

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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

**REPLY COMMENTS OF
BATTELLE MEMORIAL INSTITUTE, INC.**

Battelle Memorial Institute, Inc. (“Battelle”) hereby submits its reply comments in response to the *Notice of Inquiry* (“NOI”), in which the Commission has solicited input “to determine whether there is a need for reassessment of the Commission radiofrequency (RF) exposure limits and policies.”¹ For the reasons discussed below, Battelle suggests that, at a minimum, the Commission issue a notice of proposed rulemaking proposing that Section 1.1310 of the Commission’s Rules be amended to establish a maximum permissible exposure (“MPE”) limit for the 102-109.5 GHz band derived from the Institute of Electrical and Electronics Engineers, Inc. (“IEEE”) standard C95.1-2005,² and that Section 1.1307(b) be amended to

¹ Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies, *First Report and Order, Further Notice of Proposed Rulemaking and Notice of Inquiry*, 28 FCC Rcd 3498, 3501 ¶ 5(2013) (“NOI”). In light of the shutdown of the Federal government, the Commission extended the deadline for the submission of reply comments in response to the NOI until November 18, 2013. See Revised Filing Deadlines Following Resumption of Normal Commission Operations, *Public Notice*, DA 13-2025 (Oct. 17, 2013).

² Institute of Electrical and Electronic Engineers (“IEEE”), *IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz*, IEEE Std C95.1-2005.

provide for exclusions from routine environmental evaluation for facilities in those bands that are benign.

Battelle is the world's largest non-profit research and development organization. With over 22,000 employees at more than 130 locations globally, Battelle explores emerging areas of science, develops and commercializes cutting-edge technology, and manages laboratories (including National Labs operated by the Department of Energy).³ Battelle is currently involved in the development of a technology solution that will for the first time permit spectrum in the 102-109.5 GHz band (which is allocated for non-government fixed and mobile use),⁴ to be used to meet the growing demand for commercially-viable, high-bandwidth, low-latency, point-to-point communications. Battelle anticipates that it soon will petition the Commission to amend its rules to facilitate use of the 102-109.5 GHz band, employing a regulatory regime modeled on that currently applied to the 71-76 GHz, 81-86 GHz, 92-94 GHz and 94.1-95 GHz bands (collectively, the "70/80/90 GHz Band").

The Commission recognizes in the *NOI* that the current exposure limits, which it adopted in 1996, included only frequencies from 100 kHz to 100 GHz, while the more recent 2005 IEEE C95.1-2005 standard and the similar guidelines of the International Commission on Non-Ionizing Radiation Protection encompass the frequency range from 0 to 300 GHz.⁵ The *NOI* asks, therefore, "whether, in addition to the limits already established for RF fields between 100 kHz and 100 GHz, we should also explore actions to control exposure outside of this frequency range (*e.g.*, in the range between 0 and 100 kHz and/or 100 and 300 GHz) due to sources

³ See Battelle Memorial Institute, About Us, <http://www.battelle.org/about-us> (last visited Nov. 15, 2013). Battelle is a charitable trust organized as a non-profit corporation under the laws of the State of Ohio. Because it is organized for charitable, scientific and educational purposes Battelle has been granted 501(c)(3) status by the Internal Revenue Service.

⁴ See 47 C.F.R. § 2.106.

⁵ *NOI*, 28 FCC Rcd at 3580 ¶ 229.

authorized by the Commission.”⁶ The answer, simply put, is “yes” – as technology evolves to make use of spectrum above 100 GHz viable, the Commission’s rules must keep pace.

The 100 GHz upper limit is an historical anachronism. Although the Commission examined 0 Hz to 300 GHz during its initial 1979 consideration of RF exposure guidelines,⁷ it relied on the 1982 American National Standards Institute standard, which covered only 300 kHz through 100 GHz.⁸ A decade later, when the Commission next took up the issue, it based its regulations in part on a National Council on Radiation Protection and Measurements (“NCRP”) standard with the same frequency range.⁹ While recognizing that there were other standards available that covered a wider range of frequencies, the Commission explained that its use of this narrower frequency range was not a significant issue because:

[T]he FCC-regulated transmitters of concern operate at frequencies between 300 kHz and 100 GHz. Therefore, we see no need at this time to adopt guidelines for frequencies outside of the range of the NCRP recommendations.¹⁰

While that reasoning made sense at the time, seventeen years later technology has improved to the point where frequencies above 100 GHz will soon be used by Commission-regulated transmitters. Thus, the Commission should follow the *NOI* with a notice of proposed rulemaking to amend Section 1.1310 of the Commission’s Rules to establish a MPE limit for the

⁶ *Id.*

⁷ *Id.*; Biological Effects of Radio Frequency Radiation when Authorizing the Use of Radio Frequency Devices, *Notice of Inquiry*, 72 F.C.C. 2d 482, 484 ¶ 5 (1979).

⁸ Biological Effects of Radio Frequency Radiation when Authorizing the Use of Radio Frequency Devices, *Report and Order*, 100 F.C.C. 2d 543, 548 n.10 (1985) (*citing* American National Standards Institute (“ANSI”), *American National Standard Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 300 kHz to 100 GHz*, ANSI C95.1-1982).

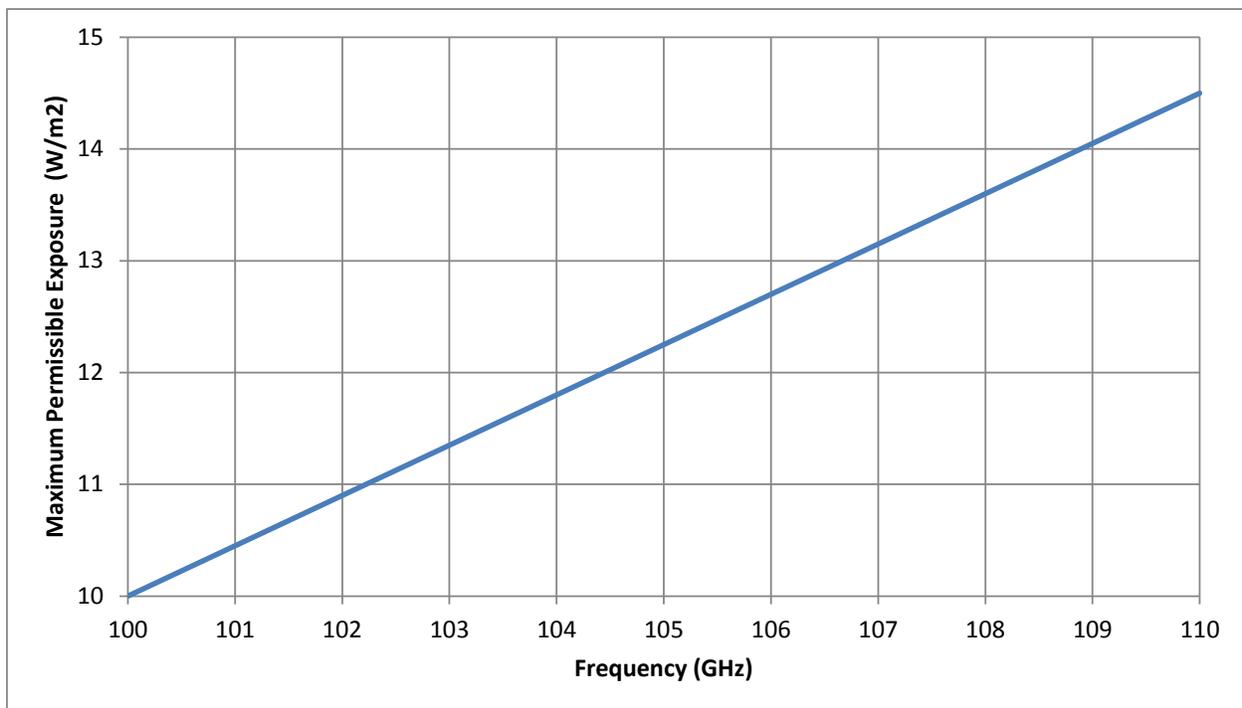
⁹ Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, *Report and Order*, 11 FCC Rcd 15123, 15124 n.1, 15129 ¶ 14 (1996), *citing* National Council on Radiation Protection and Measurements (“NCRP”), *Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields*, NCRP Report No. 86 (1986).

¹⁰ *Id.* at 15135 ¶ 29.

102-109.5 GHz band based on the IEEE C95.1-2005 standard, and to amend Section 1.1307(b) to provide the same exclusions from routine environmental evaluation for facilities in the 102-109.5 GHz bands that are afforded licenses in the 70/80/90 GHz Band.

Under Battelle’s proposed approach, at least for the 102-109.5 GHz band the MPE limit would be defined as equal to $(90f_G - 7000)/200 \text{ W/m}^2$, where f_G is the frequency in gigahertz. Figure 1 below depicts the MPE as a function of frequency over the 100-110 GHz range:

Figure 1. IEEE Std C95.1-2005 Maximum Permissible Exposure from 100-110 GHz



In initial comments submitted in response to the *NOI*, no commenters have opposed raising the upper end of the frequency range for the guidelines beyond 100 GHz. Moreover, a substantial number of comments support adoption of the IEEE C95.1-2005 standard, which extends to 300 GHz, as precisely the science-based approach that the *NOI* calls for,¹¹ Among

¹¹ See, e.g., Comments of the Telecommunications Industry Association, ET Docket No. 13-84, at 3 *et seq.* (filed Sept. 3, 2013); Comments of the Consumer Electronics Association, ET Docket No. 13-84, at 5 *et seq.* (filed Sept. 3, 2013); Comments of Mobile Manufacturers Forum, ET Docket No. 13-84, at 5 *et seq.* (filed Sept. 3, 2013) [“MMF Comments”]; Comments of the International Committee on Electromagnetic Safety (ICES) of

other things, they have noted that the IEEE C.95.1-2005 standard is “based on a significantly improved understanding of the RF and thermal dosimetry, and biological and health effects” since the current standards were adopted and “provide a very conservative framework for the protection of persons exposed to RF fields.”¹²

Battelle recognizes, as noted in the *NOI*, that the general compliance obligations under Sections 1.1307(c) and (d) of the Commission’s Rules currently apply above 100 GHz.¹³ However, those rules are subjective and lack specific benchmarks, which create significant uncertainty for manufacturers that can best be cured by adoption of specific MPE limits and defined exclusions. The establishment of MPE limits based on internationally recognized standards will provide regulatory certainty and transparency for those interested in the 102-109.5 GHz band. Adoption of Battelle’s proposal will provide an incentive to those that are seeking to explore and invest in new technologies that push the useable range for spectrum above 100 GHz. A modest expansion of the upper frequency bound of the RF exposure standards, from 100 to 109.5 GHz, will make a significant contribution to the level of regulatory certainty concerning its work in progress. It will also provide the kind of certainty that will allow the adoption of similar standards by other governments. And, as the Government Accountability Office (“GAO”) has recognized, the failure to harmonize U.S. approach emission standards with those applied internationally can “result in additional costs” and adversely impact device design “in a way that

the Institute of Electrical and Electronics Engineers, Inc.(IEEE), ET Docket No. 13-84, at 7 (filed Sept. 3, 2013). *See also* Comments of CTIA – The Wireless Association, ET Docket No. 13-84, at 29-34 (filed Sept. 3, 2013).

¹² MMF Comments at 4.

¹³ *See NOI*, 28 FCC Rcd at 3580 ¶ 229.

could limit performance and functionality.”¹⁴ The GAO has recognized that because many manufacturers’ devices are sold in multiple countries, a lack of harmonization forces manufacturers to develop and test devices based on different exposure limits, requiring the expenditure of additional resources and slowing the time to market.¹⁵

For the foregoing reasons, Battelle respectfully requests that the Commission issue a notice of proposed rulemaking to amend Section 1.1310 of the Commission’s Rules to establish a MPE limit for the 102-109.5 GHz band derived from the IEEE C95.1-2005 standard, and to revise Section 1.1307(b) to provide the same exclusions from routine environmental evaluation for 102-109.5 GHz facilities as are afforded licensees in the 70/80/90 GHz Band.

Respectfully submitted

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¹⁴ United States Government Accountability Office, Report to Congressional Requesters, *TELECOMMUNICATIONS: Exposure and Testing for Mobile Phones Should Be Reassessed*, GAO-12-771, at 19 (July 2012).

¹⁵ *See id.*