and Television Broadcasting and Communications Equipment" and "Computer Manufacturers." According to the SBA's regulations, an RF manufacturer must have 750 or fewer employees in order to qualify as a small business.[162] Census Bureau data indicates that there are 858 companies in the United States that manufacture radio and television broadcasting and communications equipment, and that 778 of these firms have fewer than 750 employees and would be classified as small entities.[163] Further, according to SBA regulations, a computer manufacturer must have 1,000 or fewer employees in order to qualify as a small entity.[164] Census Bureau data indicates that there are 716 firms that manufacture electronic computers and of those, 659 have fewer than 500

[161] *See* Cylink Reply at 17.

[162] *See* 13 C.F.R. § 121.201, Standard Industrial Classification (SIC) Code 3663.

[163] *See* U.S. Department of Commerce, *1992 Census of Transportation, Communications and Utilities* (issued May 1995), SIC category 3663.

[164] *See* 13 CFR § 121.201, (SIC) Code 3571.

employees and qualify as small entities.[165] The remaining 57 firms have 500 or more employees; however, we are unable to determine how many of those have fewer than 1,000 employees and therefore also qualify as small entities under the SBA definition. The Census Bureau categories are very broad and specific figures are not available on the number of these firms that will manufacture U-NII devices; however, we acknowledge the likelihood that many of them will be small businesses.

IV. ***Description of Projected Reporting, Recordkeeping and Other Compliance Requirements:*** The rules adopted in this Report and Order will require U-NII manufacturers to comply with the Commission's equipment certification requirements set forth in Section 15.210(b), prior to marketing, and the radio frequency hazard requirements set forth in Sections 1.1307(b), 1.1310, 2.1091, and 2.1093 of the rules. All equipment will be deemed to operate in an 'uncontrolled' environment. Any application for equipment certification for these devices must contain a statement confirming compliance with these requirements. Technical information showing the basis for this statement must be submitted to the Commission upon request. The equipment certification requirement is necessary to ensure compliance with the Commission's rules and promote electromagnetic compatibility. Further, compliance with the radio frequency hazard requirements is necessary to protect the health of individuals using the equipment. These requirements are typically required for all unlicensed equipment. No further reporting or recordkeeping requirements will be imposed. Therefore, the only compliance costs likely to be incurred are costs necessary to ensure that prototype devices comply with our equipment certification requirements and radio frequency hazard requirements.

Skills of an application examiner, radio technician or engineer will be needed to meet the requirements. If a device is not categorically excluded, the manufacturer of the device must make a determination of whether the device will comply with the RF radiation limits. This study can be done by calculation or measurement, depending upon the situation. In many cases the studies can be done by a radio technician or engineer. Certification applications are usually done by application examiners.

V. ***Significant Alternatives and Steps Taken By Agency to Minimize Significant Economic Impact on a Substantial Number of Small Entities Consistent with Stated Objectives:*** Based on comments received in response to the NPRM, the Commission considered several significant alternatives. For example, although the *NPRM* proposed to make 350 megahertz available for U-NII devices, parties with incumbent or future operations request that less spectrum be made available in order to protect their interests. Specifically, parties with mobile satellite service ("MSS") interests argues that U-NII devices should not be permitted in

[165] *See* U.S. Small Business Administration 1995 Economic Census Industry and Enterprise Report, Table 3, SIC Code 3571, (Bureau of the Census data adapted by the Office of Advocacy of the U.S. Small Business Administration).

the 5.15-5.25 GHz band because of potential use of this band by MSS feeder links.[166] Further, amateur radio parties oppose U-NII operations in the 5.725-5.875 GHz band because of amateur operations in this spectrum.[167] Resound Corporation ("Resound") and the Federal Highway Administration ("FHWA") oppose U-NII operations in the 5.850-5.875 GHz band because of future plans to use this spectrum.[168] After considering these alternatives, the Commission concluded that 300 megahertz of U-NII spectrum at 5.15-5.35 GHz and 5.725-5.825 GHz is appropriate for these devices to operate without interfering with incumbent and potential operations. This reduction from the proposed U-NII spectrum is necessary to protect Part 15 hearing assistance devices, potential intelligent transportation system operations, and amateur operations in the 5.825-5.875 GHz band from interference. This action should not have a negative impact on small U-NII businesses and will protect incumbent and proposed spectrum users which may be small businesses.

Additionally, various parties recommend different technical standards for U-NII devices. For example, some U-NII proponents support increasing the proposed power limit and permitting unrestricted antenna gain for U-NII devices in order to accomplish longer range communications.[169] However, AT&T and point-to-point microwave parties oppose longer range use of U-NII devices and support short range, low power operations.[170] The Commission has determined that U-NII devices should be governed by minimal technical rules which permit maximum flexibility in the way these devices are implemented. Specifically, the Commission has concluded that an increase in the power limits proposed in the *NPRM* is supported by new material in the record in this proceeding, but does not believe unrestricted antenna gain should be permitted due to interference concerns. The Commission has determined that the public interest is best serviced by increasing the maximum peak power limit as follows: 50 mW peak transmitter output power with up to 6 dBi antenna gain (equates to 200 mW EIRP) permitted in the 5.15-5.25 GHz band; 250 mW peak transmitter output power with up to 6 dBi antenna gain (equates to 1 W EIRP) permitted in the 5.25-5.35 GHz band; and 1 W peak transmitter output power with up to 6 dBi antenna gain (equates to 4 W EIRP) permitted in the 5.725-5.825 GHz band. In addition, to permit manufacturers flexibility in designing U-NII equipment, the Commission will permit the use of higher directional antenna gain provided there is a corresponding reduction in transmitter output power of one dB for every dB that the directional antenna gain exceeds 6 dBi. Also, U-NII use of the 5.15-5.25 GHz band is restricted to indoor operations only. Further, this action

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[166] *See e.g.,* Loral/Qualcomm Licensee, Inc. Comments at 4.

[167] *See e.g.,* Amateur Radio Relay League, Inc. Comments at 5.

[168] *See* Resound Comments at 7 and FHWA Comments at 2.

[169] *See e.g.,* Apple Computer, Inc. Comments at 8.

[170] *See e.g.,* AT&T Comments at 3; Pacific Telesis Group Comments at 4; and Telecommunications Industry Association, Fixed Point-to-Point Communications Section Comments at 4.

adopts a power spectral density ("PSD") requirement for U-NII devices that would require that the maximum power be spread across of bandwidth of at least 20 megahertz. This PSD requirement will ensure that U-NII devices spread its signal energy evenly across the band and encourages the use of this spectrum by wideband high data rate applications, but permits non-wideband operations at reduced powers. These increased power limits will permit U-NII equipment manufacturers, many of which may be small businesses, more flexibility to develop products to meet market demands.

Further, the Commission considered several alternatives from the comments regarding a spectrum etiquette for U-NII devices. Although some parties support the proposed interim "listen-before-talk" ("LBT") spectrum etiquette until industry can develop a formal spectrum etiquette,[171] others oppose the interim etiquette because it would limit the flexibility of U-NII devices to use different technologies.[172] Further, several U-NII proponents support the adoption of an industry developed spectrum etiquette to govern unlicensed use of this spectrum.[173] Metricom, however, suggests that rather than adopting a complex spectrum etiquette, U-NII devices should be required to use spread spectrum techniques.[174] The Commission has now concluded that the proposed LBT spectrum etiquette could delay deployment of U-NII devices and hinder innovation in the development of these devices. Rather, the Commission has concluded that simple technical rules, such as PSD limits and out-of-band emission requirements, should be sufficient to ensure spectrum sharing between incumbent operations and new U-NII devices. The Commission declined to adopt a spectrum etiquette, any channelization plan, or a minimum modulation efficiency requirement because such requirements may preclude certain technologies or some of the many different concepts envisioned by U-NII proponents. We believe this action will benefit small entities by permitting these entities to develop innovative equipment to meet market demands without having to follow protocols governing use of the spectrum.

Finally, the *NPRM* proposed to establish parameters in the rules ("safe harbor"), under which U-NII devices complying with these parameters could operate without being considered sources of harmful interference. Incumbent parties oppose "safe harbor" rules or any action that would provide unlicensed devices addition spectrum rights.[175] However, U-NII proponents request that these devices be protected either by "safe harbor" rules or by

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[171] *See e.g.,* Consumer Electronics Manufacturers' Association Comments at 4.

[172] *See e.g.,* Hewlett-Packard Comments at 3.

[173] *See e.g.,* WINForum comments at 21.

[174] *See* Metricom Reply at 10.

[175] *See e.g.,* Loral/Qualcomm Licensee, Inc. Comments at 15; Metricom Reply at 7; and San Bernardino Microwave Society Reply at 3.

providing a primary allocation status for the unlicensed operations.[176] After considering the alternatives, the Commission concluded that "safe harbor" rules are not necessary at this time to provide assurances to assurance to U-NII operators that their communications will not be prohibited. Rather, the Commission invited MSS parties to monitor the emissions from U-NII devices in the 5.15-5.25 GHz band and if emissions approach the 10 dBW/MHz level to request that we reassess the use of this band through future rule making.[177] At that time the Commission could determine if future U-NII devices should be required to operate at different technical standards. This approach will provide both MSS feeder link and U-NII operations with an appropriate level of protection and assurance for the continuation of their operations. While, the Commission is confident that an interference situation will not arise, this approach will permit it to develop regulatory solutions that will adequately protect the investments of both services, if such a situation were to develop.

Report to Congress: The Commission shall send a copy of this Final Regulatory Flexibility Analysis, along with this Report and Order, in a report to Congress pursuant to the Small Business Regulatory Enforcement Fairness Act of 1996, 5 U.S.C. § 801 (a)(1)(A). A copy of this FRFA will also be published in the Federal Register.

[176] *See e.g.,* Apple Computer Comments at 27, WINForum Reply at 23, and Consumer Electronics Manufacturers' Association Comments at 7.

[177] We also note that it may also be appropriate to reassess the technical parameters governing U-NII devices in light of second generation MSS systems. For example, second generation MSS systems may be more sensitive and therefore more susceptible to interference from U-NII devices. On the other hand, if European HIPERLAN systems proliferate and operate at more power than U-NII devices, second generation MSS systems may be required to more robust and immune to interference from such devices.

SEPARATE STATEMENT
OF
COMMISSIONER SUSAN NESS

Re: Operation of Unlicensed NII Devices in the 5 GHz Frequency Range

Today the Commission opens another door to the wireless future by authorizing a new category of unlicensed, short-range, broadband digital devices.

As a result, wireless local area network (LAN) and other equipment can now be developed to connect our computers, laptops, and personal digital assistants (PDAs) to each other, to the Internet of today, and to the global information infrastructure of tomorrow. In many buildings, including schools, a wireless connection will be a cost-effective alternative to pulling wire through walls and ceilings.

We are providing a total of 300 megahertz of spectrum for these devices. This generous amount will permit substantial experimentation with technologies and features, and will support widespread use of these devices in the future.

While this spectrum is shared with existing services, our technical rules will permit these devices to operate without causing harmful interference. This is an example of how unlicensed devices and spectrum sharing can increase the efficient use of our spectrum.

This equipment has not yet been developed and tested, but our spectrum allocation today moves it forward. The bands selected are consistent with the European High Performance Local Area Network (HIPERLAN) potentially enabling such devices to be exported.

While it is too early to know which technologies and devices might succeed in the marketplace, the potential is created for U.S. leadership in a whole new world of high-tech digital wireless products.