

**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of

Revision of Parts 2 and 15 of the
Commission's Rules to Permit Unlicensed
National Information Infrastructure (U-NII)
Devices in the 5 GHz band

ET Docket No. 03-122
RM - 10371

REPLY COMMENTS OF THE WI-FI ALLIANCE

The Wi-Fi Alliance (“the Alliance”),¹ a broad-based international trade association comprised of more than 200 companies that design, manufacture, and market Wireless Local Area Network (“WLAN”) equipment, respectfully submits these reply comments on the Notice of Proposed Rulemaking (“NPRM”) in the above-referenced proceeding.² The Alliance is proud to announce that the Commission’s proposed U-NII spectrum allocation received virtually unanimous support in the opening round of comments.³ The Commission itself has deployed an

¹ The Wi-Fi Alliance, formerly known as the Wireless Ethernet Compatibility Alliance, is an international trade association formed in 1999 with the goal of promoting the adoption and commercialization of IEEE 802.11-compatible products. These products may be used to support Wireless Local Area Networks in the 5 GHz frequency band.

Membership in the Alliance is open to all companies that support the IEEE 802.11x standards. Current members include nearly every major radio manufacturer that produces wireless network equipment for the U.S. market. Alliance membership, with over 200 companies, continues to grow. A complete membership listing may be found on our website, www.wi-fi.org.

² FCC 03-110, rel. June 4, 2003 (“NPRM”).

³ *See, e.g.*, Comments of the American Petroleum Institute at 3; Comments of the Cellular Telecommunications & Internet Assoc. (“CTIA”); Comments of Cisco Systems, Inc.; Comments of The License-Exempt Alliance at 2; Comments of Microsoft Corp; Comments of Motorola Corp.; Comments of Nokia Inc.; Comments of Proxim Corp.; Comments of the Telecommunications Industry Assoc.; Towerstream Corp.

unlicensed wireless infrastructure within its Washington, DC, offices, which will allow the agency to take advantage of the proposed spectrum allocation once a Report and Order (“R&O”) is issued. Indeed, as Microsoft notes:

[A]ctions speak louder than words: last month the Commission unveiled a Wi-Fi network to provide free wireless Internet access to visitors at its headquarters office.”⁴

Many comments acknowledge the collaborative efforts of the FCC, NTIA, the Department of Defense (“DoD”), NASA, and the WLAN industry in developing the recently approved U.S. Proposals for the World Radiocommunication Conference 2003.⁵ Many comments also recognize that the internationally harmonized operations proposed in the NPRM would strongly benefit the long-term growth of WLAN equipment, resulting in substantial benefits to American industry and the general public.⁶ Thus, the FCC should expeditiously adopt the proposed rules with minimal clarification.

I. The Opening Comments Overwhelmingly Recognize The Public Interest Benefits That The Proposed Allocation Offers.

The Commission’s proposed spectrum allocation will position our nation’s wireless information infrastructure for future growth and provide long-lasting public benefits. Many commenting parties hail the benefits of low-cost unlicensed wireless services, from allowing the

Notably, even ARRL recognizes that the interference mitigation mechanisms proposed by the Commission to protect radar systems, specifically DFS and TPC, will offer protection to Amateur Services. *See* Comments of ARRL, The National Association for Amateur Radio at 2-4.

⁴ *See* Comments of Microsoft Corp. at 4.

⁵ *See, e.g.,* Comments of CTIA at 4; Comments of IceFrye Semiconductor. As the Alliance and others have noted, the WRC-03 Resolution (“Resolution COM 5/16”) and the corresponding changes to the Table of Frequency Allocations were adopted unanimously.

⁶ *See, e.g.,* Comments of Agere Systems at 2; Comments of the Information Technology Industry Council at 2; Comments of The License-Exempt Alliance at 2.

deployment of broadband communications to underserved locations to offering Internet access in public locations, such as libraries, restaurants, airports, and educational institutions.⁷ They explain that the additional unlicensed spectrum would allow for enhanced throughput and greater mobility in both business and residential locations. Comments also note the considerable productivity increase for companies that have invested in unlicensed wireless technologies as well as the substantial improvement in the accuracy of work performed by employees of these companies.⁸

This global harmonization of spectrum offers U.S. wireless equipment manufacturers a broader market and the advantages of economies of scale. Thus, the opening of greater global markets to U.S. manufacturers will benefit the multitude of American industries that increasingly rely on unlicensed wireless services, and, once the Commission authorizes the proposed operations, U.S. business and industrial users will be able to use the same wireless device when traveling overseas. Accordingly, the Commission should swiftly authorize the proposed 5 GHz operations, including the minor clarifications that the Alliance offers.

II. Many Comments Support The Proposed Regulations Along With The Minor Clarifications Offered By The Wi-Fi Alliance.

As noted above, the Commission's proposed modification to the Part 15 rules to expand U-NII device operation to include the 5.470-5.725 GHz spectrum received tremendous support in the opening round of comments.⁹ The comments recognize that the interference avoidance

⁷ See, e.g., Comments of Airespace Inc.; Comments of Microsoft Corp. at 4-6.

⁸ See Comments of the Information Technology Industry Council at 3.

⁹ See n.3, *supra*.

mechanisms being proposed for U-NII operations at 5.47-5.725 GHz will afford incumbent users ample protection from harmful interference.¹⁰

In addition, many comments support the Alliance's view that the Commission's proposal to implement a "bandwidth correction factor"¹¹ for U-NII devices with a receive bandwidth less than 1 MHz should be abandoned.¹² These parties recognize that the concept of allowing narrowband Part 15 signals in these 5 GHz bands is at odds with the concept underlying the U-NII bands, which were established to support "wideband" operations. Accordingly, Part 15 operations within the current and proposed U-NII bands should be restricted to "wideband" U-NII devices consistent with the goals of the U-NII regulations and the clear intentions of the actions of WRC-03 in making the globally harmonized allocation.

A. The Mass of Comments Agree That Dynamic Frequency Selection With Radar Detection Will Ensure Successful Spectrum Sharing.

The overwhelming majority of comments recognize that the Commission's implementation of Dynamic Frequency Selection ("DFS") with Radar Detection in the proposed expanded U-NII mid-band will provide adequate protection to incumbent radar systems.¹³

¹⁰ See NPRM at ¶ 10.

¹¹ See NPRM at ¶ 21.

¹² See, e.g., Comments of Airespace; Comments of IEEE 802 at 30-34; Comments of Proxim Corp. at 4. Section 15.403(i) of the current Unlicensed National Information Infrastructure Device rules defines U-NII devices as "intentional radiators" that utilize "wideband digital modulation techniques and provide a wide array of high data rate mobile and fixed communications." 47 C.F.R. § 15.403(i) (2003).

¹³ See, e.g., Comments of IEEE 802 at 5-9; Comments of Proxim Corp. at 4;

Moreover, the minor modifications to the FCC's proposals offered by the Alliance are supported by many commenting parties.¹⁴

0 dBi Reference. Several commenting parties, in addition to the Alliance, asked the Commission to revise the proposed regulation for DFS/Radar Detection Implementation to more clearly state the practical effect of the statement: "referenced to a 0 dBi antenna."¹⁵ In particular, during conformance testing, when a device's antenna is removed and the simulated radar signal is injected into the antenna port via conducted means, the detection threshold must be increased by an amount in dB equal to the antenna gain in dB.¹⁶

Specific Radar Detection Parameters. The Alliance fully expects that the informal NTIA working group, which is working to confirm the ability of DFS to detect radar operations, will provide the Commission with supplementary information on testing of specific DFS parameters. The parameters in proposed rule Section 15.407(h)(2) sufficiently and completely describe the radar detection requirements (with the exception of the 0 dBi reference discussed above).¹⁷ The FCC should avoid regulation of certain parameters, such as the number of pulses

¹⁴ See, e.g., Comments of IceFrye Semiconductor, Inc. ("DFS definition should ... note that it only requires uniform spreading of the loading over all available channels."); Comments of Advanced Micro Devices (same). See also Comments of the Wi-Fi Alliance at 6-7.

¹⁵ See, e.g., Comments of Motorola Corp. at 8.

¹⁶ As the Alliance explained in its opening comments, if multiple antennae are to be certified for a product, the *lowest* antenna gain value should be used for radar detection testing via conducted means. See Comments of the Wi-Fi Alliance at 7 n.17.

¹⁷ While the Alliance is supportive of the proposed regulation, it asks the FCC delete the language that recites "typical" time increments in proposed rule 15.407(h)(2)(c) for "Channel Move Time." See Comments of Atheros Communications, Inc. at 8. As Atheros recognizes, non-obligatory language in FCC regulations can be confusing. Here, U-NII equipment operating in the expanded mid-band will be tested for compliance with time *requirements*, not *typical* time increments. For this reason, the following language in the proposed "Channel Move Time" regulation that recites "typical" time increments should be deleted: (i) "typically less than 200 ms and"; (ii) "The aggregate time of the intermittent management and control signals are typically less than 20 ms."

and observation time for reliable radar detection, as many of these parameters are highly dependant upon the radar under test and will be incorporated into the procedures under development.

DFS Implementation By Central Controller. The vast majority of opening comments also support the FCC’s proposal to require that only the central controller device implement the Radar Detection Function of DFS in configurations where there are multiple U-NII devices managed by a central controller.¹⁸ As these many comments explain, the Commission’s approach will help maintain low WLAN equipment costs as such systems typically operate with a single central controller (or access point) that coordinates spectrum use by a plethora of client devices.

B. The Mass of Comments Also Agree That Transmit Power Control Will Further Enable Successful Spectrum Sharing.

Comments overwhelmingly agree that the Commission should adopt Transmit Power Control (“TPC”) as an interference mitigation mechanism for U-NII equipment operating at 5.47-5.725 GHz.¹⁹ However, as many explain, because TPC is intended solely to ensure that the aggregate signal power is 3 dB less than the maximum permitted power, TPC should not be

¹⁸ See NPRM at ¶ 22. See also Comments of Airespace, Inc.; Comments of Intel Corp. at 2; Comments of Proxim Corp. at 3.

¹⁹ As previously recognized, the requirements to implement TPC as well as DFS with radar detection in the expanded U-NII mid-band were part of a carefully crafted compromise between the FCC, NTIA, DoD, and industry to protect critical government radar systems. Notably, the NPRM addresses only those requirements that would apply to this expanded mid-band. Thus, ARRL’s request that the Commission require TPC in the upper U-NII band at 5.725-5.825 GHz is beyond the scope of this proceeding. See Comments of ARRL at 10. ARRL’s additional request that U-NII equipment implement DFS and be able to avoid *any signal* above the specified threshold (*see id.* at 9-10) is not only beyond the scope of this NPRM, but also unnecessary in light of the Commission’s observations in the NPRM. See NPRM at ¶ 19.

required for devices that already transmit with a power level that is 3 dB less than the maximum permitted power.²⁰

Commenting parties also overwhelmingly agree that the Commission should not require a specific triggering mechanism for TPC because such an unnecessary regulation could inhibit innovation in equipment design.²¹ As these commenting parties recognize, equipment designers already strive to use the least amount of transmit power to ensure reliable transmissions, as low transmit-power translates into increased system capacity by limiting interference to other devices.²² Indeed, because many WLAN client devices are battery powered, equipment designers are impelled to incorporate energy efficient designs, which require them to use less transmit power to maximize battery life.²³

C. Test Procedures and Equipment Authorization

Many comments explain that the Commission should take advantage of the substantial work completed in Europe under the auspices of ETSI regarding the development of

²⁰ *See, e.g.*, Comments of Atheros Communications, Inc. at 4-5; Comments of Nokia Inc. at 3. As many comments point out, this is fully consistent with the new ITU Radio Regulations and the WRC-03 Resolution COM 5/16, which states that TPC shall be employed “to provide, on average, a mitigation factor of at least 3 dB on the maximum average output power of the systems, or if [TPC] is not in use, then the maximum mean e.i.r.p. shall be reduced by 3 dB.” *See* WRC-03 Resolution COM 5/16, Resolves 7.

²¹ *See* Comments of Motorola Corp. at 8-9; Comments of Nokia Inc. at 3;.

²² *See* Comments of Intel Corp at 3 (fixed triggering mechanism for TPC could impact the ability of today’s equipment to adapt the data rate to specific channel conditions); Comments of Motorola Corp. at 8. *See also* NPRM at ¶ 24 (“Because TPC equipped devices adjust their transmit power to the minimum necessary to achieve the desired performance, the average interference power from a large number of devices is reduced, the power consumption is minimized and network capacity is increased.”).

²³ Moreover, because TPC and DFS are required in Europe, manufacturers are likely to implement the DFS/TPC extensions due to the economic advantage of having one product implementation that is acceptable globally.

conformance testing to DFS and TPC requirements.²⁴ This will help streamline the development of conformance testing in the U.S. As Atheros Communications, Cisco Systems, and Proxim observe, Commission implementation of internationally acceptable conformance test procedures will limit the impact of such testing on equipment costs and time to market.²⁵

A number of comments ask the FCC implement procedures that can be readily practiced with commercially available off-the-shelf test equipment to allow equipment manufacturers to perform in-house design verification and quality checks, and enable effective and efficient test lab certification procedures.²⁶ As the Alliance has noted, the well-planned and early introduction of the new test procedures into the existing Part 15 equipment authorization regime for TCBS and recognized test labs will prevent costly backlogs that unnecessarily hinder the time to market.²⁷

D. Transition Period

Many commenting parties agree with the Alliance's proposal to tie the start dates of the transition periods to the availability of accepted test procedures for Radar Detection and DFS conformance testing rather than to the publication of the Report and Order ("R&O") in the Federal Register as proposed in the NPRM.²⁸ These parties recognize that the FCC's proposal could lead to an unwanted situation where new rules are made effective, but there is no mechanism in place by which to receive FCC equipment authorizations for new equipment.

²⁴ See Comments of Motorola Corp. at 9; Comments of Nokia Inc. at 4. See also ETSI EN 301 893 V1.2.2 (2003-06).

²⁵ See Comments of Atheros Communications, Inc. at 5-7; Comments of Cisco Systems, Inc. at 8; Comments of Proxim Corp. at 6-7.

²⁶ See, e.g., Comments of Atheros Communications, Inc. at 5-7.

²⁷ See Comments of the Wi-Fi Alliance at 12-13.

²⁸ See, e.g., Comments of Agere Systems at 7; Comments of Airespace Inc; Comments of IEEE 802.

The sooner the FCC promulgates these proposed rules and a conformance test procedure is approved, the less non-DFS legacy equipment will be deployed at 5.25-5.35 GHz, thereby limiting the potential for incompatibilities and enabling the timely deployment of systems that can mitigate interference to other spectrum users.

CONCLUSION

In light of the tremendous support for the expanded U-NII allocation, the Alliance respectfully requests that the Commission quickly authorize U-NII operations at 5.47-5.725 GHz incorporating the minor clarifications that the Alliance has offered. Indeed, the sooner U.S. equipment makers are able to offer the efficiencies of next generation unlicensed wireless equipment, the sooner the American economy will be able to reap the substantial added benefits. Prompt action to implement this internationally compatible allocation is an appropriate and needed conclusion to the United States' leadership at WRC-03.

Respectfully submitted,

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