

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

In the Matter of	)	
	)	
Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies	)	ET Docket No. 13-84
	)	
Proposed Changes in the Commission’s Rules Regarding Human Exposure to Radiofrequency Electromagnetic Fields	)	ET Docket No. 03-137
	)	

**COMMENTS OF WI-FI ALLIANCE**

Wi-Fi Alliance hereby submits its comments in the above-referenced proceedings regarding the Commission’s implementation of the National Environmental Policy Act (“NEPA”) through rules governing exposure to radiofrequency (“RF”) emissions from radio transmitters.<sup>1/</sup> The Commission has not modified its rules applicable to RF exposure since 1996 and since that time there has been a proliferation of RF devices, including Wi-Fi transmitters.<sup>2/</sup> In the interim, domestic and international technical and standard-setting bodies have continued to evaluate RF exposure and the growth of RF devices has triggered consumer questions regarding their use. Accordingly, Wi-Fi Alliance agrees that the RF exposure rules should be re-assessed in order to take advantage of the greater body of knowledge available, conform the FCC’s rules to widely accepted standards, and make information more accessible to the public.

**I. BACKGROUND**

Wi-Fi Alliance is a global, non-profit industry association of more than 500 leading companies devoted to seamless interoperability. With technology development, market building,

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<sup>1/</sup> See *Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies; Proposed Changes in the Commission’s Rules Regarding Human Exposure to Radiofrequency*, First Report and Order, Further Notice of Proposed Rulemaking and Notice of Inquiry, 28 FCC Rcd 8618 (2013) (“*NOI*”).

<sup>2/</sup> See *NOI* ¶ 205 (“The most recent proceeding inviting comment on exposure limits was initiated in 1993 and culminated in a Report and Order in 1996, which resulted in our present limits.”).

and regulatory programs, Wi-Fi Alliance has enabled widespread adoption of Wi-Fi worldwide, certifying more than 3,600 new products last year alone. The mission of Wi-Fi Alliance is to provide a highly effective collaboration forum for Wi-Fi matters, grow the Wi-Fi industry, lead industry growth with new technology specifications and programs, support industry-agreed standards, and deliver greater product connectivity through testing and certification. Accordingly, this proceeding is critical to Wi-Fi Alliance and its members. Wi-Fi Alliance is pleased to have the opportunity to submit the following comments in this proceeding.

## **II. COMMENTS**

### **A. The Commission Should Modify its Proposal for SAR-Based Exemption From RF Evaluation for Single RF Sources.**

In this proceeding, the Commission takes three actions. First, it adopts new rules governing RF exposure – primarily implementing existing regulations. Second, it proposes additional rules that implement the current RF exposure levels. Finally, it inquires about whether the current exposure levels should be changed and whether other substantive modifications to its regulations are necessary. While Wi-Fi Alliance generally focuses its comments on the Notice of Inquiry, it urges the Commission to modify one of the proposed new rules.

In particular, the Commission proposes a frequency-dependent Specific Absorption Rate (“SAR”)-based formula to determine whether a single transmitter operating with up to a calculated maximum time-averaged effective radiated power or available time-averaged power, given a separation distance, is exempt from routine environmental evaluation.<sup>3/</sup> Wi-Fi Alliance supports the Commission’s proposal to adopt a formula that will permit affected entities to determine if they are exempt from routine environmental evaluation. As the Commission notes,

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<sup>3/</sup> See *NOI* ¶ 148. The Commission’s proposal is in addition to the proposed exclusion based on Maximum Permissible Exposure (“MPE”) limits. See *id.* ¶ 127. Wi-Fi Alliance also supports the proposed MPE-based exemption. Like the SAR-based proposal, the MPE levels will allow manufacturers flexibility while maintaining the needed requirements to ensure safety.

these thresholds are important to address exemptions from SAR testing of, among others, wireless local area network (“LAN”) transmitters, which includes Wi-Fi devices. However, the exemption limits that the Commission proposes are too low.<sup>4/</sup> Instead, the Commission should use the low-power exclusion contained in International Electrotechnical Commission (“IEC”) 62479 (“IEC 62479”).<sup>5/</sup> Annex B of IEC 62479 explains in detail the derivation of that low-power exclusion and the algorithm found in Annex B is generally applicable to most wireless phones and LAN devices. The IEC standard is already adopted internationally. In contrast, the proposed 1 mW exclusion and the scale proposed by the Commission are overly conservative and are inconsistent with current devices. Adoption of the IEC standard will reduce unnecessary and costly compliance testing.

Wi-Fi Alliance recognizes that the proposed low-power exclusion is based on the SAR levels currently contained in the Commission’s rules<sup>6/</sup> and that in the Notice of Inquiry the Commission asks whether these limits are appropriate. While Wi-Fi Alliance appreciates that the Commission may not wish to presuppose a change to its SAR limits generally, it should not wait until the resolution of the issues presented in the Notice of Inquiry to adopt a low-power exclusion that more closely adheres to international standards. As noted below, Wi-Fi Alliance recommends that the Commission’s rules follow, to the extent possible, established international guidelines. Doing so in this case would be a reasonable first step. The Commission need not

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<sup>4/</sup> Wi-Fi Alliance endorses the earlier-submitted Cisco comments that the Commission references, which determined that, for a large percentage of Wi-Fi mobile cards as well some home access points, the actual MPE compliance distance was actually less than 20 cm, meaning that an adjustment to the standard was required. *See NOI* ¶ 146 (citing Comments of Cisco Systems, Inc., ET Docket No. 03-137, at 9-10 (filed Dec. 8, 2003) (stating that “the Commission’s proposal to apply a single, frequency independent power level threshold for determining exclusion from mandatory RF evaluation is overly restrictive”)).

<sup>5/</sup> INTERNATIONAL ELECTROTECHNICAL COMMISSION, ASSESSMENT OF THE COMPLIANCE OF LOW-POWER ELECTRONIC AND ELECTRICAL EQUIPMENT WITH THE BASIC RESTRICTIONS RELATED TO HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS (10 MHZ TO 300 GHZ), IEC 62479 (2010).

<sup>6/</sup> *See NOI* at 3624, Appendix D.

modify all exposure limits (and it has not yet proposed to do so) but it should use the IEC 62479 criteria in the limited instance of deriving the proposed low-power exclusion.

In any event, the Commission should include the exemptions (both based on SAR and MPE) in its Knowledge Data Base (“KDB”) and not its rules. As the Commission has observed, the KDB guidance gives the Commission the flexibility necessary to implement certain changes to its policies when such changes are warranted.<sup>7/</sup> By issuing its own guidance, the FCC “can communicate how best to incorporate the input of all relevant expert standards” and “readily use the most appropriate elements of conflicting outside standards.”<sup>8/</sup> This proceeding demonstrates the need for the Commission to retain flexibility to establish exposure standards based on current science and technology. If the Commission includes the allowable exclusion limits in the KDB, it will preserve the flexibility of responding to those changes without the need to initiate a time consuming and lengthy rulemaking proceeding.

**B. The Commission Should Adopt Internationally Based Exposure Limits and Measurement Techniques.**

In the Notice of Inquiry, the Commission notes that “much time has passed since [it] last sought comment on exposure limits.”<sup>9/</sup> It also observes that a great deal of scientific research has been completed in recent years regarding RF exposure and that the U.S. Government Accountability Office (“GAO”) has recommended that the Commission formally reassess its current RF energy exposure limit.<sup>10/</sup> Finally, the Commission notes that the International Commission on Non-Ionizing Radiation Protection (“ICNIRP”) published exposure guidelines in 1998 (validated in 2009) and is anticipated to release an update in the near future, while the

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<sup>7/</sup> See NOI ¶¶ 28, 38.

<sup>8/</sup> See NOI ¶ 38.

<sup>9/</sup> See NOI ¶ 205.

<sup>10/</sup> See NOI ¶ 206.

Institute of Electrical and Electronics Engineers (“IEEE”) published a major revision to its RF exposure standard in 2006 and a new version or reaffirmation is expected soon.<sup>11/</sup> Based on all these factors, the FCC seeks to conduct a science-based examination of its current limits.<sup>12/</sup>

Wi-Fi Alliance supports the Commission’s proposed reassessment of its exposure rules. The Commission’s existing guidelines were adopted in 1996 and are based in part on the American National Standards Institute (“ANSI”)/IEEE C95.1-1992 Standards and the National Council on Radiation Protection and Measurements (“NCRP”)’s 1986 report on biological effects of RF fields.<sup>13/</sup> As the GAO observed, the FCC’s most recent comprehensive review of its RF exposure limits was based on recommendations made more than 20 years ago, and there have been significant advancements in both science and technology in the intervening period.<sup>14/</sup> Further, as GAO pointed out, the FCC has recognized that research on RF exposure is ongoing, and the Commission pledged to monitor advancements in the science to ensure that its guidelines continue to be appropriate and scientifically valid.<sup>15/</sup> The Commission should, therefore, reassess its RF exposure limit to ensure that is using a limit that reflects the latest evidence and that does not impose additional costs on manufacturers and limitations on RF device designs.<sup>16/</sup>

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<sup>11/</sup> See NOI ¶ 213; see also International Commission on Non-Ionizing Radiation Protection, *ICNIRP Statement on the Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (Up to 300 GHz)*, 97 HEALTH PHYSICS 257 (2009) (reconfirming the 1998 ICNIRP basic restrictions in the frequency range 100 kHz-300 GHz until further notice).

<sup>12/</sup> See NOI ¶ 210.

<sup>13/</sup> See NOI ¶¶ 211-213.

<sup>14/</sup> GOVERNMENT ACCOUNTABILITY OFFICE, TELECOMMUNICATIONS: EXPOSURE AND TESTING REQUIREMENTS FOR MOBILE PHONES SHOULD BE REASSESSED, GAO 12-771, at 19 (July 2012) (“GAO Report”).

<sup>15/</sup> GAO Report at 18; see also *Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation*, Report and Order, 11 FCC Rcd 15123 ¶ 4 (1996) (noting that “research and analysis relating to RF safety and health is ongoing” and stating that the Commission intends to continue working with industry and government stakeholders “to ensure that our guidelines continue to be appropriate and scientifically valid”).

<sup>16/</sup> GAO Report at 19.

During the period since the Commission last evaluated its exposure rules, and as the Commission notes, IEEE Standard C95.1-2005 has been updated to align its localized exposure limits with the ICNIRP limits of 2W/kg over 10gm averaging mass for the general public exposure and 10W/kg over 10gm averaging mass for the occupational exposure.<sup>17/</sup> Wi-Fi Alliance appreciates that the Commission seeks to base its review of the appropriate RF exposure levels on the guidance of other federal agencies with expertise in the health field. As the Commission notes, exposure standards should be based on sound science, and given that it is not a health and safety agency, the FCC defers to other organizations and agencies with respect to interpreting the biological research necessary to determine what levels are safe.<sup>18/</sup> Nevertheless, it should also incorporate, as it did in adopting rules in 1996, the important IEEE standard.<sup>19/</sup>

IEEE has had the C95.1 standard in place since April 2006 and it is consistent with the ICNIRP guidelines. IEEE – as a leading developer of international standards in key technology areas and publisher of nearly a third of the world’s technical literature in electrical engineering, computer science and electronics<sup>20/</sup> – is one such organization that the Commission has acknowledged to be an expert in interpreting RF levels that are safe.<sup>21/</sup> Thus, just as the Commission recognized the value of incorporating the IEEE C95.1 standard in its rules in 1996, it should do so now. In so doing, the Commission would not be creating RF limits that are

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<sup>17/</sup> See *NOI* ¶ 213; see also GAO Report at 17. Also, as noted above, ICNIRP published a revision to its RF exposure standard during that period and is expected to release a new version or reaffirmation soon.

<sup>18/</sup> See *NOI* ¶ 6; see also *NOI* ¶ 219 (asking whether the Commission’s current standards should be modified in any way and soliciting information “on the scientific basis for such changes”).

<sup>19/</sup> See *NOI* ¶ 210.

<sup>20/</sup> See IEEE at a Glance, IEEE, [http://www.ieee.org/about/today/at\\_a\\_glance.html](http://www.ieee.org/about/today/at_a_glance.html).

<sup>21/</sup> See, e.g., *NOI* ¶ 48 (discussing a determination made by IEEE – “a standard-setting body that thoroughly reviewed the relevant research” – which was “based upon its technical expertise in the measurement of human exposure to RF radiation”); *SCI Towers, LLC - Application for Antenna Structure Registration*, Memorandum Opinion and Order, 28 FCC Rcd 6448 ¶ 13 (2013) (noting that the IEEE RF emissions guidelines “were developed by scientists and engineers with a great deal of experience and knowledge in the area of RF biological effects and related issues”).

“more” or “less” restrictive.<sup>22/</sup> Instead, it would merely be updating its rules to reflect the latest IEEE standard, recognize current science and technology, and harmonize the United States standards with those of 115 countries and territories throughout the world, including the European Union countries.<sup>23/</sup>

In addition to using international standards for RF exposure, the FCC should adopt measurement techniques that are developed by international standards groups and harmonized among industries. Wi-Fi Alliance recommends that the FCC adopt IEC 62209-2, “Human Exposure to RF Fields from Hand-Held and Body-Mounted Wireless Communication Devices.”<sup>24/</sup> In this standard, a single tissue-equivalent liquid is specified for testing devices in close proximity to the human body. This liquid is the same as the head-simulating tissue in IEC 62209-1. In contrast, the FCC requires body-mount devices (including laptops with Wi-Fi) to test with a body liquid as specified in Office of Engineering and Technology (“OET”) Bulletin 65 Supplement C and was derived from extrapolations from the head tissue by the FCC but not verified by others.<sup>25/</sup> Using the single IEC 62209-2 test, instead of both it and the FCC’s test, would eliminate unnecessary duplicative procedures while ensuring public health and promoting

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<sup>22/</sup> See *NOI* ¶ 207 (“In this *Inquiry*, we seek comment on whether our [present exposure limits] should be more restrictive, less restrictive, or remain the same.”).

<sup>23/</sup> See Jack Rowley, et al., *Radiofrequency Exposure Policies Relevant to Mobile Communication Devices and Antenna Sites*, BioEM 2013, Thessaloniki, Greece (June 10-14, 2013) (reporting on standards for wireless communications among 229 countries and territories and stating that 102 had adopted the ICNIRP guidelines for mobile networks and 115 had adopted the ICNIRP guidelines for mobile devices).

<sup>24/</sup> See INTERNATIONAL ELECTROTECHNICAL COMMISSION, HUMAN EXPOSURE TO RADIO FREQUENCY FIELDS FROM HAND-HELD AND BODY-MOUNTED WIRELESS COMMUNICATION DEVICES – HUMAN MODELS, INSTRUMENTATION, AND PROCEDURES – PART 2: PROCEDURE TO DETERMINE THE SPECIFIC ABSORPTION RATE (SAR) FOR WIRELESS COMMUNICATION DEVICES USED IN CLOSE PROXIMITY TO THE HUMAN BODY (FREQUENCY RANGE OF 30 MHZ TO 6 GHZ), IEC 62209-2 (2010).

<sup>25/</sup> See OFFICE OF ENGINEERING AND TECH., FEDERAL COMMUNICATIONS COMMISSION, EVALUATING COMPLIANCE WITH FCC GUIDELINES FOR HUMAN EXPOSURE TO RADIOFREQUENCY ELECTROMAGNETIC FIELDS: ADDITIONAL INFORMATION FOR EVALUATING COMPLIANCE OF MOBILE AND PORTABLE DEVICES WITH FCC LIMITS FOR HUMAN EXPOSURE TO RADIOFREQUENCY EMISSIONS, OET BULLETIN 65 SUPPLEMENT C (2001) (providing guidance and general statements on the Commission’s RF exposure limits policies for portable and mobile devices). The Commission notes that OET has been able to provide more up-to-date information for these devices in its Knowledge Database (“KDB”). See *NOI* ¶ 28.

global harmonization. Therefore, for any Wi-Fi products used near the body, the Commission should specify use of the IEC 62209-2 testing procedures.

In addition to inquiring about the appropriate RF exposure limits, the Commission also asks about the measurement techniques that should be used to evaluate compliance with those limits.<sup>26/</sup> Wi-Fi Alliance recommends that the Commission incorporate into its testing standards for 802.11 devices operational duty cycles relevant for determining worst case transmitter duty factor correction for SAR testing. Use of the existing test standards – which require 100% duty cycle – over-estimate RF exposure results.<sup>27/</sup> Currently, the FCC requires 100% duty cycle during SAR testing; for devices which are not at 100% duty cycle, a duty cycle correction factor is applied and the SAR value is scaled up to 100% duty cycle.<sup>28/</sup> However, Wi-Fi technology maximum duty cycles vary based on data rate. The lowest data rates (1Mb/s, 6Mb/s) generally have the highest duty cycles (96%, 93%), while the higher data rates (>54Mb/s) maximum duty cycles are <85%. The testing rules should be amended to reflect the differences in duty cycles based on data rate.

### **C. The Commission Should Update the Consumer Information on its Website Discussing the Health Effects of RF Exposure.**

The Commission notes that it has taken several steps to make information regarding RF exposure available to the public. Specifically, it has provided RF safety information in its OET

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<sup>26/</sup> See *NOI* ¶¶ 220-230 (seeking comment on various metrics for compliance with regard to exposure to RF energy); *NOI* ¶¶ 244-247 (discussing evaluation techniques and seeking suggestions for changes to OET Bulletins 56 (guidelines regarding the biological effects and potential hazards of RF exposure) and 65 (guidelines for human exposure to RF electromagnetic fields, including SAR limits)).

<sup>27/</sup> See Wout Joseph et al., *Determination of the Duty Cycle of WLAN for Realistic Radio Frequency Electromagnetic Field Exposure Assessment*, 111 *PROGRESS IN BIOPHYSICS AND MOLECULAR BIOLOGY* 30 (2013); see also Kenneth R. Foster, *Radiofrequency Exposure from Wireless LANs Utilizing Wi-Fi Technology*, 92 *HEALTH PHYSICS* 280 (2007) (stating that “to approach a duty cycle of 100% for 6 or 30 min . . . would be truly exceptional”).

<sup>28/</sup> See OFFICE OF ENGINEERING AND TECH., FEDERAL COMMUNICATIONS COMMISSION, GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E, KDB 789033, at 3 (2013); OFFICE OF ENGINEERING AND TECH., FEDERAL COMMUNICATIONS COMMISSION, SAR MEASUREMENT PROCEDURES FOR 802.11 A/B/G TRANSMITTERS, KDB 248227, at 7 (2007).



Bulletins and their supplements, and in the *Local Official's* and Consumer and Governmental Affairs Bureau's guides, and it also provides links to other external resources, all of which are available on the Commission's website.<sup>29/</sup> Wi-Fi Alliance appreciates the information that the Commission has made available, both which it has produced and to which it cites via external links on its website. However, as the Commission notes, consumers continue to have questions regarding RF exposure.<sup>30/</sup> In order to meet these consumer demands, the FCC should enhance its website to provide even more information. For example, Wi-Fi Alliance has information about the health effects issues of RF on its own website.<sup>31/</sup> The information was developed in an easy-to-understand style for Wi-Fi members, policy makers, the press and the general public. Every effort is made to keep the information up to date to reflect major changes in regulations or the scientific literature related to RF and/or specifically to Wi-Fi. The FCC is welcome to include a link on its website to that information and is encouraged to include links for other products as well. More generally, Wi-Fi Alliance suggests that the FCC expand its consumer information about RF exposure to reflect the variety of radio-based technologies used today. Although resources exist on government websites outside of the U.S.,<sup>32/</sup> it would be helpful to direct the general public in the United States to information provided by the FCC as well.

### III. CONCLUSION

Because its current rules governing RF exposure limits are based on decades-old research, Wi-Fi Alliance agrees with the Commission that the RF exposure rules should be re-assessed and appreciates the agency's efforts in this field. By considering its guidelines in light

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<sup>29/</sup> See NOI ¶ 231.

<sup>30/</sup> See NOI ¶ 232.

<sup>31/</sup> See Wi-Fi and Health, Wi-Fi Alliance, <http://www.wi-fi.org/knowledge-center/articles/wi-fi-and-health>.

<sup>32/</sup> See, e.g., Public Health England, Radio Wave Health Effects, <http://www.hpa.org.uk/webw/HPAweb&Page&HPAwebAutoListName/Page/1317139286441>; Health Canada, Safety of Wi-Fi Equipment, <http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/prod/wifi-eng.php>.

of the most up-to-date research and in view of international standards, the Commission can ensure that its policies remain appropriate and scientifically valid. Because consumers have a high level of interest in RF exposure, the Commission should expand the information available through its website and other outlets.

Respectfully submitted,

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